

Foot Ulcer Management

Case Definitions

Foot ulcer

A break of the skin of the foot that involves at a minimum the epidermis and part of the dermis.

Diabetic foot ulcer

Foot ulcer in person with currently or previously diagnosed diabetes mellitus, usually accompanied by neuropathy and/or Peripheral Arterial Disease (PAD) in the lower extremity.

Loss of protective sensation (LOPS)

A sign of diabetic neuropathy, or nerve dysfunction characterised by an inability to sense light pressure, for example, as applied with a 10g Semmes-Weinstein monofilament.

Peripheral Arterial Disease

Obstructive atherosclerotic vascular disease with clinical symptoms, signs, or abnormalities on non-invasive or invasive vascular assessment, resulting in disturbed or impaired circulation in one or more extremities.

Screening and Prevention

Identifying the at-risk foot

Complete MMEX Foot Screening Tool

Or Diabetic Neurovascular Foot assessment

Presence of a Full Thickness Ulcer	Yes / No
Risk factors for foot ulceration	
<i>Peripheral neuropathy</i> (one of more of the following tests)	
- Protective sensation (monofilament) undetectable	Yes / No
- Vibration (128-Hz tuning fork) undetectable	Yes / No
- Light touch (Ipswich touch test) undetectable	Yes / No
<i>Foot pulses</i>	
- Posterior tibial artery absent	Yes / No
- Dorsal pedal artery absent	Yes / No
<i>Other</i>	
Foot deformity of excessive bony prominences	Yes / No
Limited joint mobility	Yes / No
Signs of abnormal pressure, such as callus	Yes / No
Ruddy discoloration on dependency	Yes / No
Poor foot hygiene	Yes / No
Inappropriate footwear	Yes / No
Previous ulcer	Yes / No
Lower extremity amputation	Yes / No

Category	Ulcer risk	Characteristics	Frequency*
0	Very low	No LOPS and No PAD	Once a year
1	Low	LOPS or PAD	Once every 6-12 months
2	Moderate	LOPS + PAD, <i>or</i> LOPS + foot deformity <i>or</i> PAD + foot deformity	Once every 3-6 months
3	High	LOPS or PAD, <i>and</i> one or more of the following: - history of a foot ulcer - a lower-extremity amputation (minor or major) - end-stage renal disease	Once every 1-3 months

*Screening frequency is based on expert opinion, since there is no published evidence to support these intervals.

Regularly inspecting and examining the at-risk foot

If International Working Group of the Diabetic Foot (IWGDF) risk 1-3 comprehensive exam required:

- **History:** Inquiring about previous ulcer/lower extremity amputation, end stage renal failure (ESRF), PAD, social isolation, poor access to health care.
- **Vascular status:** Palpation of pulses, inquire about pain at rest or claudication.
- **Neurological:** Enquire about neuropathic pain.
- **Skin:** Assess skin colour, temperature, presence of callous or oedema, preulcerative signs.
- **Bone/joint:** check for deformities, abnormally large bony prominences or limited joint mobility.
- **Footwear:** Ill-fitting, inadequate or lack of footwear.
- **Foot hygiene:** Improperly cut toenails, unwashed feet, superficial fungal infection and unclean socks.
- **Physical limitations:** i.e.: Obesity or visual acuity – which may hinder foot care.
- **Foot care knowledge:** Gauge the patient's understanding of how diabetes can affect their feet.

Educating the patient and their family

Aim: To improve the patient's foot self-care knowledge and self-protective behaviours, and to enhance their motivation and skills to facilitate adherence to this behaviour.

- Can the patient perform a foot inspection? If not, who can assist them? Do they require visual aids?
- Explain the need to perform daily foot inspections of the full surface of both feet and interdigitally.
- Ensure they know how to notify an appropriate health care professional if they develop a blister, cut, ulcer, stand on a foreign body or burn their feet.
- Review the following:
 - Check feet daily!
 - Avoid walking barefoot!
 - Do not wear shoes that are too tight or have rough edges/uneven seams.
 - Visually inspect and manually feel inside shoes before putting them on.
 - Wash feet daily and dry between toes.
 - Cut toenails straight across.
 - Encourage regular foot examinations by a health care professional.

Ensure routine wearing of footwear

In a person with diabetes and insensate feet, walking barefoot or wearing inappropriate footwear are major causes of foot trauma. This can lead to delayed detection of a foot ulcer and possible associated infection and amputation.

