

MedicineToday

The Peer Reviewed Journal of Clinical Practice

The ABCS of foot care in diabetes

Reprint Collection

Assessing the risk factors

A is for anaesthesia

B is for blood

C is for care

S is for structure

Patient handouts

Nerve damage

Foot care and footwear for healthy feet

Your foot report



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The Peer Reviewed Journal of Clinical Practice



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The articles in this reprint collection were originally published in *Medicine Today*, November 2008 to May 2009.

The ABCS of foot care in diabetes

Any health professional working with people who have diabetes knows how devastating diabetes-related foot disease can be. The tragedy is that many of the problems are preventable.

We have developed the ABCS of foot care for people with diabetes as a simple, quick and practical model for medical and allied health professionals to enable an easy yet comprehensive assessment of the feet in a few minutes.

The ABCS model covers the four key risk factors for foot problems in diabetes:

- A is for Anaesthesia (neuropathy)
- B is for Blood (vascular supply)
- C is for Care (foot care needs and provision)
- S for Structure (foot shape and pressure areas).

We recommend grading the results of assessing these factors into three levels of risk, the foot factor 'traffic lights':

- red – for danger and immediate action
- amber – for caution and issues to address
- green – for healthy feet and review in six months.

Foot care in patients with diabetes can therefore be guided by assessing the ABCS in their feet and checking them against the traffic lights to determine the risk of minor foot injuries becoming severe foot problems.

The ABCS of foot care in diabetes promotes a standard, cross-disciplinary approach to diabetes foot assessment, and is supplemented with patient-friendly information in the form of patient handouts.

The development of an electronic, or e-health, version of the ABCS model means that clinicians can also access it at their computers.¹

We hope that you and your colleagues and patients find this structured assessment model useful and of benefit. MT

1. To access the e-health ABCS of diabetes foot care 'traffic lights', please contact: Cathy.Teager@health.sa.gov.au

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The ABCS of foot care in diabetes: assessing the risk factors

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This first article in a series on risk factors for foot problems in people with diabetes introduces the ABCS of foot care.

GPs are familiar with the ABCS of diabetes care – A_{1c} (glycosylated haemoglobin; A), blood pressure (B), cholesterol (C), smoking (s) and salicylates (s) – which refer to the risk factors for diabetes complications in general. This article introduces the ABCS of foot care in people with diabetes – which refer to the risk factors for diabetes-related foot problems. The ABCS are:¹

- A – anaesthesia (i.e. peripheral neuropathy)
- B – blood supply (i.e. peripheral vascular disease)
- C – care (i.e. routine preventive foot care)
- S – structure (i.e. abnormal foot structure).

Neuropathy and/or peripheral vascular disease in people with diabetes, along with poorer defence against infection, can mean that minor foot injuries develop into foot ulcers that can take months to heal, or possibly lead to amputation. The loss of a toe, foot or leg usually heralds

a loss of more of that leg and/or of the other leg – almost 3400 Australians had lower limb amputations in 2004–05.² Foot problems are second only to cardiovascular problems in terms of health care costs in patients with diabetes.³

The foot factors, the ABCS, become important for those people with diabetes who are aged over 60 years, who have had diabetes for 20 years or more, or who have significant macrovascular complications (i.e. coronary artery disease, cerebrovascular disease) and/or microvascular complications (i.e. retinopathy, nephropathy). The Commonwealth Government recognises the importance of foot problems in people with diabetes. Medicare's routine 'annual cycle of care for diabetes' (which attracts a Service Incentive Program [SIP] payment) includes a six-monthly foot check, and the Medicare Plus services

available through Team Care Arrangements (TCAs) include podiatry.⁴

Foot review in diabetes is focused on the ABCS because people with diabetes are prone to peripheral neuropathy and peripheral vascular disease and often need special care to avoid problems, especially as they are likely to have abnormal foot structure. The box on page 6 summarises the ABCS of foot care and the assessing of these factors.

The 5 A's – Ask, Assess, Advise, Assist and Arrange – provide a practical framework for foot care (Table 1):

- Ask about symptoms
- Assess signs
- Advise on foot care, footwear and action plans
- Assist by involving other carers
- Arrange regular reviews, and specialist referrals if indicated.

The diabetes annual cycle of care supported by Medicare provides a structure for ongoing diabetes care and the opportunity to apply the 5 A's in the six-monthly foot check (Figure).⁴

A practice nurse can apply the first four A's – ask, assess, advise and assist, as listed in Table 1 – and then use the findings of the first two A's to grade the level of risk of the feet using the foot factor 'traffic lights' listed in Table 2. The nurse should bring to the attention of the GP

Comments on foot problems from patients with diabetes

'My feet feel like they are wrapped in cotton wool...'

'I can get to the first floor but then it gets too painful...'

'My skin is so dry and cracks so easily... and I'm finding it hard to get my hands close enough to cut my nails...'

'My family laughs but having bunions isn't funny. I have to get special shoes or stretch them, and to cut holes in my slippers...'



