

Foot Care

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Foot Care

Foot complications are among the most serious and costly diabetes complication for people with type 1 and type 2 diabetes.¹ Approximately 15% of people will develop a foot ulcer at some time during their lifetime and if that foot ulcer fails to heal this can lead to amputation.² Furthermore the five year survival rate is poor for the person who has had an amputation.² However, strategies which encompass prevention, patient and staff education, multidisciplinary treatment of foot ulcers and close monitoring can reduce the rate of amputations by 49-85%.¹

There are five key elements that underpin foot management.¹

- Regular inspection and examination of the feet by health care providers.
- Identification of the foot at risk.
- Education of the person, family and health care providers.
- Appropriate foot wear.
- Treatment of non-ulcerative pathology.

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Assessing and defining risk

Diabetic foot ulcers usually result from two or more risk factors occurring together. It is estimated that anywhere between 19.6%³ and 50%¹ of people with diabetes have at risk feet. All health care providers can play a role in helping people understand their level of risk and its associated self care practices. It is estimated that 70% of foot complications can be prevented by giving everyone that has diabetes some basic advice to keep them safe, and more specific tailored advice for those patients with increased risk factors.⁴

Targeted prevention of foot complications starts with identifying people who are at greater risk. It is only by a thorough and systematic history and assessment that the health professional can determine the level of risk for the individual. People with diabetes need to be aware of their level of risk, so they can develop the appropriate self care habits and behaviours. Foot care and education relevant to the level of risk should be put in place. Determining the level of risk will guide subsequent management including the type of referrals, frequency of follow up appointments and types of footwear.

It is important to understand that absence of symptoms especially pain does not mean that a persons feet are healthy; a person may have neuropathy, peripheral arterial disease, or even an ulcer and not be aware of it.¹

Risk factors

When defining risk there are four major risk factors to consider.

1. Previous foot ulceration, Charcot or previous amputation

A history of a previous foot ulcer or amputation is the single biggest risk factor for a patient to develop another one and automatically puts the person in a high risk category. Similarly a patient who has had an episode of Charcot Arthropathy is likely to have a significant level of neuropathy and significant foot deformity.

2. Peripheral neuropathy

Peripheral neuropathy is a major underlying risk factor in people with diabetes developing a foot ulcer.⁵ Sensory loss associated with peripheral neuropathy becomes progressively more common with increasing duration of diabetes or with poor glycaemic control.

Neuropathy leads to;

- > an insensitive foot – the patient does not feel pain, temperature or trauma
- > loss of sweating reflex so the skin is abnormally dry
- > muscle wasting which predisposes the person to structural deformities such as Claw toes
- > increased likelihood of developing corns and thickened callous and potentially ulceration.

The real risk of neuropathy to the patient

If a person with neuropathy has a minor trauma such as blisters from ill fitting shoes or walking barefoot on hot ground this can be enough to start a chronic ulcer.¹ If the person cannot feel their injury then they will continue to walk on the damaged area and will not identify the need to seek help as it is painless.

Clinical signs and symptoms of peripheral neuropathy

Abnormal sensitivity can be either;

- > decreased sensation - numbness
- > increased sensitivity - hypersensitive feelings of tingling, numbness, pins and needles, shooting pain and/or electric shocks. loss of vibration perception
- > inability to perceive hot or cold loss of deep tendon reflexes
- > loss of proprioception (position sense) and balance.

3. Peripheral arterial disease (PAD) – impaired circulation

Diabetes greatly increases the risk of PAD especially in women. People with diabetes are more likely to develop PAD at a younger age, with greater severity and women lose the protection of gender. The presence of PAD becomes progressively more common with the duration of diabetes and poor control. PAD is progressive and degenerative; hyperglycaemia, smoking, hypertension and hyperlipidaemia are all risk factors.⁶ Smoking is particularly significant in exacerbating PAD in people with diabetes and smoking cessation should be offered as a priority. PAD in conjunction with or without minor trauma may result in a painful, ischaemic foot ulcer.¹ However, if the person also has neuropathy then some symptoms associated with PAD such as intermittent claudication or rest pain may be absent. PAD is associated with a two to four fold increased risk of amputation.⁵ People with diabetes should be assessed regularly for PAD. Signs and symptoms of peripheral arterial disease can include;

- > absence of 1 or more foot pulses.
- > intermittent claudication
- > shiny appearance of skin
- > discolouration of skin may vary from;
 - white - classical presentation of an ischaemic limb
 - red (Hyperaemic) - can be confused with cellulitis
 - blue /purple - cyanotic
 - black - necrotic/gangrenous.
- > skin cool to touch
- > loss of hair on feet and toes.