In the Kimberley, patients with a chronic health condition can access one pair of shoes per year through the Boab Health Services Integrated Team Care (ITC) Program.

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How to access footwear for a patient:

- Complete a GP Management Plan (GPMP)
- Complete an ITC request form, specifically requesting footwear and insole provision plus travel allowances.

If there are signs of abnormal loading of the foot (hyperaemia, callous and ulceration) refer the patient to the appropriate podiatry service for treatment, specialised offloading, custom made footwear, and orthoses.

Treating risk factors for ulceration

- Removal of foreign bodies
- Debridement of callous
- Protecting blisters/draining if appropriate
- Treating ingrown or thickened toenails
- Treating fungal skin infections
- Optimisation of diabetes (see Kimberley Clinical Protocol: [Diabetes Type II in Adults](#))
- Revascularisation of a poorly perfused limb

Ulcer Classification/Assessment

SINBAD system

- Simple tool to classify ulcer severity based on size/depth, site, neurovascular status, and presence of infection.
- For communication between health professionals.
- Does not require specialist equipment.

Wifi system

- Wound, ischemia and foot infection scoring system.

Infection Classification – IWGDF/ Infectious disease society of America System (IDSA)

- Infection severity table

TIME Chart

- Ulcer assessment tool



Principles of Ulcer Management

Foot ulcers will heal in most patients if the guidelines below are followed, however, optimal wound care cannot compensate for continuing trauma to a wound bed, or inadequately treated ischaemia or infection. Patients with an ulcer deeper than the subcutaneous tissues need intensive multidisciplinary treatment, and depending on their social situation and local resources, may need to be hospitalised.

Pressure offloading and ulcer protection

Please consult a podiatrist

- A non-removable knee-high offloading device is considered gold standard treatment in offloading a plantar neuropathic ulcer.

- Total contact casting
- CAM boot (secured with fiberglass/Coban)
- When this is contraindicated, consider a removable knee-high or ankle-high device.
 - CAM boot
 - Ankle CAM boot
- If the above is not considered appropriate, trial felt padding in combination with appropriate footwear/Darco shoe +/- orthotics.
- For more information see [Guidelines on offloading foot ulcers in persons with diabetes](#) (IWGDF 2019 update)

Restoration of Tissue Perfusion

Aim of revascularisation is to restore direct flow to at least one of the foot arteries, preferably the artery that supplies the anatomical region of the ulcer.

- In patients with non-palpable pulses and/or ankle brachial pressure index <0.5, or a Toe Pressure <30mmHg consider urgent vascular imaging and consultation with Royal Perth Hospital (RPH) Vascular on call. Complete Wifl assessment.
- Arterial Dopplers and CT Angiograms (CTA) are available in the region. Consider arterial calcification and renal function prior to CTA request.
- Patients may benefit from Ankle brachial pressure index (APBI), Bedside Dopplers and Toe Pressures, as well as an assessment of rest pain and claudication completed by a Podiatrist.
- Emphasise efforts to reduce cardiovascular risk (cessation of smoking, control of hypertension or dyslipidaemia, use of antiplatelet drugs)
- ****Do not debride ulcers/tissue in a pulseless foot without prior discussion with a vascular specialist****
- For more information see [Guidelines on diagnosis, prognosis, and management of PAD in patients with foot ulcers and diabetes](#) (IWGDF 2019 update)

Treatment of infection

Diagnose a diabetic foot infection clinically, based on the presence of local or systemic signs and symptoms of inflammation.

Superficial ulcer with limited soft tissue infection:

- Clean/flush and debride all devitalised tissue and associated callous. Seek assistance from a podiatry service.
- Collect a swab and request a baseline X-ray.
- Commence empirical oral antibiotic therapy.

Deep or extensive infection (mod-severe):

- Advise patient to urgently seek care at local emergency department for consultation with a podiatrist and surgeon on call- for the removal of necrotic or infected tissue/bone.

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- Assess for PAD. If present, organise appropriate vascular imaging.
 - RPH Vascular on call; consideration for revascularisation.
- Order diagnostic imaging (X-ray/CT) and pathology (deep swabs or tissue/bone biopsy).
- Initiate broad spectrum antibiotic therapy aimed at common organisms, including obligate anaerobes as per electronic Therapeutic Guideline (eTG).
- Adjust antibiotic regimen based on clinical response, as well as pathology results.
 - Discuss with RPH Infectious Diseases on call.
- Optimise wound environment and offloading of the ulcer as per podiatry.