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The ABCS of diabetic foot care and their assessment

A - Anaesthesia

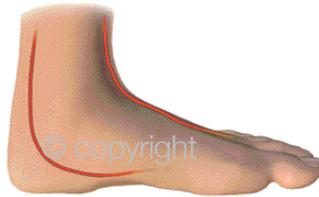


Peripheral neuropathy

Check:

- Abnormal sensation
- Loss of sensation

B - Blood supply



Peripheral vascular disease

Check:

- Symptoms of claudication
- Pulses
- Ankle to brachial pressure index

C - Care



Check:

- Foot care routines
- Visual impairment, musculoskeletal stiffness
- Footwear

S - Structure



Check: • Arches



Check: • Alignment



any patients with warning signs of neuropathy, peripheral vascular disease, inadequate self-care or abnormal foot structure.

The GP can then apply the fifth A, 'arrange', by individualising foot care using a graded approach depending upon the foot assessment findings. In the 'traffic lights' approach (Table 2):

- all 'green lights' indicates low risk – general foot care advice recommended
- one or more 'amber lights' indicates moderate risk – regular podiatry care and assessment required
- one or more 'red lights' indicates high risk – referral to a podiatrist required.

The GP's arrangements for referrals can be made through GP Management Plans (GMPs) and Team Care Arrangements (TCAs), for which Medicare support may be claimed.

Assessing A - presence of anaesthesia

The gold standard for checking sensation is to determine the thresholds for vibration, temperature or touch, which can be time-consuming and complex. It is much simpler, and generally quite sufficient, to follow the 'Keep it short and simple' (KISS) principle and ask the patient about symptoms of abnormal sensation (dysaesthesia) or loss of sensation (anaesthesia) and to check for loss of sensation.

A quick check of sensation is to see if the patient can, with their eyes shut, feel cotton wool being bent at several different parts of the foot. If he or she cannot feel the cotton wool, the test should be tried using a finger – assuming the tester has normal sensation, if the tester can feel the touch then so should the patient. The final check, and a very

convincing demonstration to the person, is to repeat the exercise with the person's eyes open. Patients can then see they have a loss of sensation and will understand better that they have a potential problem and need to take precautions.

Ideally, a 10 g monofilament should be used in preference to cotton wool as it has been shown to identify those patients at immediate risk of undetected foot injury. The force of 10 g required to bend a correctly calibrated monofilament indicates loss of enough sensation for the foot to be at risk of such injury.

Checking for sensation to pinprick (using a disposable sharp) and checking reflexes confirms any abnormality.

Neuropathy accompanied by pain is less common but more distressing than neuropathy without pain. Glycaemia and diet should be reviewed in patients with painful neuropathy, and medication such

Table 1. The ABCS and the 5A's - a framework for foot care

ABCS of foot care	The five 5A's				
	Ask about symptoms	Assess signs	Advise about foot care and/or footwear	Assist by involving other carers	Arrange reviews and/or referrals
Anaesthesia	Any tingling, numbness?	Sensation	Daily foot care routine Inappropriate footwear	Possibly a relative or other carer, a visiting nurse or a podiatrist	Podiatry assessment and review, action plan
Blood supply	Any claudication, cold feet?	Pulses	Daily foot care routine Inappropriate footwear	Possibly a relative or other carer, a visiting nurse or a podiatrist	Podiatry assessment and review, action plan
Care	What foot care routines are followed? Do shoes fit well?	Nails and skin (thickening, drying, cracking)	Foot care routines Appropriate footwear	Possibly a relative or other carer, a visiting nurse or a podiatrist	Education, ongoing review
Structure	Any foot soreness?	Foot arches, angles and abnormalities - when standing	Special footwear	Possibly a relative or other carer, a visiting nurse or a podiatrist	Orthotic, podiatry and/or physiotherapy review

as capsaicin cream (Zostrix HP) or night-time amitriptyline (Endep) may be used as symptomatic treatment. Gabapentin (e.g. Neurontin) or pregabalin (Lyrica) may also be used. Sleep disturbances and associated emotional distress need to be addressed.

Peripheral neuropathy should be assumed until proven otherwise in patients who have had diabetes for 20 years or more.

Assessing B - decreased blood supply

Once again the KISS principle applies. The ankle to brachial Doppler pressure index or plethysmograph may be the ideals but it is much simpler to ask for symptoms of claudication or 'freezing feet' and to check pulses (femoral, popliteal, posterior tibial and dorsalis pedis).

If Doppler ultrasound equipment is available, the ankle to brachial pressure index should be checked (below 0.9 is abnormal). When peripheral arterial disease is recognised, a vascular consultation should be considered. Early assessment and intervention in vascular disease may prevent an amputation.