4. Foot deformity

Foot deformities, such as bunions, hammer or claw toes are major contributors to increasing foot pressures. Callus (hard skin) develops in response to shear stresses and usually occurs close to a bony prominence. This is made worse by the fact that most people with diabetes have abnormally dry skin due to the presence of autonomic neuropathy which causes a loss of the sweating reflex. Callus contributes to increases in foot pressure by acting as a foreign body and predisposes to the formation of ulcers beneath these lesions.

Limited joint mobility and bony deformities or callus in the presence of neuropathy increase the risk of ulceration.⁵ Similarly deformity from previous amputation also increases the risk of ulceration (3-fold increase). Patients that have had a previous Charcot will most likely have a significant level of neuropathy and foot deformity and will always be vulnerable to pressure breakdowns and damage.

5. Other risk factors

There is also evidence to suggest that the following factors increase the persons risk;²

- > visual impairment
- > kidney disease
- > poor glycaemic control
- > ill fitting footwear
- > smoking
- > socio-economic disadvantage.

Identifying those at risk

NHMRC recommendations²

1. Assess all people with diabetes and stratify their risk of developing foot complications into the categories of low, intermediate or high.
2. Assess risk stratification by inquiring about previous foot ulceration and amputation, visually inspecting the feet for structural abnormalities and ulceration, assessing for neuropathy eg with a 10 gram monofilament, assessing vascular status by palpating foot pulses.

Defining risk of foot complications and amputation

The NHMRC guidelines (2011) outline 3 separate levels of risk stratification;

- > low risk - no risk factors and no previous history of foot ulcer/amputation
- > intermediate risk - the person has one risk factor eg neuropathy, peripheral arterial disease or foot deformity and no previous history of foot ulcer/amputation
- > high risk - the person has two or more risk factors eg neuropathy, peripheral arterial disease or foot deformity and/or a previous history of foot ulcer/amputation.

NOTE: All Aboriginal and Torres Strait Islander people should be considered high risk until adequately assessed.

Frequency of risk assessment

Low risk - foot examination annually

Intermediate risk & high risk - foot examination every 3 to 6 months and foot protection program including;

- > podiatry review
- > foot care education
- > foot care education
- > appropriate footwear.

High risk with current foot ulceration/amputation - foot examination frequency and care as directed by podiatrist/GP/multi-disciplinary foot team (see p.13).

Doing a foot risk assessment

Health professionals such as diabetes educators, practice nurses, Aboriginal health workers and community nurses are in an excellent position to carry out foot risk assessments. Contact your local podiatry service or diabetes service for information about foot risk assessment forms that can guide your practice.

Additional foot pathologies and their management

Tinea

Tinea is a fungal infection which often targets the feet;⁷

- > **Symptoms:** itching and stinging, reddening, scaly rash, cracking, splitting and peeling, blisters
- > **Treatment:** antifungal creams, seek medical or podiatry advice if person has at risk feet
- > **Reducing the risk:** dry feet thoroughly particularly between the toes, expose the feet to as much as air as possible, wear cotton socks, wear thongs to swimming pools and communal showers, wear clean socks each day, expose shoes in sunshine.

Dry skin

- > Massage a water-based moisturiser such as Sorbolene cream into all areas of the feet (do not put cream between the toes). Wipe off stickiness.

Corns and calluses

- > Callus and corns are signs of pressure and the mainstay of treatment is to reduce the pressure to prevent recurrence.
- > Corns and calluses should never be cut or removed with commercial remedies which may ulcerate the skin. Refer to podiatrist.

Moist skin:

- > Can be found inter-digitally, especially when toe joints are stiffened or close together. If excessive maceration, paint toe creases with alcohol solution on a cotton bud.
- > It may be necessary to use an antifungal agent solution if there is a fungal infection – athlete's foot present.

