

The Diabetic Foot



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Statistics

- Est. >1.7 million Australians with DM (AusDiab)
- 15-20% will develop foot ulcer
- Only 2/3rds of ulcers will heal
- 60% will re-ulcerate within 1yr of healing
- 50% of all DM admissions are foot related
- 85% of diabetes related amps preceded by ulcer






Statistics

- >3000 legs amputated across Aust per year
 - 2nd worst in developing world (behind USA)
- Est. 40-50% of DM foot amps preventable
- Av cost per DM foot admission >\$22,000
- Lose contra-lateral leg within 18months
- Reduced life expectancy by 8yrs
- Worldwide, one leg lost every 20 sec



PREVENTION ESSENTIAL

Diabetic Foot Pathophysiology

- Two complications of diabetes that affect the feet are *peripheral neuropathy* and *peripheral vascular disease*
- Two-thirds of diabetic foot ulcers are neuropathic
- The combination of foot deformity and neuropathy are the primary cause of foot ulceration
- Casual link between deformity  abnormal loading 
plantar pressure  ulceration

Diabetic Foot Pathophysiology

- Deformity can be inherent or secondary to the diabetes disease process
- Trauma is a common precursor to ulceration (thermal, footwear, penetrating object)
- Impaired healing due to the underlying disease and its complications
- Normal immune response is impaired by the diabetes, therefore foot infection is often masked/atypical



Risk factors for DM foot ulcer

- Neuropathy
- Foot deformity
- Poorly controlled diabetes
- Smoking
- Barefoot walking
- Poor footwear
- Male sex
- PVD
- Previous ulcer/amputation
- Poor eyesight
- Unable to reach / care for feet
- Impaired cognition
- Lack of knowledge



Diabetic Foot Assessment

- Neurological – Monofilament/Vibration
- Vascular – Palpate pulses/Doppler/ABIs/Toe Pressures
- Hx of amputation/ulceration
- Foot deformity
- Nail pathology
- Callus/corns



Vascular Assessment	Left	Right
Palpation Dorsalis Pedis (present/absent, regular/irregular)		
Palpation Posterior Tibial (present/absent, regular/irregular)		
Ultrasound Dorsalis Pedis (not detected, monophasic, biphasic, triphasic)		
Ultrasound Posterior Tibial (not detected, monophasic, biphasic, triphasic)		
Ankle Brachial Index (dorsalis pedis (DP), posterior tibial(PT))	DP ABI / = PT ABI / =	DP ABI / = PT ABI / =
Toe Brachial Index (indicate which toe was used: Hallux/other)	Toe pressure = TBI / =	Toe pressure = TBI / =
Claudication (Yes/No, Grade, location, onset)		
Relevant Vascular History (including surgical vascular procedures)		

Neurological Assessment	Right	Left
Neuropathic Symptoms Please list in box provided	<input type="checkbox"/> None <input type="checkbox"/> Burning <input type="checkbox"/> Numbness <input type="checkbox"/> Tingling <input type="checkbox"/> Other	<input type="checkbox"/> None <input type="checkbox"/> Burning <input type="checkbox"/> Numbness <input type="checkbox"/> Tingling <input type="checkbox"/> Other
Vibration Sensation (graduated tuning fork apex of hallux)	Present Reduced Absent	Present Reduced Absent
Monofilament (10grams) √ = Detected, X = Not detected		
Evidence of Peripheral Neuropathy (circle choice) If unable to detect monofilament at 1 or more sites = yes	YES NO	YES NO

Comments			
Risk Classification	Tick	Description	
Low Risk		No risk factors and no previous history of foot ulcer/amputation	
Intermediate Risk		One risk factor (neuropathy, PAD, or foot deformity) and no previous history of foot ulcer/amputation	
High Risk		Two or more risk factors (neuropathy, PAD, or foot deformity) and/or previous history of foot ulcer/amputation	
Active Problem		Current ulceration, infection, recent amputation, active /acute charcot foot.	
Reassessment due:		3 months	6 months 12 months Discharge