Tropical pathogens guide

- Empirical therapy should cover gram positive pathogens and common gram-negative pathogens. Consideration should be given to the potential involvement of obligate anaerobes, as well as Pseudomonas when choosing empirical antibiotic regimen.
- Where possible, obtain wound swabs for microscopy, culture and sensitivities (MCS). This is particularly important due to the diverse range of pathogens encountered in the Kimberley, as well as high rates of Methicillin Resistant Staphylococcus Aureus (MRSA).
- For more information see [Guidelines on the diagnosis and treatment of foot infection in persons with diabetes](#) (IWGDF 2019 update)

Suggested Route of Administration, Setting, and Duration of Therapy by Clinical Syndrome

Site of Infection, by Severity or Extent	Route of Administration	Setting	Duration of Therapy
Soft-tissue only			
Mild	Topical or oral	Outpatient	1-2 wk; may extend up to 4 wk if slow to resolve
Moderate	Oral (or initial parenteral)	Outpatient/ inpatient	1-3 wk
Severe	Initial parenteral, switch to oral when possible	Inpatient then outpatient	2-4 wk
Bone or joint			
No residual infected tissue (e.g., postamputation)	Parenteral or oral	...	2-5 d
Residual infected soft tissue (but not bone)	Parenteral or oral	...	1-3 wk
Residual infected (but viable) bone	Initial parenteral, then consider oral switch	...	4-6 wk
No surgery, or residual dead bone postoperatively	Initial parenteral, then consider oral switch	...	≥3mo

Metabolic control and treatment of co-morbidities

- Optimise glycaemic control.
- Aim to control other concomitant conditions which may

be prolonging healing, such as peripheral oedema and malnutrition.

- Consult with the physician team where relevant, as well as a diabetes educator and dietitian.

Local ulcer care

- Regular inspection of the ulcer by a podiatrist, with frequency corresponding to severity.
- Regular debridement of callous, slough and devitalised tissue.
- Do not soak feet, as this will cause tissue maceration.
- Dressings should be selected based on exudate control, cost, and comfort for the patient. Consult with podiatrist for dressing advice if in doubt.
 - Call regional podiatrist for advice. Patients are normally well known and active plans are normally in place.
 - Therapeutic Guidelines Ulcer and Wound Dressings, TIME Wound Assessment Tool and [Kimberley Standard Dressing List](#) (KSDrL)

While debridement is a quick and relatively easy ulcer treatment, it is not permanent and must be used in combination with offloading.

Ulcer education

- Instruct patients and carers on appropriate ulcer care, how to identify signs of infection and when to ask for help.
- The importance of regular dressing changes and wound monitoring by a health professional.
- Keep dressings dry at all times.
 - Showering – use plastic bags or shower bags. Use a shower chair/plastic chair to sit on, whilst resting foot out of the water on a stool.
 - Avoid puddles and large bodies of water.
 - If dressings do get wet, encourage immediate flush of ulcer and change of dressings. Monitor for infection.
- Wear offloading/footwear at all times whilst weightbearing, to accelerate the healing process and protect the contralateral foot.
- Encourage appointment attendance, even if the ulcer is healing.

Optimising the home environment

- Assessing the home/yard space. Is the area clean and free of hazardous debris that could complicate/delay wound healing?
- Sufficient lighting for wound/dressing assessment?
- Easy access i.e., ramps, stair assistance.
- Consider referring the patient to an occupational therapist for cases where environmental factors are suspected to play a large role in recalcitrant ulcer management.

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Additional Information

What is Debridement?

- The excision of necrotic, devitalized, or infected tissue from a wound to allow for pressure reduction, adequate inspection of underlying tissues, to drain pus/exudate, to optimize the effectiveness of topical preparations and to stimulate healing.
- There are many methods of debridement used to manage foot ulcers.
 - Autolytic, biological, enzymatic, sharps or surgical debridement.
- Things to consider:
 - Professionals' skill and training
 - Vascular status of the limb
 - Patient environment while debriding
 - Patient's pain

Don't miss a Charcot Foot

Charcot Neuroarthropathy is a destructive joint disorder resulting in gross structural deformity of the foot and/or ankle on a background of peripheral neuropathy.

Most cases are initially misdiagnosed, leading to lifelong foot deformity and amputation.

