Microvascular complications: Foot care

Recommendations

Recommendation	Reference	Grade*
Assess all people with diabetes and stratify their risk of developing foot complications	1 NHMRC, 2011	C
Assess risk stratification by enquiring about previous foot ulceration and amputation, visually inspecting the feet for structural abnormalities and ulceration, assessing for neuropathy using either the neuropathy disability score or a 10 g monofilament, and palpating foot	1 NHMRC, 2011	C
People assessed as having intermediate-risk or high-risk feet should be offered a foot protection program. This includes foot care education, podiatry review and appropriate footwear	1 NHMRC, 2011	C
Pressure reduction, otherwise referred to as 'redistribution of pressure' or 'off-loading', is required to optimise the healing of plantar foot ulcers	1 NHMRC, 2011	B
Off-loading of the wound can be achieved with the use of a total contact cast or other device rendered irremovable	1 NHMRC, 2011	B
People with diabetes-related foot ulceration are best managed by a multidisciplinary foot care team	1 NHMRC, 2011	C
There is insufficient evidence to recommend any specific dressing type for typical diabetic foot ulcers	2 Diabetes Canada, 2018	C, level 3
General principles of wound care include the provision of physiologically moist wound environment and off-loading the ulcer	2 Diabetes Canada, 2018	D, consensus
Non-viable tissue should be debrided	2 Diabetes Canada, 2018	A, level I
Provided that all other modifiable factors (off-loading, infection, deformity) have been addressed, adjunctive wound-healing therapies, such as topical growth factors and granulocyte colony-stimulating factor (G-CSF) or dermal substitutes, may be considered for non-healing, non-ischaemic wounds	2 Diabetes Canada, 2018	A, level 1
In people stratified as having low-risk feet (where no risk factors or previous foot complications have been identified), foot examination should occur annually	1 NHMRC, 2011	Consensus
In people stratified as having intermediate-risk or high-risk feet (without current foot ulceration), foot examination should occur at least every 3–6 months	1 NHMRC, 2011	Consensus
*Refer to 'Explanation and source of recommendations' for explanations of the levels and grades of evidence.		

Clinical context

Foot ulceration and limb amputation are among the major drivers of disability and healthcare costs in people with diabetes. Foot ulceration is a leading cause of hospitalisation for people with diabetes,[1] and in 2012–13, 3570 people with diabetes had a lower limb amputation in Australia.[3]

A foot protection program that includes prevention, patient education, multidisciplinary care, and close monitoring and treatment of foot ulcers can substantially reduce amputation rates.

For information about the Foot Forward program to prevent amputation, contact Diabetes Australia.

In practice

Patient education and support

Foot care education should be provided to all people with diabetes to assist with prevention of foot complications.

Patient education and support regarding foot care should include:

- emphasising the importance of appropriate footwear and foot care (improper footwear and tinea infection are associated with increased problems)
- establishing a regular self-monitoring schedule (including visual checks)
- developing an action plan to respond to early problems (eg skin breakdown).

Regular podiatric review should be considered.

Assessing risk of foot complications

A careful foot assessment should be performed to stratify the risk of developing foot complications. Stratification is dependent on four risk factors:[1]

- peripheral arterial disease (PAD) – which can be assessed by dorsalis pedis and tibialis anterior pulses or hand-held Doppler. If problems are suspected, consider ankle-brachial pressure index (ABI) testing, toe brachial index (TBI) testing or absolute toe pressure
- peripheral neuropathy – which can be assessed using a neuropathy disability score or a 10 g monofilament
- deformities
- previous amputation or ulceration.

The following factors might also increase the risk of foot complications:[1]

- visual impairment
- kidney disease
- sub-optimal glucose control
- ill-fitting footwear
- socioeconomic disadvantage.

Table 1 shows risk stratification and corresponding foot care. People at intermediate and high risk should be assessed by a diabetic high-risk foot service. The intensity of monitoring and review increases according to the level of risk.

Refer to the section ‘Microvascular complications: Diabetes-related neuropathy’ for practice-based tools for assessing circulation and foot deformity.

Table 1. Guidance on risk categorisation for complications, and elements to consider during foot assessment[1]

Stratification of foot ulceration and amputation risk in diabetes		NHMRC grade*	Foot care and education tailored to foot risk status
Low risk	No risk factors for foot ulceration or ulceration/amputation	C	Offer basic foot care information and annual foot assessment
Intermediate risk	One risk factor only (ie neuropathy, PAD) and no previous history of foot ulceration or amputation	C	Offer program that includes foot care education, podiatry review every six months and footwear assessment
High risk	Two or more risk factors (ie neuropathy, PAD or foot deformity) and/or previous foot ulceration or amputation	C	Offer program that includes foot care education, podiatry review and footwear assessment (eg a high-risk foot service)
High risk	Aboriginal or Torres Strait Islander people with diabetes	Practice Point	Offer program that includes foot care education, podiatry review and footwear assessment (eg a high-risk foot service)

NHMRC, National Health and Medical Research Council; PAD, peripheral arterial disease

*Refer to 'Explanation and source of recommendations' for explanations of the levels and grades of evidence.

Indications for **immediate** referral to a multidisciplinary foot care clinic include active foot disease:

- foot ulcer, with or without local Infection
- suspected Charcot neuroarthropathy (eg unilateral, red, hot, swollen, possibly aching foot).