Minor skin damage:

Can be treated by using the recommended first aid routine below.

First aid for minor skin injuries (small cuts, abrasions etc);

- > Gently wash and dry the foot. Ideally use a salt water solution eg 1tbls/15ml normal table salt to 0.5litres lukewarm water.
- > Apply antiseptic – eg Povidone-iodine or chlorhexidine solution.
- > Apply a clean non-stick dressing and secure with tape-bandage.
- > Protect with additional padding or bandage if needed.
- > After the daily shower re-dress the foot until healed.

Notify the doctor if there is any deterioration, signs of infection or delay in healing within 24 hours or immediately if any pus.

Practice tips

Active problem	Signs and symptoms
Infection	<ul style="list-style-type: none">> look for redness, warmth, discharge, swelling, pain> usually accompanied by elevated blood glucose levels> may spread rapidly - signs visible across the foot or up the leg> signs may be masked by ischaemia or neuropathy
Corns and callus	<ul style="list-style-type: none">> must be regarded as pre-ulcerative, especially in the neuropathic foot> appear as areas of hard, yellow, thickened skin> occur at pressure points> early treatment and pressure relief prevents ulceration
Skin breaks	<ul style="list-style-type: none">> possible portal for bacteria and therefore infection> check between toes and around heels> treat skin which is excessively dry or moist
Nail disorders	<ul style="list-style-type: none">> thickness> discoloration> infection> check general condition> provision for basic nail care may be necessary

Prevention

All people with diabetes should receive foot care education that is targeted to their level of risk. For people with at risk feet the foot care education should be part of their individualised foot protection program.

Education is best presented in several sessions using a mixture of methods. The person with diabetes needs to learn how to recognise potential foot problems and be aware of the steps they need to take when a problem occurs. Education should be structured in such a way that it is appropriate for their individual level of risk.

As part of the foot assessment it is important to ascertain what the person understands about the effects of diabetes on foot health. Asking the person if they know why and how diabetes can affect their feet and what the associated self care practices are. Are their feet adequately cared for?

The last part of the assessment is an opportunity to assess whether the person is capable of the level of care that is required for their level of foot risk.

All health care providers should be involved in ensuring that the person with diabetes has regular inspection and examination of both feet. Shoes and socks should also be inspected. It is through regular checks and reinforcement of appropriate and relevant self care practices that the person with diabetes will gain an appreciation of the importance of foot care.

Basic foot care principles

Foot care involves daily washing, drying and regular inspecting of the feet. People who are unable to do so should be helped to find the best way to perform this. Health care providers and carers can supervise this practice initially and regularly check that the person performs foot care daily. The person may need help to organise a low, safe seat, plastic bowl, mirror and a mild soap.

Health care providers should assist as appropriate for those who are not able to manage themselves.

Trimming toe nails

Toe nails which are 'normal' in size and shape (absence of thick-gryophotic, crumbly-mycotic, ingrown +/- infection) may be cut by any competent person.⁸

Wash the feet, ensure a seat in a good light and provide a pair of clean, stainless steel nail clippers. Each person must have their own clippers or clippers need to be cleaned and sterilised between cuttings.

Trim nails following the natural curve of the toe, being sure not to cut too short. Never cut down the sides of the nail. If there are sharp edges, file with nail file or emery board.

Foot care education for those with low risk feet

Foot care education should be provided to all people with diabetes to assist with the prevention of foot complications and the early treatment of injury.

The person with low risk feet needs education and information about the importance of;

- > daily foot hygiene
- > regular inspection of the feet (what to look for, when to seek help, who they can contact if there is a problem)
- > foot examination by an appropriately trained health profession at least annually
- > having information about first aid for minor cuts
- > appropriate footwear for their needs.

The person with low risk feet needs to understand that their foot risk can change over time and that regular inspection at home and by their health professional will ensure that any changes are detected early thus reducing the risk of foot complications.

Foot protection program for those with at risk feet

A key aspect of education is to teach those with at risk feet the importance of self care. The responsibility of the individual with diabetes or of their carer cannot be emphasised strongly enough. Daily inspections of at risk feet and footwear should be conducted at home, with particular attention paid to the identification of any problems and early management of these. People assessed as having 'at risk' feet should be offered a foot protection program.

