Diabetic foot complications and their management at primary healthcare clinics in Johannesburg

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Background: Primary healthcare (PHC) in South Africa is predominantly nurse-driven, focusing on illness prevention and treatment of acute and chronic disorders. However, data on diabetic foot complications at PHC clinics is limited, and the role of podiatrists in prevention is underutilised. Diabetic foot complications, particularly ulcers, are a significant cause of amputations, with early identification and treatment crucial for prevention.

Methods: This cross-sectional retrospective study involved 536 diabetic patients with foot complications from three Johannesburg PHC centres. Descriptive statistics were used to analyse patient data.

Results: The study reveals a high prevalence of diabetic foot complications in PHC clinics, emphasising the need for community foot health promotion and podiatrist involvement. Early intervention is crucial, especially in patients with longer diabetes duration. Inadequate management and screening of foot-related complaints by nurses are observed. Lack of guidelines and well-defined referral pathways contribute to inadequate diabetic foot management.

Conclusion: The study reveals significant challenges in managing diabetic foot complications in South Africa's PHC system, emphasising the need for reform, early intervention, and the inclusion of podiatrists to provide holistic care and prevent amputations. The study concludes that podiatrists should be an integral part of PHC teams to improve diabetic foot care.

Keywords: diabetic foot, primary healthcare, South Africa, diabetic foot complication, diabetic foot risk management, diabetic foot risk factors

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Introduction

Primary healthcare (PHC) in South Africa is largely nurse-driven, focusing on illness prevention, disease prevention, and treatment of acute and chronic disorders.[1] The health department manages various health services, including primary, secondary, and tertiary healthcare centres.[2] PHC is ideal for early identification of diabetic foot complications, but data on diabetic foot complications at PHC clinics is scarce.[3]

Podiatrists diagnose, treat, and manage lower limb and foot diseases, and their role in preventing complications like ulceration and amputation is underutilised.[4] Despite the need for podiatrists in PHC, they are not included in relevant strategies to drive inclusion, as seen in their exclusion from the draft document of Human Resources for Health 2030.[5]

Diabetic foot complications and their current management

Diabetes causes half of all amputations, mostly due to infected diabetic foot ulcers.[6] Early treatment and identification of risk factors can improve prevention and treatment outcomes.[7] Clinicians can reduce lower-extremity amputation risk through comprehensive history and foot examination.

Offloading is a technique used to reduce pressure at the ulcer site to speed up healing and reduce complications. It is crucial in foot ulcer treatment as it helps prevent damage to soft tissue voids, often leading to unnoticed damage in diabetic sensory neuropathy patients.

Additionally, diabetes often gives rise to diabetic foot infections (DFIs), a prevalent and expensive complication. Infections affecting the soft tissues and bones in DFIs commonly result in the development of sepsis and/or the necessity for amputation. However, 25% of patients do not recover. Early supplementary treatment can improve results, and routine treatment is often limited to four weeks.[8]

The ever-increasing number of diabetic-related amputations in South Africa may indicate a lack of access to early care for diabetic patients with foot complications. Despite this, the current framework is silent on foot health, prevention, and management of foot pathologies across all levels of care, particularly at the PHC level.

Methodology

In this cross-sectional retrospective design study, the researcher used quantitative methods. This approach allows a complete overview of the research problem. This study was cross-sectional, as the researcher was not choosing participants based on a selected outcome but rather a selected locality. The study was quantitative as the data was expressed using statistics and numbers. By using quantitative methods, the researcher was able to attain the aim of the study, which was to investigate, identify, and describe the incidence of diabetic foot complications and their management at PHC centres in Johannesburg.

This study was retrospective as the outcome of interest had already occurred and used data from medical records. This study was conducted

at three PHC centres in Johannesburg Region F. The researcher used the non-probability sampling method to choose the three clinics as the PHC centres for the study. Only diabetic patients were part of the sample. This method allowed the researcher to choose participants that fit a particular inclusion and exclusion criteria aligned with the study's aims.