Any patients presenting with acute limb ischaemia should be referred immediately to an emergency department.

Patients with chronic, limb-threatening ischaemia require urgent referral to a vascular specialist.

Foot ulceration

A foot ulcer is a serious condition and needs to be managed immediately.

Assessment

Several wound classifications have been developed to provide objective assessment of severity of foot ulcers.

- The International Working Group on Diabetic Foot (IWGDF) guidelines recommend using IWGDF/Infectious Diseases Society of America (IDSA) classification criteria to assess infection severity.[4]
- The wound, ischaemia, foot infection (WIfI) system is recommended for use in people with PAD to stratify amputation risk and revascularisation benefit.[4]
- The SINBAD system – Site, Ischaemia, Neuropathy, Bacterial infection, Area, Depth – is recommended for communication between health professionals (Table 2).[5]

If arterial insufficiency is suspected, assessment and management of the peripheral vasculature is mandatory before debridement.

Referral to a vascular surgeon, high-risk foot clinic and/or multidisciplinary team is suggested in this situation.

Table 2. The SINBAD wound classification system[5]		
Clinical domain	**Condition**	**Score***
Site	Forefoot	0
	Mid foot/hind foot	1
Ischaemia	Pedal blood flow intact (at least one pulse palpable)	0
	Clinical evidence of reduced pedal blood flow	1
Neuropathy	Protective sensation intact	0
	Protective sensation lost	1
Bacterial infection	None present	0
	Present	1
Area	Ulcer <1 cm^2	0
	Ulcer ≥1 cm^2	1
Depth	Ulcer confined to skin and subcutaneous tissue	0
	Ulcer reaching muscle, tendon or deeper	1
*Highest total possible score is 6.		

Wound management

Patient ability to understand and undertake management should always be a factor in choosing a treatment and in counselling the patient regarding the treatment plan.

Debridement

Local sharp debridement of non-ischaemic wounds improves healing. Other methods of debridement that might be appropriate in certain cases include larval therapy, hydrosurgical debridement and autolytic debridement.[6]

The priority of debriding wound tissue is to prepare the surface and edges of a wound to facilitate healing. Debridement also reduces pressure on the wound, allows for full inspection of tissue underneath the debrided tissue and helps drain secretions or pus.[6]

Wound dressings

Currently, there is insufficient evidence to demonstrate the superiority of any one type of wound dressing over another in the management of ulcers. Dressings should therefore be tailored to the specific characteristics of the wound.

- In **non-ischaemic ulcers**, create a moist wound environment.
- Appropriate management of wound exudate levels should be a guiding principle in dressing selection and frequency of dressing change.
- In **ischaemic ulcers**, maintain a dry wound environment using a dry, non-adherent dressing until someone with experience in PAD has reviewed the wound.

A full list of considerations for dressing choice can be found on page 15 of Wounds International's *Best practice guidelines: Wound management in diabetic foot ulcers*.

Off-loading devices

Ongoing weight bearing on an insensate foot causes continued trauma and results in poor wound healing.

Pressure on the wound should be off-loaded, using padding or other off-loading devices such as total-contact casts and removable prefabricated devices (eg controlled ankle-movement walkers, half-shoes, therapeutic shoes).

Ulcers are often caused by patients' footwear; if this is the case, advise the patient not to continue wearing the same shoes.

Guidelines on footwear for people with diabetes can be found in an article by van Netten et al.

Infection

The need for antibiotics should be determined on clinical grounds.

It is appropriate for cultures to be collected for identification of microbiological organisms and antibiotic sensitivities. The most appropriate tissue samples for microbiological evaluation are either deep tissue swabs after debridement or tissue/bone biopsies.

There is no need to culture clinically uninfected ulcers, as colonising organisms will always be detected.

Infected ulcers should be treated with antimicrobial therapy according to published antibiotic guidelines.

The duration of therapy may need to be for extended periods.

Resources

Diabetic Foot Australia has resources for health professionals and people with diabetes.

Wounds International's guidelines for management of diabetic foot ulcers provide detailed and practical information.

References

1. National Health and Medical Research Council. National evidence-based guideline: Prevention, identification and management of foot complications in diabetes. Canberra: NHMRC, 2011.
2. Diabetes Canada Clinical Practice Guidelines Expert Committee. Diabetes Canada 2018 clinical practice guidelines for the prevention and management of diabetes in Canada. Can J Diabetes 2018;42:S1–S325.
3. Australian Institute of Health and Welfare. Burden of lower limb amputations due to diabetes in Australia: Australian Burden of Disease Study 2011. Canberra: AIHW, 2017.
4. Schaper N, van Netten J, Apelqvist J, Bus SA, Hinchliffe RJ, Lipsky BA. IWGDF Practical guidelines on the prevention and management of diabetic foot disease. International Working Group on the Diabetic Foot, 2019.
5. Ince P, Abbas Z, Lutale J, et al. Use of the SINBAD classification system and score in comparing outcome of foot ulcer management on three continents. Diabetes Care 2008;31(5):964–67.
6. Wounds International. Best practice guidelines: Wound management in diabetic foot ulcers. London: Wounds International, 2013.

We acknowledge the Traditional Custodians of the lands and seas on which we work and live, and pay our respects to Elders, past, present and future.

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