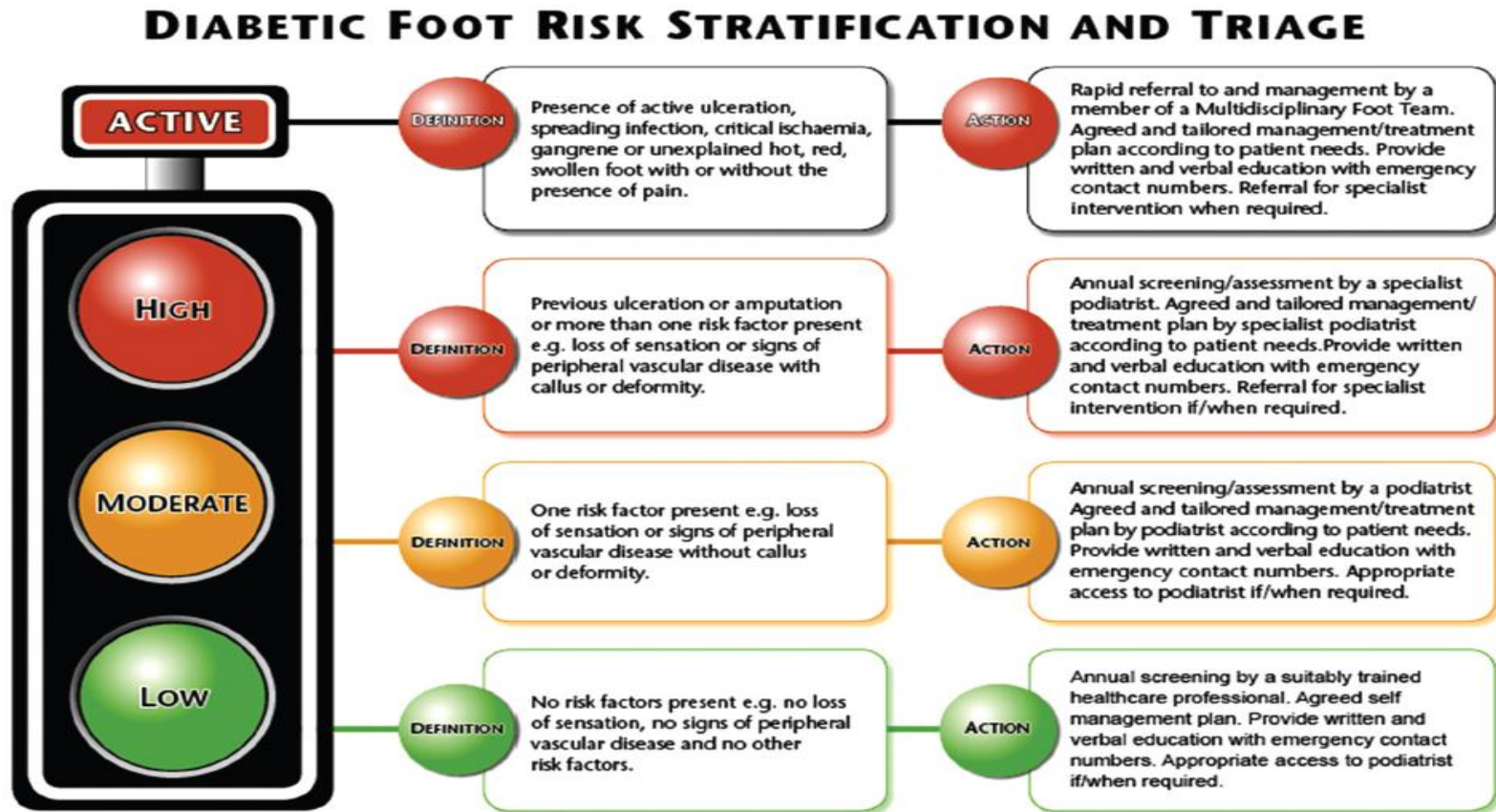
Reference: National Evidence Based Guideline: Prevention, identification and management of foot complications in

diabetes. National Health



Risk Stratification

Figure 2. Foot risk assessment and traffic light schema with suggested patient pathways related to risk



These risk categories relate to the use of the SCI-DC foot risk stratification tool



Neuropathy

- Most important risk factor for ulceration
- Present in 30-70% of DM patients
- Sensory (↓pain, temp, vibration)
 - Burning, tingling, numbness
- Motor (reflexes, mus strength, deformity)
- Autonomic (skin integrity)



Types of Foot Ulcers

- **Ischaemic (10%)**

- Borders / Dorsum of foot
- Minimal or no peri-wound callous
- Painful
- Irregular edges
- Punched out appearance
- Necrotic
- Weak or Non-palpable pulses
- ABI < 0.8 , Toe pressure < 45mmHg



Types of Foot Ulcers

- **Neuropathic (55%)**

- Generally painless
- Plantar weight-bearing areas
- Moderate / heavy peri-wound callous
- Moderate to high exudate
- Palpable pulses, ABI > 0.8, Toe pressure > 45mmHg
- Insensate foot



Types of Foot Ulcers

- **Neuro-ischaemic (34%)**
 - Combination of Ischaemic and Neuropathic



Managing Diabetic Foot Ulcers

- **Infection** (soft tissue/cellulitis/OM)
- **Vascular supply** (revascularisation)
- **Diabetes control** (HBA1c <6)
- **Dressings / Oedema control**
- **Wound debridement** (local/surgical)
- **Pressure offloading**
- **Patient education**
- **Multidisciplinary management**
(43-85% ↓amps)



Managing Infection

- **Cellulitis**- oral AB's or IV AB's?
- **Collection** – Incision & Drainage plus AB's
- **Osteomyelitis/Septic Arthritis** – 6/52 IV AB's then oral AB's OR Surgical removal of bone/amp.