A foot protection program as outlined in NHMRC 2011 guidelines includes;

- > foot care education
- > podiatry review
- > appropriate footwear.

1. Foot care education which should be considered includes;¹

- > daily inspection of feet, including areas between the toes (if not possible then arrangements will need to be made for someone else to be able to do it)
- > regular washing of feet with careful drying, especially between the toes (water temperature always below 37 degrees)
- > do not use a heater or a hot water bottle to warm up feet
- > avoid walking barefoot when walking indoors or outdoors
- > avoid wearing shoes without socks
- > daily inspection and palpitation of the inside of the shoes
- > do not wear tight shoes or shoes with rough edges and uneven seams
- > do not use moisturising creams between the toes
- > change socks daily
- > wear stockings inside out or seamless
- > do not wear tight or knee high socks
- > care in cutting nails
- > always have corns and calluses removed by a podiatrist
- > notify healthcare provider at once if blister, cut, scratch or sore has developed (action plan)
- > ensure regular examinations by podiatrist and other health professionals.

2. Regular podiatry review

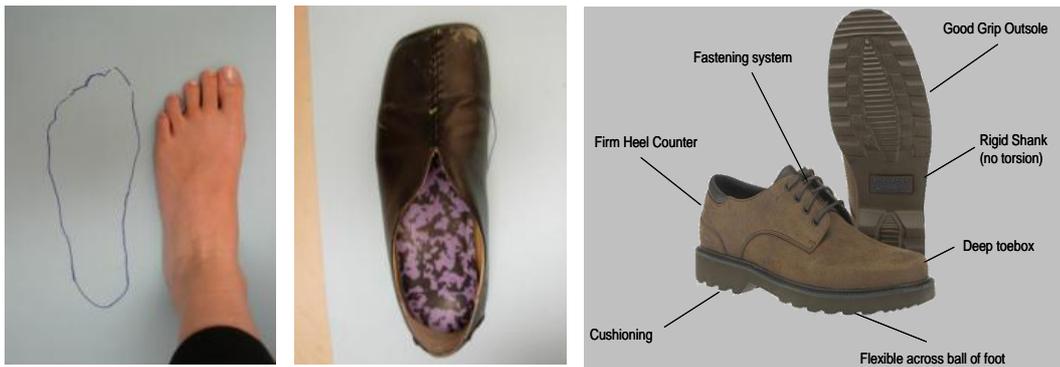
It is important that regular podiatry review is part of the foot protection program. In addition, the person should receive individualised education about when and how to seek help from their health professionals should a problem arise.

In a person with 'at risk' feet it is important that callus, nail and skin pathology are assessed and potentially treated by a podiatrist. Deformities may be managed using orthoses and sometimes surgery.¹

3. Appropriate footwear

Inappropriate footwear is a major cause of ulceration.^{1,5} People who do not have altered sensation or deformities can select off-the-shelf footwear. For people with neuropathy and/or PVD extra care is needed when selecting shoes. Shoes should not be too tight or too loose eg allow 1-2cm longer than the foot.¹ Shoes should be selected at the end of the day to allow for any swelling and any new shoe needs to be broken in very slowly eg half an hour only on the first day and then increase time over next few days, checking for signs of pressure.

If there are signs of abnormal loading of the foot eg callus, corns, ulceration then the person will probably need special foot wear including insoles and orthoses. Consult a podiatrist.



Ensure footwear is of appropriate size, shape and width to accommodate the foot. Avoid vinyl uppers as these can trap moisture. Poorly fitting shoes can cause blisters and corns which may ulcerate, especially in the person with sensory loss.⁶

A Foot Protection Plan - Example

John is a 55 year old man who has peripheral neuropathy. He has adequate blood supply and no visual or dexterity limitations. He has had no previous ulcer and has adequate self care skills. His assessment finds that he has an intermediate risk and will need at least 6 monthly podiatry reviews. As part of his care he is given a factsheet on caring for at-risk feet and an individualised Foot Care Protection Plan.