Study population

The study involved diabetic patients with foot complications from three Johannesburg PHC centres. The study used 536 files and a self-constructed data collection tool. The tool was piloted at another clinic and discussed with the statistician for improvements to increase validity and reliability.

Data analysis

Descriptive statistical methods were used for this study.[9] The collected data was assessed by a statistician. Count, average, and quartile functions were used to analyse the data statistically.

Results

This study aimed to investigate the various aspects of diabetes management and foot health across three clinics at PHC. The analysis focused on age distribution, gender representation, duration of diabetes, diabetic foot risk factors, reported foot pathologies, and the utilisation of referral pathways for management. It is noteworthy that the cases of diabetic foot complications predominantly presented among male patients (59%) compared to female patients (41%). Given this discrepancy, more research should be undertaken to shed light on the possible contributing factors and devise appropriate strategies to address the unique challenges faced by males and females during treatment for diabetic foot ulcers.

The study encompassed a wide age range with participants from young adults to the elderly, indicating a diverse patient population (Figure 1). Most patients across all three clinics had diabetes for less than 20 years, with the highest percentage falling within the 0–9-year range (Table I). There were a limited number of cases with diabetes durations exceeding 40 years, highlighting the need for long-term management strategies.

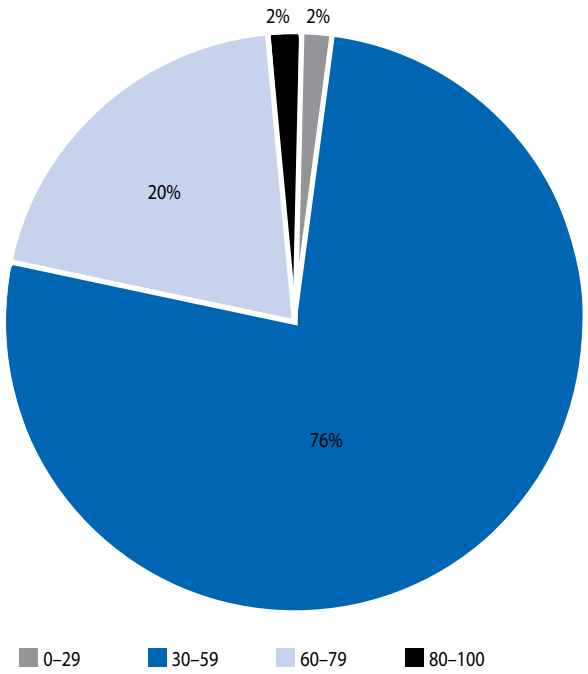

Figure 1: Overall age spread

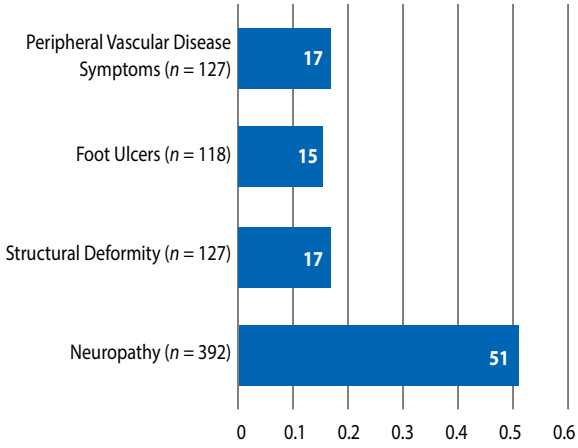

