Foot assessment in patients with diabetes

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BACKGROUND
Diabetes has long been associated with increased risk of foot ulceration and lower extremity amputation.

OBJECTIVE
This article briefly describes the risk factors, assessments and management of people with diabetes, to guide physicians to identify and appropriately refer people with diabetes at risk of foot problems.

DISCUSSION
The literature is clear that the presence of peripheral neuropathy associated with diabetes, foot deformity, peripheral arterial disease, and poor glycaemic control increase the risk of foot complications. By annually undertaking foot screening of all people with diabetes, those at risk can be identified and referred for appropriate management. Until screening is undertaken regularly on all patients with diabetes, the currently high rates of foot ulceration and lower extremity amputation will continue.

When diagnosed with diabetes, many patients are aware that amputation and gangrene in the feet are possible complications of the disease.[1] Prevalence studies show that approximately 15% of those with diabetes will have foot ulceration at some time during their lives.[2] People with foot problems and diabetes mellitus have 15 times the increased risk of undergoing a lower extremity amputation compared to those without diabetes.[3]

Identifying people at risk of foot problems is important to ensure they are targeted for appropriate management to prevent foot complications.[4] Management of the diabetic foot in the Australian community has to date been poor. Australian figures show that the number of persons diagnosed with diabetes who have had a foot assessment is only 50%,[1] despite foot assessments being shown to be effective at identifying those at high risk of foot ulceration and amputation.[4–6]

How to identify an at risk foot

The greatest significant risk factor for foot ulcer formation and lower extremity amputation is peripheral neuropathy.[7] In those with neuropathy who develop foot ulceration, 77% will have had a minor traumatic event, and 63% will have a foot deformity.[8] Moreover, once a foot ulcer is present and there is poor arterial supply, a foot ulcer becomes more difficult to heal and the risk of amputation occurring significantly increases.[7] This common causal pathway to developing a foot ulcer is shown in *Figure 1*. The key risk factors for foot ulceration and lower extremity amputation are listed in *Table 1*. Other risk factors include nail pathology, skin pathology, footwear and behavioural issues.

Poor glycaemic control is a significant risk factor for amputation, increasing severity and prevalence for all foot specific risk factors.[9–11] The importance of glycaemic control cannot be overemphasised, as this factor can prevent the formation and progression of these risk factors.[12]

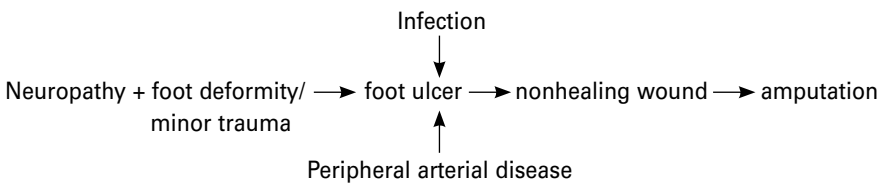

Figure 1. Most common causal pathway for foot pathology leading to lower extremity amputation in diabetes

Table 1. Risk factors and the evidence based indicators used to assess the overall risk level of lower extremity amputation of people with diabetes

Risk factor	Assessment
Glycaemic control	Ideally, HbA1c <7%. If glycaemic control is poor, referral to an endocrinologist, diabetes educator and/or dietician may be necessary
Peripheral arterial disease	Take history of symptoms, visually assess feet, palpate pulses. If no pulses palpable, undertake ankle brachial index using Doppler or refer to a vascular specialist
Peripheral neuropathy associated with diabetes	Using a 10 g monofilament at four distal sites (*Figure 2*) to test light touch sensation. If one or more sites are negative there is reduced sensation. Appropriate education is necessary to prevent unchecked trauma
Foot deformity	Visually assess for callused areas and fixed joint deformities in areas of pressure. Should calluses or pressure areas form, refer to a podiatrist for reduction of callus and assessment of foot function

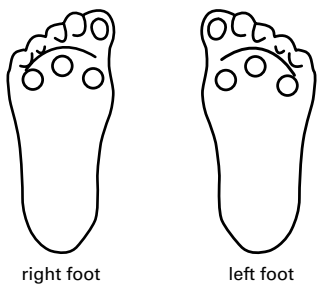

Figure 2. Monofilament (10 g) assessment sites on the foot for diabetic neuropathy assessment

Foot deformity may be the result of neuropathy, eg. claw and hammer toes. Other deformities include hallux valgus, prominent metatarsal heads (due to subluxation) and Charcot neuroarthropathy. Calluses and corns can produce pressure areas that may break down.[13] These need to be addressed by a podiatrist.[13]

The diabetic foot assessment

A diabetes foot assessment should incorporate history, examination and investigations. Specific examination of the diabetic foot as per Diabetes Australia GP diabetes management review includes:

- palpate pulses
- assess level of sensation (*Figure 2*)
- assess for presence of foot deformity
- assess for presence of nail deformity
- assess for presence of active lesion.