- Diagnosing - X-ray, B&WC scan, CT, MRI, bone biopsy
- Swabs/ Tissue samples



Manage Infection



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Importance of Offloading

- Appropriate offloading reduces time to heal, risk of infection & amputation
- Around 90% of diabetic foot ulcers have neuropathic component
- Plantar foot ulcers under constant pressure / repetitive trauma
- Need to reduce / redistribute vertical and shearing stress on ulcer
- Patient proprioception / balance / flexibility / cognitive ability will determine suitable offloading
- Complete non-weightbearing ideal but not practical
- Compliance is an issue - Need to constantly encourage patient to wear prescribed offloading



Offloading

- **Total Contact Cast (TCC)** – gold standard
- **CROW** (Charcot Restraint Orthotic Walker)
- **Aircast**
- **CAM Walker/Moon Boot**
- **Woundcare shoe/Darco**
- **Footwear & Insoles**
- **Football Dressing**



Preventing further ulceration

- Ensure appropriate footwear and insoles
- Educate patient/family/carers
- Daily foot checks by patient/family/carers
- Regular neurovascular foot assessment by:
Podiatrist / Nurse / GP (6-12monthly)
-Early diagnosis and intervention of PVD
- Optimise DM control



Charcot Arthropathy

- Pathophysiology not well understood
- Two theories have been put forward – *neurotraumatic theory* and the *neurovascular theory*
- Initial presentation is a red, hot, swollen foot (+/- pain)
- Multiple fractures/bony changes
- History of very minor or no trauma at all
- Background of lengthy diabetes, gross neuropathy and good circulation
- Patients present at different stages of the condition



Charcot Arthropathy

- Often misdiagnosed (DVA, Cellulitis, Osteomyelitis)
- Clinical experience is important in diagnosis
- Charcot changes may not be evident early on X-ray
- Poor prognosis if not treated promptly – significant foot deformity
- **Treatment plan:** Non/limited weightbearing, total contact casts, optimise glycaemic control, ?bisphosphonates, monitor via x-ray and temperature
- Regular follow-up through the acute to chronic phase



Model of Care

http://www.healthnetworks.health.wa.gov.au/modelsofcare/docs/High_Risk_Foot_Model_of_Care.pdf

Cardiovascular and Diabetes & Endocrine Health Networks

Model of Care for the High Risk Foot

'If crocodiles had taken 34 legs and 14 lives in 3 years and had cost the taxpayer \$3.5 Million dollars, every person in Australia would know about it, and there would be an outcry for action'

O'Rourke I, Heard S, Treacy J et al. ANZ Journal of Surgery 2002; 72 (4): 286



National Guidelines

<http://www.nhmrc.gov.au/guidelines/publications/di21>

Prevention, Identification and Management of Foot Complications in Diabetes




THE GEORGE INSTITUTE
for Global Health


Baker IDI
HEART & DIABETES INSTITUTE


AHTA
Affiliate
Health Technology
Assessment

These guidelines have been endorsed by | Australasian Podiatry Council | Australian Diabetes Educators Association
Australian Diabetes Society | Australian Practice Nurses Association | Diabetes Australia Ltd
Pharmaceutical Society of Australia | The Royal Australian College of General Practitioners

April 2011

18 August 2014

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Multi-disciplinary Foot Clinics

- “*Gold standard*” in the management of diabetic foot ulceration +/- infection
 1. Reduced wound healing times
 2. Increased percentage of healed ulcers
 3. Decreased incidence of amputation
 4. Improved prognosis for limb salvage



Multi-disc Team Members

- Coordinator – Podiatrist (RPH), Endocrinologist (FHS), Vasc (SCGH)
- Podiatrists
- Endocrinologist/Diabetes Consultant &/or Reg
- ID/Micro Consultant &/or Reg
- Vascular Consultant/Reg
- Silver Chain Liaison Nurse
- Pedorthist
- Orthopaedic Surgeon – fortnightly
- On call: Vascular, Diabetic Educator, Woundcare Nurse



Access to Foot Care

- Tertiary Hospitals
 - High Risk/Active patients with active ulceration, amputation, severe PAD.
 - Multidisciplinary Foot Ulcer Clinics (RPH, SCGH and FHS)
 - GP/Consultant referral generally accepted
 - Multidisciplinary Foot Ulcer Clinic Telehealth Service for rural/remote patients (RPH – Fax 6477 5181 or phone 6477 5214)
 - Referral to Vascular Clinics/Silver Chain/HITH



Access to Foot Care

- Secondary Hospitals and Community Clinics
 - Moderate/Intermediate to High Risk patients with previous history of foot complications (amputation/ulceration/foot deformity/PAD).
 - Osborne Pk, SDH, BHS, RKH, Armadale, Lockridge, Moorditj Djena
- Private Services
 - Low to Moderate Risk Patients requiring routine treatment and screening/assessment.
 - May be eligible for Medicare funded care plan with up to 5 allied health visits per year (GP referral).

What can you do?

- Educate patients on importance of foot health
 - Regular podiatry review, daily foot checks, seek medical advice ASAP, don't walk barefoot, ensure footwear appropriate
- Educate on foot complications
 - neuropathy/PAD/ulceration/infection/amp
- Check every patient's feet for signs of injury/ulceration
- Recommend a podiatry review (at least every 12/12)
- Appropriate and early referral essential if ulcer noticed (Podiatry, Vascular etc)
- Help patients optimise BGL control & encourage weight loss
- Encourage patients to wear offloading devices/footwear