Figure 2: Recorded diabetic risk factors across all three clinics

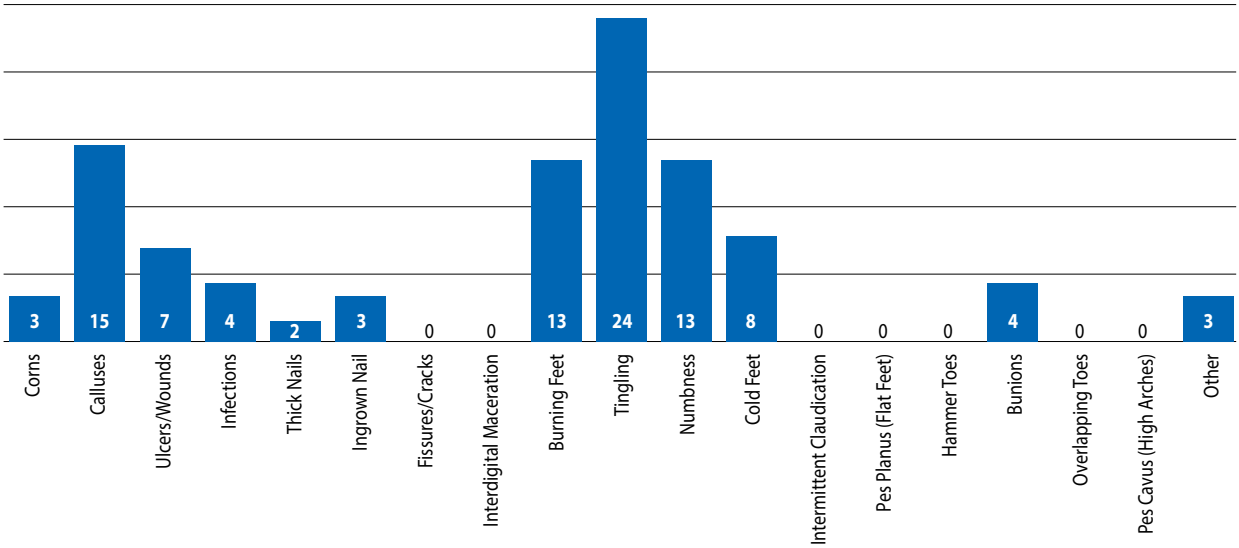

Figure 3: Reported foot pathologies across all three clinics

Table I: Duration of diabetes in patients at the three different clinics

Clinic		Clinic A		Clinic B		Clinic C	
		n	%	*n*	%	*n*	%
Duration of diabetes (years)	0–9	98	59	97	59	71	43
	10–20	57	35	50	31	82	49
	21–40	10	6	15	9	14	8
	41–80	0	0	1	1	0	0
	Total	**165**		**163**		**167**	

The recorded diabetic risk factors were consistent across the three clinics, emphasising the importance of addressing these factors in diabetes management (Figure 2). Hyperkeratosis and peripheral neuropathy were the most prevalent foot pathologies reported, suggesting a need for specialised care in managing these conditions (Figure 3). Burning feet, ulcers/wounds, and numbness also exhibited noteworthy percentages, indicating areas of concern for patient foot health (Table II). The utilisation of referral pathways as a form of management varied across the three clinics (Figure 4). This approach demonstrates a comprehensive strategy for addressing patients' specific needs.

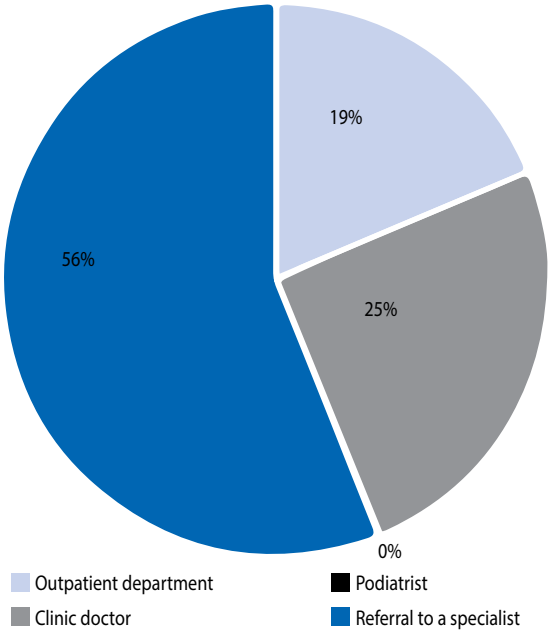

Figure 4: Referral pathway across all three clinics

Discussion

Prevalence of diabetic foot complications at the primary healthcare level

This study highlights the number of diabetic foot complications presenting at PHC centres and the percentage of those who already have diabetic foot complications that occur in PHC facilities. The distinction between males and females is critical since research has shown that diabetes is more common among males than females. The literature highlighted that most patients who present at PHC clinics in South Africa are predominantly females.[10]