Potential problems	Cause	Action
Skin break	Injury eg cut, heat injury	Avoid walking barefoot even when inside. Check inside the shoe before you put them on. Make sure shoes fit well. Keep feet away from excess heat eg heaters, hot water bottles, wheat bags. If an injury does occur: <ul style="list-style-type: none"> > gently wash and dry the foot > apply mild antiseptic and cover with a sterile dressing > contact your doctor immediately for further advice.
Rubbing, blisters	excess pressure or ill fitted shoes	Check feet daily to see if there are any signs of pressure or other damage. Break shoes in slowly. See podiatrist for footwear advice.
Nails		Cut nails following natural curve of toe, not too short, and file edges.
Moist areas between the toes		Moisturise the feet but not between the toes. See doctor if signs of tinea infection.
Redness, warmth or swelling	infection	See doctor straight away.
Please see your podiatrist every: 6 months		
If concerned please contact: Dr Brown – 8222 6114 Podiatrist (Mary) 8232 4711 Diabetes Educator (Jane) 8211 4757		

Managing foot complications

People presenting with foot ulcers must be managed in relation to the extent of ulceration and results of investigations. Foot ulcers present a special problem and require intensive medical, nursing and podiatry assessment and management. Pressure is often the key issue in ulcer development, and ulcers will not heal unless pressure on the area is reduced or eliminated. If the ulcer is on a weight bearing or a frictional area of the foot, podiatry advice should be sought, as wound management alone is unlikely to allow the area to heal or remain healed.³ Ulcer care stresses the need for adequate circulation, early antibiotics if clinically indicated, appropriate wound care and removal of pressure.

Referral to a multidisciplinary foot care team

The NHMRC 2011 guidelines clearly state that people with diabetes related foot ulceration are best managed through a multidisciplinary foot care team.²

The multidisciplinary team needs to work across primary and secondary health services.¹ The team commonly includes a physician, podiatrist, specialist nurse, orthotists and surgeon.⁵ If this expertise can not be found locally a virtual clinic can be set up using technology such as digital photos, telephone and videoconferencing. Strong local networks are also important so that staff can keep up to date and resources can be used appropriately.

Indicators for referral include;²

- > deep ulcers (probe to tendon, joint or bone)
- > ulcers not reducing in size after 4 weeks despite appropriate treatment
- > the absence of foot pulses
- > ascending cellulitis and
- > suspected Charcot's neuroarthropathy (eg unilateral, red, hot, swollen).

Principles of ulcer treatment;¹

- > relief of pressure and protection of the ulcer eg mechanical off loading
- > restoration of skin perfusion eg surgery, cardiovascular risk factor reduction
- > treatment of infection eg debridement and antibiotics
- > metabolic control and treatment of co morbidity eg BGLs less than 8.0mmol/L, treat oedema and malnutrition
- > local wound care eg wound debridement and control of exudate
- > education of patient and relatives eg self care, how to recognise and report (worsening) signs and symptoms of infection such as fever, changes in wound or hyperglycaemia
- > determining the cause and preventing recurrence.

For more information please refer to the NHMRC Quick Decision Guide at

<http://t2dgr.bakeridi.edu.au/LinkClick.aspx?fileticket=H7cgA-bmWak%3d&tabid=172>

Foot care in specialist areas

Foot care in the operating theatre

Protect bony protuberances such as ankle bones, heels and 'bunions' with cushioning materials if the operation requires a body position which will cause prolonged pressure to the 'at risk' areas. Use lambskin boots, protectors, foam, air pillows, etc. Inform the theatre nurse of the need for pressure relieving devices during the operation and prior to theatre.

Keep feet warm. A cold foot will automatically close down peripheral circulation. An ischaemic area, under pressure, may precipitate skin breakdown and subsequent ulcer. Use cotton or wool socks and sockettes to increase warmth.

Foot care in intensive care / high dependency / recovery

The focus of attention will be on 'vital signs' but there are numerous examples of people with diabetes who recover from a heart attack or stroke, only to spend months immobilised with a non-healing foot ulcer. Sensible foot care will avert this risk.

Use cushioning materials, attend pressure areas two hourly with immobilised, paralysed or unconscious patients, keep the feet warm with socks, wash and thoroughly dry interdigital areas and treat macerated skin.

Lengthy bed rest often associated with hospital admissions requires careful assessment and daily observation of feet. Avoid pressure being exerted on toes and heels.

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