

# Diabetic Foot Ulcers



This guidelines summary has been developed for health professionals caring for clients with diabetic foot ulcers. Diagnosis of the aetiology of a leg or foot ulcer should be undertaken by health professionals with expertise in the area.

For this summary, all recommendations have had their levels of evidence classified as follows:

Level I	Evidence from a systematic review or meta-analysis of at least two level II studies
Level II	Evidence from a well designed randomised controlled trial (for interventions), or a prospective cohort study (for prognostic studies)
Level III	Evidence from non-randomised studies with some control or comparison group (pseudo-randomised controlled trial; non-randomised experimental trial, cohort study, case-control study, time series studies with a control group; historical control study, retrospective cohort study)
Level IV	Evidence from studies with no control or comparison group
EO	Consensus statements provided by a National or International Panel of experts in the area.

This is a summary of recommendations from the following sources, which should be accessed for further details as required:

1. Wounds Canada. Best practice recommendations for prevention and management of diabetic foot ulcers. 2019. [woundscanada.ca](http://woundscanada.ca)
2. International Working Group on the Diabetic Foot. IWGDF Guidelines on the prevention and management of diabetic foot disease. 2019, IWGDF. <https://iwgdfguidelines.org/>
3. Lavery L, et al. WHS guidelines update: Diabetic foot ulcer treatment guidelines. Wound Repair Regen 2016; 24:112-26.
4. Registered Nurses' Association of Ontario. Assessment and management of foot ulcers for people with diabetes. 2013, RNAO: Toronto. <https://rnao.ca>
5. National Health & Medical Research Council. National evidence-based guideline on prevention, identification and management of foot complications in diabetes. 2011, Baker IDI Heart & Diabetes Institute: Melbourne.
6. Scottish Intercollegiate Guidelines Network. Management of diabetes: A national clinical guideline. 2017. <https://www.sign.ac.uk/assets/sign116.pdf>
7. National Institute for Health and Care Excellence. Diabetic foot problems: prevention and management. 2016: NICE. <https://www.nice.org.uk/guidance/ng19>
8. Wu L, et al. Dressings for treating foot ulcers in people with diabetes: an overview of systematic reviews. Cochrane Database Syst Rev 2015; 7:CD010471



## Assessment

1. Assess all clients with diabetes for the risk of developing a foot ulcer,<sup>1,2</sup> including:
  - assess for peripheral arterial disease (PAD), i.e. medical and psychosocial history, pedal pulses, skin characteristics, pedal Doppler arterial waveforms and Ankle-brachial pressure Index (ABPI) or toe brachial index (TBI).<sup>2</sup> An ABPI <0.9, TBI <0.75, abnormal Doppler waveform, or transcutaneous oxygen pressure <40mmHg suggests PAD. An ABPI >1.3 requires further investigation. Confirm arterial disease with duplex ultrasound scans.<sup>2,3</sup> (I)
  - assess for neuropathy, e.g. with a 10g Semmes-Weinstein monofilament, test for vibration perception,<sup>2,3</sup> and for sensory, autonomic and motor changes<sup>4,5</sup> (II)
  - assess for structural abnormality and history of previous lower limb problems<sup>5,6</sup> (II)
2. Classify the level of risk for developing a foot ulcer, using risk stratification, as:<sup>2</sup>
  - **Very low risk:** no risk factors present e.g. no loss of sensation, no PAD, no other risk factors
  - **Low risk:** loss of sensation or presence of PAD
  - **Moderate risk:** loss or sensation plus PAD, or loss of sensation and foot deformity, or PAD and foot deformity
  - **High risk:** loss of sensation or PAD, AND one or more of the following: history of a foot ulcer, lower-extremity amputation, end-stage renal disease (EO)
3. Assess the risk of developing a foot ulcer when diabetes is diagnosed, if any foot problems arise, on admission to hospital, and on any change in condition while in hospital<sup>7</sup> (EO)

4. Reassess annually for people at very low risk, every six-12 months for people at low risk, every three-six months for people at moderate risk, and every one-three months for people at high risk<sup>2</sup> (EO)
5. Assessment of feet and diabetic foot ulcers should be undertaken by health professionals with training in this area<sup>2,4</sup> (IV)
6. All Aboriginal and Torres Strait Island people with diabetes should be considered to be at high risk of developing foot complications until assessed otherwise<sup>5</sup> (EO)
7. Take a comprehensive health history of all clients with diabetic foot ulceration, including the ulcer history, medical history, glycaemic control, nutrition, and psychosocial history<sup>2,4</sup> (EO)
8. Assess ulcer characteristics: site, area, depth, ulcer bed, peri-wound tissue, exudate, signs of infection (erythema, pain, heat, swelling, odour, purulent exudate), PAD and neuropathy<sup>2,5,7</sup> (EO)
9. Classify ulcer as neuropathic, neuro-ischaemic or ischaemic. Assess severity of infection clinically using IWGDF/ISDA criteria. For clients with PAD, classify amputation risk using Wound/Ischaemia/Infection (WIFI) system<sup>2</sup> (III)
10. The SINBAD system to classify ulcer severity is useful for standardised communication between health professionals<sup>2,5</sup> (IV)
11. Document foot ulcer characteristics after each assessment to determine progress<sup>1,5</sup> (II)