Signs and Symptoms (typically unilateral)

- Foot +/- Ankle Inflammation
- Swelling
- Erythema
- Heat (skin temperature normally >2 degrees Celsius warmer than contralateral)
- Pain (in a neuropathic foot)

Common Differential diagnoses

- Cellulitis with or without the presence of a wound
- Osteomyelitis
- Strain/Sprain/Fracture
- Septic Joint
- Gout
- Deep Vein Thrombosis (DVT)

Treatment Goals

- Halt inflammatory process.
- Relieve pain.
- Minimise potential deformity.

Treatment

(URGENT – to prevent lifelong deformity)

- Call and/or urgent written referral to a podiatrist.
- Foot +/- ankle Xray – request weight bearing lateral views.
- Bloods – to exclude severe infection. NB: WCC, C-reactive

protein (CRP) and Erythrocyte Sedimentation Rate (ESR) are also mildly elevated in Charcot cases.

- Offload the foot and affected joint until the Charcot diagnosis can be excluded or confirmed.
 - Gold Standard – Total Contact Casting
 - CAM boot – made irremovable. Limited weight bearing on the affected foot.
 - Provide crutches, frames, wheelchair and shower chairs to assist.

Refer/Discuss

Refer to Podiatry Referral Process Flowchart ([page 6](#))

Referrals within WACHS by electronic referral

Referrals outside of WACHS by phone, email or fax

West Kimberley High Risk Foot Service

Senior Podiatrist

Broome Hospital – WA Country Health Service Kimberley

T: (08) 9194 2222 | M: 0448 303 066 | F: (08) 9194 2205

E: WK_HRFS@health.wa.gov.au

East Kimberley High Risk Foot Service

Senior Podiatrist

Kununurra Hospital – WA Country Health Service Kimberley

T: (08) 9166 4222 | M: 0473 734 963

E: EK_HRFS@health.wa.gov.au

Regional Interdisciplinary High Risk Foot Clinic

Physicians, Podiatrist, Diabetes Nurse, Dietitian and (virtual) Vascular Surgeon

Based in Broome Hospital

Electronic referral – General Medicine – High Risk Foot

M: 0448 303 066 | F: (08) 9194 2205

E: WK_HRFS@health.wa.gov.au

Boab Health Podiatry Service

Referrals: MMEx Boab Health Allied or Form on [website](#).

East Kimberley T: (08) 9168 2560

West Kimberley T: (08) 9192 7888

F: (08) 9192 7999

E: reception@boabhealth.com.au

Resources

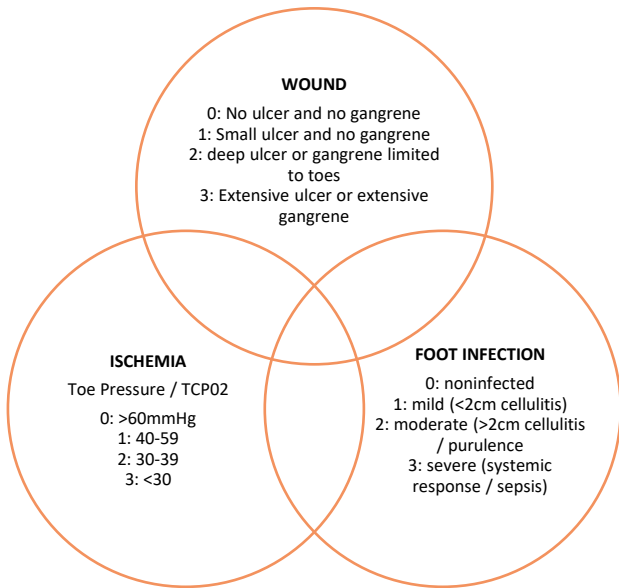
SINBAD System for Classifying and Scoring Foot Ulcers

Category	Definition	SINBAD score
Site	Forefoot	0
	Midfoot and hindfoot	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	0
	Present	1
Area	Ulcer ≤ 1 cm	0
	Ulcer > 1 cm	1
Depth	Ulcer confined to skin and subcutaneous tissue	0

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Wifl System

Tissue loss/Ischaemia and Foot infection form 3 intersecting rings of risk, which can be graded.