Based on the provided information, it is confirmed that the 566 patients whose files were collected from PHC centres all presented with diabetic

Table II: Reported foot pathologies at the three different clinics

		Clinic A		Clinic B		Clinic C		Total	
		n	%	*n*	%	*n*	%	*n*	%
Reported foot pathology	Corns	10	2	22	6	11	2	43	3
	Calluses	67	15	36	10	136	19	239	16
	Ulcers/wounds	33	8	18	5	62	9	113	8
	Infections	12	3	14	4	47	7	73	5
	Thick nails	1	0	2	1	30	4	33	2
	Ingrown nail	24	5	10	3	11	2	45	3
	Fissures/cracks	0	0	0	0	0	0	0	0
	Interdigital maceration	0	0	0	0	0	0	0	0
	Burning feet	53	12	62	17	80	11	195	13
	Tingling	103	24	109	30	134	19	346	23
	Numbness	52	12	44	12	105	15	201	13
	Cold feet	41	9	31	8	42	6	114	8
	Intermittent claudication	0	0	0	0	0	0	0	0
	Pes planus (flat feet)	0	0	0	0	4	1	4	0
	Hammer toes	0	0	2	1	0	0	2	0
	Bunions	31	7	7	2	11	2	49	3
	Overlapping toes	0	0	2	1	0	0	2	0
	Pes cavus (high arches)	0	0	0	0	0	0	0	0
	Other	11	3	8	2	25	4	44	3
	Total	**438**		**367**		**698**		**1 503**	

foot complications. This implies that the patients seeking care at these centres indeed have diabetic foot complications. Given the previous remark, the outcomes of this study are relevant since community foot health promotion should arguably be available at all PHC centres. It could be argued that podiatrists are best suited to drive this initiative and there is a need for podiatrists at the level of PHC centres to assist with the early identification and management of diabetic foot complications and risk factors.

In addition, having podiatrists at this level of healthcare could help reduce primary and secondary amputation and prevent amputation in the remaining limb. Podiatrists at the PHC level could drive diabetic foot screening, early identification of risk, as well as foot health education initiatives and provide preventative treatments. The current district health delivery system in South Africa mandates that these preventative strategies or interventions be available at the PHC level. Without these structured interventions, patients at the PHC level risk developing severe complications that may result in losing a limb.[11]

However, podiatric services are only available at a few PHC centres in South Africa, and these are all centred in Gauteng. In cases where podiatric services are available, they remain poorly structured and ignored or unknown by other healthcare professionals.[12] Without structured foot health services, one might argue that diabetic patients are not given quality care at lower levels of care in the health system. The exclusion of podiatrists from the PHC team has resulted in a lack of, or severely limited, preventative foot health interventions in most PHC settings. This statement implies that patients presenting at these facilities may be deprived of a critical component of care, early identification, and prevention of complications, which ought to occur at the PHC level. The status quo should be changed if there is any hope of making a significant impact in the care of diabetic patients in South Africa.

Management of diabetic foot complications at primary healthcare centres

Because of their heavy workloads and training gaps, nurses may struggle to perform diabetic foot evaluations and screenings and implement an adequate management plan.[12] Evidence of diabetic foot complications in patients seen at PHC centres signals the need for early targeted interventions at this level of care. Such interventions must include effective prevention measures, early detection of diabetic foot issues, and appropriate assessment and management.

However, although there is an obvious need for foot health services at the PHC level, the service delivery structure still leans heavily towards a curative, high-cost care approach with limited adherence to a defined referral system. The predominantly hospital-centric healthcare system and emerging epidemics prevent the successful provision of quality, comprehensive, and integrated primary care to millions of South Africans.

The current study found that the 536 patients who were part of this study were inadequately assessed concerning their foot complaints. The patient files reviewed in this study highlighted the poor capture of foot-related complaints or pathologies in patients seen by nurses at the PHC level. This finding highlights these patients' risk as their complaints may be overlooked, incorrectly captured, or ignored during consultation.