Evidence based assessments used to classify risk level for lower extremity amputation are included in *Table 1*.

Classifying level of risk

Undertaking a foot examination alone does not reduce the risk of foot complications.[14] Once the level of risk of amputation is ascertained a management plan must be formulated and implemented in an effort to reduce these risk factors.

While there are several foot risk classification systems for general screening purposes, the simplest is often the easiest to use, hence the classification system suggested by the National Institute Clinical Excellence (*Table 2*) is ideal.[15] This risk status then allows the selection of appropriate, targeted management strategies (*Table 3*).

Those at low risk include the majority of the population with diabetes who would be seen in the community.[2] These people would only require an annual foot assessment, as recommended by Diabetes Australia, to monitor progress.[16,17]

Those at increased risk require more intensive education and regular podiatry care, including frequent foot review by their general practitioner (ideally feet should be inspected at every visit).[13]

Those at high risk or with existing ulcers would benefit from referral to specialist multidisciplinary foot services with skill and experience in treating and managing these population groups.[15,16] Specialist services aim to implement treatments to reduce risk level by more regular foot care, appropriate footwear, and other strategies shown in the literature to improve outcomes.[18] These services are generally attached to hospitals. The Australian Podiatry Association can be contacted for details.

Medicare items

The GP is in an ideal position to screen the feet of people with diabetes. This has been recognised in the development of Medicare items rewarding quality care of diabetic patients and others with chronic complex conditions.

The Medical Benefits Schedule Cycle of Care for patients with diabetes requires a minimum 6 monthly foot examinations (*Table 4*). The diabetes cycle of care attracts PIP and SIP payments, which also require the practice to establish a register and recall system for all patients with diabetes.

A GP management plan (item 721) can be developed by the GP to ensure

Table 2. Foot risk classification system suggested by the National Institute Clinical Excellence[15]

Risk level	Risk factors
Low risk	Normal sensation and palpable pulses
Increased risk	Neuropathy or absent pulses or other risk factor
High risk	Neuropathy, or absent pulses plus deformity, or skin changes or previous ulcer or previous foot/leg amputation
Ulcerated foot	

Table 3. Assessment and management of lower limb problems in people with diabetes[13]

Level of risk	Recommended management
Low	Annual foot assessment, education, exercise
At risk	More intensive education, regular podiatry care, frequent review and exercise
Ulcer present	Refer to multidisciplinary high risk foot service for management

comprehensive care is provided to patients with diabetes. If the patient does not have complex care needs warranting the development of multidisciplinary team care arrangements (TCAs) then a GPMP alone is considered an alternative to the SIP annual cycle of care.

The patient with more complex diabetes care needs is likely to benefit from TCAs (item 723) that involve communication with other health providers involved in the patient's care. The combination of a GPMP and TCA is equivalent to the old care plan item 720. The GPMP plus TCA combination opens the door to Medicare rebates for allied health services, including podiatry. This means that private podiatry services will become more financially accessible to patients with diabetes.

Conclusion

The risk factors of peripheral neuropathy associated with diabetes, foot deformity, peripheral arterial disease, and poor glycaemic control require assessment in order to ascertain risk level of a patient with diabetes for undergoing a lower extremity amputation.

By increasing foot assessments in people with diabetes we can identify those at high risk of lower extremity amputation. High risk patients can then be sent to specialist centres to be managed appropriately. Regular foot assessments can be undertaken by GPs or GPs can refer patients to podiatrists. In this way, there is a possibility of reducing the rate of amputation in this vulnerable group.

Summary of important points

- Annual foot assessments are necessary in all people with diabetes.
- Assessment of risk factors includes assessing for sensation, presence of arterial disease, foot deformity and glycaemic control.
- If one or more risk factors are present, referral to a podiatrist may be required.
- If a foot ulcer is present, referral to a high risk foot service is necessary.
- By identifying people at high risk of foot problems, and managing the risk factors, lower extremity amputations and foot ulcerations can be prevented.

Resource

Australasian Podiatry Council. Available at www.apodc.com.au

Conflict of interest: none declared.

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Table 4. MBS minimum requirements for annual Cycle of Care for patients with diabetes mellitus (items 2517–2526)

Management	Frequency (minimum)
HbA1c	Every year
Comprehensive eye examination	Every 2 years
Weight, height, body mass index	Every 6 months
Blood pressure	Every 6 months
Foot examination	Every 6 months
Total cholesterol, TG, HDL, cholesterol	Every year
Microalbuminuria	Every year
Self care education	
Diet review	
Physical activity review	
Smoking status review	
Medication review	

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