## Management

12. Care of a diabetic foot ulcer should be undertaken by a multidisciplinary team, including podiatrist, orthotist, GP, vascular and orthopaedic surgeon, nurse specialist and endocrinologist<sup>2,5,6</sup> (III)



### Management (continued)

13. Consider use of remote expert advice with digital imaging for people living in remote areas who are unable to attend a multidisciplinary foot care service <sup>2,5</sup> (III)
14. Offloading of pressure points is necessary. Optimal types for neuropathic forefoot or midfoot plantar ulcers are non-removable knee-high offloading devices or total contact cast <sup>2</sup> (I)  
A secondary option is removable knee devices, third: ankle-high devices, or fourth: felted foam combined with appropriate footwear <sup>2</sup> (IV)
15. Options for ulcers at other sites include specialist surgery, knee or ankle-high devices, footwear modifications or orthoses, as appropriate. Consult a specialist for advice when infection and/or ischaemia is present. <sup>2</sup> (IV)
16. Refer for acute medical or specialist assistance if there is limb-threatening or life-threatening diabetic foot disease: <sup>6,7</sup>
  - ulcer with fever or any signs of sepsis
  - ulcer with limb ischaemia
  - clinical suspicion of deep-seated soft tissue or bone infection
  - gangrene (with or without ulceration) (II)
17. Consider patients with ABI <0.5, toe pressure <30mmHg, and critical limb ischemia, including rest pain, failure to heal, and tissue loss, for revascularisation <sup>2,6</sup> (II)
18. Gently cleanse the ulcer using a neutral, non-irritating, nontoxic solution, e.g. warmed sterile water or saline <sup>3</sup> (III)
19. Removal of necrotic and devitalised tissue should be undertaken through mechanical, sharp, autolytic or biological debridement, unless revascularisation is necessary <sup>3,7</sup> (II)  
Sharp debridement should only be undertaken by trained health professionals <sup>4</sup> (EO)
20. Treatments should be re-evaluated when there is failure to achieve 50% or more ulcer size reduction after 4 weeks of therapy <sup>3</sup> (II)
21. Select a dressing that will maintain a moist healing environment, protect peri-ulcer skin, is non-traumatic and cost effective <sup>3,8</sup> (II)
22. In cases of infected ulcers<sup>2</sup>:
  - obtain a tissue biopsy for culture from soft tissue infections (III)
  - treat infection with an effective antibiotic (I)
  - refer patients with suspected osteomyelitis for further investigations (II)
  - hospitalise patients with a severe or complicated moderate foot infection (IV)
23. Adequate oxygenation of the wound environment will promote healing, and should be promoted through avoidance of dehydration, smoking, cold, stress and pain <sup>3</sup> (IV)
24. Optimising glucose control improves wound healing <sup>3</sup> (III)
25. In some clients, additional therapy may be helpful, as follows:
  - topical negative pressure wound therapy may increase healing of diabetic foot ulcers <sup>3,5,6</sup> (II)
  - cellular and a cellular skin equivalents, or platelet-derived growth factor may be of benefit in healing <sup>3,5</sup> (I)
  - hyperbaric oxygen therapy reduces risk of amputation in patients with ischemic diabetic foot ulcers <sup>3,5</sup> (II)

### Prevention

26. Offer a foot protection program for people who are assessed as having moderate or high risk for foot ulceration, including foot care education, podiatry review and appropriate footwear <sup>2,5</sup> (II)



### Prevention (continued)

27. Protective therapeutic footwear should be prescribed for clients at moderate risk for ulceration, e.g., those with PAD and neuropathy, foot deformity <sup>2</sup> (II)
28. Protective therapeutic footwear with demonstrated reduced plantar pressures should be prescribed for clients with a previously healed plantar foot ulcer <sup>2,3</sup> (II)
29. Consider teaching clients at moderate or high risk of ulceration to home monitor foot plantar temperatures daily with an infrared thermometer and consult a health professional if early inflammation is detected (i.e. higher temperatures on two consecutive days) <sup>2,3</sup> (III)
30. Treat any modifiable risk factors on the foot, e.g. blisters, callus, fissures, ingrown nails, fungal infections <sup>2</sup> (EO)
31. Provide structured education to persons with diabetes at risk of ulceration, to: <sup>2</sup>
  - avoid walking barefoot or in socks or thin footwear both indoors and outdoors
  - inspect feet and inside of shoes daily
  - practice safe foot care (washing, careful drying, emollients for dry skin, nail care, avoiding agents or techniques to remove callus or corns)
  - wear appropriate footwear
  - seek professional help when problem signs occur(EO)