Lack of guidelines in managing patients with diabetic foot complications

The Department of Health in South Africa lacks policies for foot-related problems, raising concerns about the ability of nurses to assess diabetic patients effectively. In terms of diabetic foot services, there is a strong justification and demand for a rethinking of health service provision, planning, and delivery in South Africa.

Based on existing diabetic foot complication recommendations, this study found that diabetic foot disease awareness was poor. To reduce the burden of diabetic foot disease, type 2 diabetes mellitus (T2DM) patients should have access to improved screening and prevention programs, as well as patient education while maintaining an active approach to risk factor modification, footwear, and identifying the at-risk foot.[13] South African policymakers need to use these factors to generate guidelines for the healthcare system when encountering a diabetic foot.

A study in the Western Cape found that no diabetic individuals had their feet screened, prompting a quality-improvement effort to increase diabetic foot care by healthcare clinicians at primary care clinics. The screening instrument can be completed in 1–3 minutes.[14]

Diabetic screening identifies asymptomatic individuals at high risk of developing the disease, with guidelines establishing care standards for high-quality treatment.[15] Evidence-based interventions should be used to develop recommendations for T2DM prevention, diagnosis, and treatment, as studies show that these practices significantly improve patient outcomes.[16]

Poorly defined referral pathways for patients with diabetic foot complications

A comprehensive strategy for foot healthcare is crucial, including primary prevention, secondary prevention, and tertiary referral routes. This can be achieved through the active participation of podiatrists at the PHC level. This study found that 313 patients were referred to specialists, but it is unclear which specialist and foot pathologies were referred.

Nurses need assistance managing diabetic foot complications, and a structured foot health service should be accessible at the PHC level. The referral system is failing, with nurses unaware of podiatrists' foot health services at tertiary hospitals. To improve the referral system, PHC nurses must build strong relationships with podiatrists and develop channels of contact. Visits to healthcare experts are essential for adherence, and stable visits have been positively rated by patients.[17]

Need for podiatrists as part of the primary healthcare team

The research suggests that podiatrists should be included as part of the PHC team. This study's findings demonstrate the need for podiatrists at this level of treatment. It is suggested that in the absence of podiatrists, most patients arriving at these clinics will go untreated.

In this study, 392 patients presented with neuropathy, 127 with structural deformities and peripheral vascular disease, and 118 with foot ulcers. These findings emphasise the importance of including podiatrists as PHC team members. PHC nurses deal with an ever-increasing number of patients, which has resulted in limited consultation time and, as a result,

an increase in the lack of effective management of diabetic patients, which has led to the current study's finding of many diabetic foot risk factors.

Research has discovered the necessity for podiatrists to be part of the PHC team. In the absence of podiatrists, the research participants agreed that very little is done to treat patients with foot and lower limb problems.[11] The Gauteng Department of Health is divided into five health districts, each with sub-districts. Professional nurses provide curative care, with the assistance of medical officers. District hospitals and community health centres offer support services. The department re-engineered PHC through three service streams without podiatrists.

Conclusion

In South Africa, there are major challenges regarding the management of diabetic foot complications. A significant segment of the patient population is systematically and structurally overlooked. This is a quantifiable finding as evidenced by this study. Diabetic patients with foot issues are being neglected across the country, which is a growing concern.

Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

Ethical approval was obtained from the University of Johannesburg, Faculty of Health Sciences, Research Ethics Committee (REC-768-2020).