IWGDF/IDSA System – Infection Classification

Clinical manifestations	Infection severity	PEDIS Grade
Wound lacking purulence or any manifestations of inflammation	Uninfected	1
Presence of ≥2 manifestations of inflammation (purulence, or erythema, tenderness, warmth, or induration), but any cellulitis/erythema extends ≤2cm around the ulcer, and infection is limited to the skin or superficial subcutaneous tissues; no other local complications or systemic illness	Mild	2
Infection (as above) in a patient who is systemically well and metabolically stable, but which has ≥1 of the following characteristics: cellulitis extending >2cm, lymphangitic streaking, spread beneath the superficial fascia, deep-tissue abscess, gangrene, and involvement of muscle, tendon, joint or bone	Moderate	3
Infection in a patient with systemic toxicity or metabolic instability (e.g., fever, chills, tachycardia, hypotension, confusion, vomiting, leukocytosis, acidosis, severe hyperglycemia, or azotemia)	Severe	4

TIME Wound Assessment Tool

WOUND ASSESSMENT - T.I.M.E

T	I	M	E
<p>Tissue Is the tissue non-viable?</p>	<p>Infection/Inflammation Are there any visible signs of infection?</p> <p>Red, hot, swollen, smelly or painful</p>	<p>Moisture Balance Is the wound too dry or too wet?</p> <p>Macerated = too wet Eschar = too dry</p>	<p>Edges of Wound Are the edges undermined?</p> <p>Healthy and attached Unhealthy and undermined</p>
<p>REFERRAL Maybe require debridement by podiatrist or surgeon</p>	<p>REFERRAL Swabs and imaging Dressing and compression Oral or IV antibiotics May require Hospital admission and surgical review</p>	<p>Frequency of dressing changes Appropriate primary and secondary dressing</p>	<p>Properly filling the deadspace</p>

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Podiatry Referral Process Flowchart



Government of Western Australia
WA Country Health Service



Podiatry Referral Process Flowchart

Aboriginal and Torres Strait Islander people should be considered "High Risk" until assessed otherwise consider cultural safety when conducting a foot assessment and providing foot care advice.

IMMEDIATE

Call WACHS Senior Podiatrist

People with a Chronic Health Disease
(Diabetes, Kidney disease, rheumatoid arthritis etc) or disability AND

- Foreign body in foot
- Sudden acute foot/leg pain
- Foot/ulcer infection
- Foot ulcer increased in size/deteriorated
- Suspected/Acute Charcot Foot (Red, hot, swollen and/or painful foot)
- Dry or wet gangrene of toe/s

URGENT

Email WACHS Senior Podiatrist

People with a Chronic Health Disease
(Diabetes, Kidney disease, rheumatoid arthritis etc) or disability AND

- Foot ulcer, wound or sore
- Pre-ulcerative lesion (blister, extreme callous, break in the skin, maceration between toes)
- Significant foot deformity
- Ingrown Toenails

ROUTINE

Refer To Boab Health Podiatry

People with:
(Diabetes, Kidney disease, Hansen's Disease AND

- Past amputation
- Mild foot deformity

Who may require:

- Diabetic neurovascular foot check

Refer or contact if immediate or urgent

West Kimberley Senior Podiatrist

WA Country Health Service Kimberley

M: 0448 303 066

E: WK_HRFS@health.wa.gov.au

WACHS referral via Ereferral

Based in Broome Hospital

East Kimberley Senior Podiatrist

WA Country Health Service Kimberley

M: 0473 734 635

E: EK_HRFS@health.wa.gov.au

WACHS referral via Ereferral

Based in Kununurra Hospital

Advise all members of the healthcare team of any change to the patients situation

Referrals to be sent to Boab Health Services

Community Podiatry Service

East Kimberley: 9168 2560

West Kimberley: 9192 7888

Fax: 9192 7999

E: reception@boabhealth.com.au

MMEx: Boab Health Allied

https://boabhealth.com.au/wp-content/uploads/2019/07/Allied-Health-Referral-Form.pdf

References

Diabetes Feet Australia [Guidelines](#)

International Working Group of the Diabetic Foot [Guidelines](#)

[Kimberley Standard Dressing List](#)

Ulcer and Wound Management Therapeutic Guidelines

Abbreviations

ABPI	Ankle brachial pressure index
CAM boot	Controlled ankle movement boot
CRP	C reactive protein
CTA	CT Angiogram
DVT	Deep Vein Thrombosis
ESR	Erythrocyte sedimentation rate
ESRF	End stage renal failure
eTG	electronic Therapeutic Guideline
IDSA	Infectious Disease Society of America
ITC	Integrated Team Care
IWGDF	International Working Group of Diabetic Foot
LOPS	Loss of protective sensation
MCS	Microscopy, culture and sensitivities
MRSA	Methicillin resistant staphylococcus aureus
PAD	Peripheral Arterial Disease
RPH	Royal Perth Hospital
TCPO2	Transcutaneous oxygen pressure
WACHS	WA Country Health Service
Wifi	Wound, ischemia and foot infection