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References

1. Stacey N, Mirelman A, Kreif N, et al. Facility standards and the quality of public sector primary care: evidence from South Africa's "Ideal Clinics" program. Health Econ. 2021;30(7):1543-58. https://doi.org/10.1002/hec.4228
2. Kamoie B, Teitelbaum J, Rosenbaum S. "Megan's laws" and the US constitution: implications for public health policy and practice. Public Health Rep. 2003;118(4):379-81. https://doi.org/10.1016/S0033-3549(04)50266-2.
3. Rosenbaum S, Burke T, Benevelli J, Borzi PC, Repash L. Legal issues in health information: implications for public health practice and policy. Public Health Rep. 2005;120(3):350-2. https://doi.org/10.1177/003335490512000321.
4. Merza Z, Tesfaye S. The risk factors for diabetic foot ulceration. The Foot. 2003;13(3):125-9. https://doi.org/10.1016/S0958-2592(03)00031-2.
5. Harrison-Blount M, Nester C, Williams A. The changing landscape of professional practice in podiatry, lessons to be learned from other professions about the barriers to change - a narrative review. J Foot Ankle Res. 2019;12(1):23. https://doi.org/10.1186/s13047-019-0333-2.
6. Maphumulo WT, Bhengu BR. Challenges of quality improvement in the healthcare of South Africa post-apartheid: a critical review. Curationis. 2019;42(1):e1-9. https://doi.org/10.4102/curationis.v42i1.1901.
7. Bing X, Sun C, Wang Z, et al. Transanal pullthrough Soave and Swenson techniques for pediatric patients with Hirschsprung disease. Medicine. 2017;96(10):e6209. https://doi.org/10.1097/MD.0000000000006209.
8. Stancu B, Ilyés T, Farcas M, et al. Diabetic foot complications: A retrospective cohort study. Int J Environ Res Public Health. 2022 Dec 23;20(1):187. https://doi.org/10.3390/ijerph20010187.
9. Wang A, Lv G, Cheng X, et al. Guidelines on multidisciplinary approaches for the prevention and management of diabetic foot disease (2020 edition). Burns Trauma. 2020;8:tkaa017. https://doi.org/10.1093/burnst/tkaa017.
10. Boulton AJM, Armstrong DG, Kirsner RS, et al. Diagnosis and management of diabetic foot complications. Arlington (VA): American Diabetes Association; 2018.
11. Turner DP, Houle TT. Conducting and reporting descriptive statistics. Headache. 2019;59(3):300-5. https://doi.org/10.1111/head.13489.
12. S Ntuli, Vincent-Lambert C, Swart A. Risk factors for diabetic foot ulceration in diabetic patients presenting at primary healthcare clinics in South Africa. SAJDVD. 2018;15(1).
13. Chun DI, Kim S, Kim J, et al. Epidemiology and burden of diabetic foot ulcer and peripheral arterial disease in Korea. J Clin Med. 2019;8(5):748. https://doi.org/10.3390/jcm8050748.
14. Goie TT, Naidoo M. Awareness of diabetic foot disease amongst patients with type 2 diabetes mellitus attending the chronic outpatients department at a regional hospital in Durban, South Africa. Afr J Prim Health Care Fam Med. 2016;8(1):e1-8. https://doi.org/10.4102/phcfm.v8i1.1170.
15. Alvarez C, Saint-Pierre C, Herskovic V, Sepúlveda M. Analysis of the relationship between the referral and evolution of patients with type 2 diabetes mellitus. Int J Environ Res Public Health. 2018;15(7):1534. https://doi.org/10.3390/ijerph15071534.
16. Allen ML, Van der Does AMB, Gunst C. Improving diabetic foot screening at a primary care clinic: a quality improvement project. Afr J Prim Health Care Fam Med. 2016;8(1):e1-9. https://doi.org/10.4102/phcfm.v8i1.955.
17. Duan D, Kengne AP, Echouffo-Tcheugui JB. Screening for diabetes and prediabetes. Endocrinol Metab Clin North Am. 2021;50(3):369-85. https://doi.org/10.1016/j.ecl.2021.05.002.
18. Afable A, Karingula NS. Evidence based review of type 2 diabetes prevention and management in low and middle income countries. World J Diabetes. 2016;7(10):209-29. https://doi.org/10.4239/wjd.v7.i10.209.
19. Seyed-Nezhad M, Ahmadi B, Akbari-Sari A. Factors affecting the successful implementation of the referral system: a scoping review. J Family Med Prim Care. 2021;10(12):4364-75. https://doi.org/10.4103/jfmpc.jfmpc_514_21.