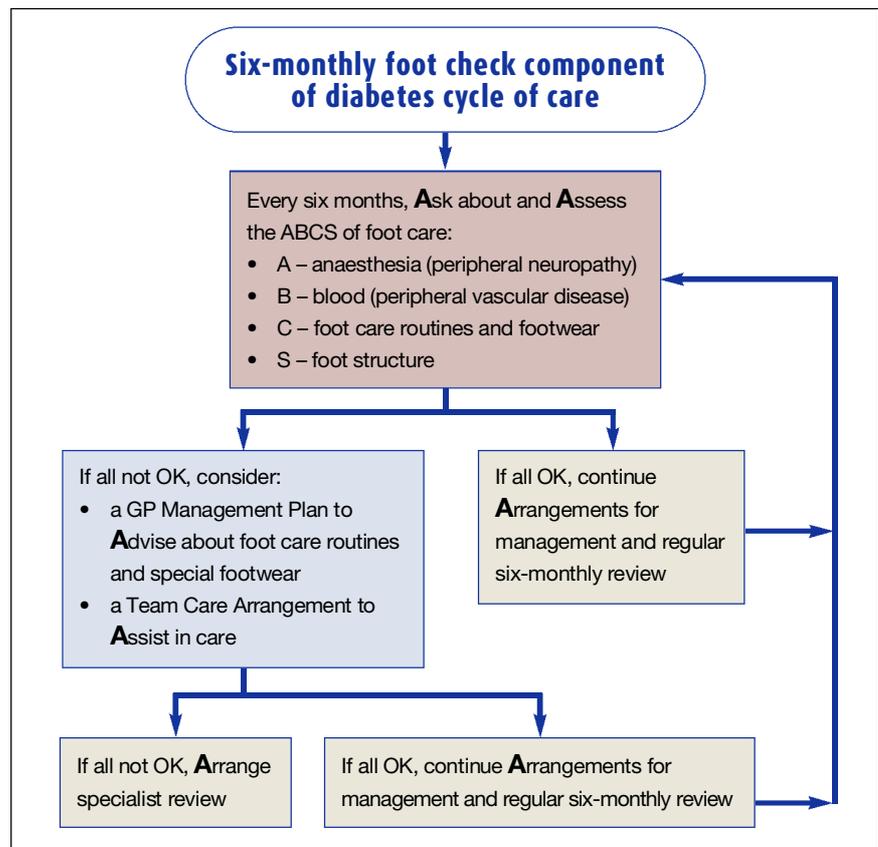


Figure. Implementing the 5A's in the foot examination section of Medicare's annual cycle of care for diabetes patients.⁴

Table 2. Foot factor traffic lights and patient risk assessment

Foot factor traffic lights			
Foot factor assessment	Red lights – ‘Danger’	Amber lights – ‘Caution’	Green lights – ‘Healthy’
Anaesthesia – Pinprick, light touch – Reflexes	No stimuli felt No reflexes	Reduced stimuli Reduced reflexes	All stimuli felt Normal reflexes
Blood supply – Pulse palpation	No pulses	Reduced pulses	Normal pulses
Care – Questioning – Observation	–* Skin breakdown	Foot care, footwear could be better Threatened skin breakdown	Appropriate foot care, footwear Normal skin
Structure – Observation	Weight-bearing ulcer	Callus or corn	No skin lesions
Patient risk assessment			
Traffic lights	Risk assessment	Recommended action	
One or more ‘red lights’	High risk	Refer promptly to a podiatrist	
One or more ‘amber lights’	Moderate risk	Regular podiatry care and assessment	
All ‘green lights’	Low risk	General foot care advice	
* Inadequate foot care in the absence of any other red or amber traffic lights is not a major risk factor for severe foot problems.			

If a person is a smoker, has had diabetes for 20 years or longer, or has coronary artery disease or cerebrovascular disease, they should be assumed to have peripheral vascular disease until proven otherwise.

Assessing C – foot care and footwear

A person with normal sensation and circulation is warned of damage by pain and protected from limb-threatening problems by the body’s healing capacity. Inadequate foot care or inappropriate footwear may not be much of a threat.

But things can change. Both neuropathy and vascular damage are quite advanced before they become symptomatic or are associated with clinical signs. A small self-care and/or footwear problem now may be a significant risk in 10 years’ time.

Anyone with diabetes, and especially someone with one or more of the other

ABCS (i.e. peripheral neuropathy, peripheral vascular disease and/or abnormal foot structure) should have his or her routine foot care and the appropriateness of his or her footwear reviewed at least every six months. A problem (especially a skin lesion on a weight-bearing area) should prompt early referral.

Assessing S – foot structure

The foot has two natural arches (i.e. anteroposterior and mediolateral), one natural orientation (and two unnatural ones – inpointing and outpointing) and, in diabetes, two potential problems associated with neuropathy (i.e. clawed toes from motor neuropathy and a ‘collapsed’ foot from sensory neuropathy).

Structural abnormalities are common and are indicated by localised corns and calluses. In a person without neuropathy or peripheral vascular disease and with appropriate foot care and footwear, they

are usually only minor problems of discomfort. In a person with diabetes and one of the other ABCS, however, abnormal foot structure can become limb-threatening.

The foot should be examined in its functional position (standing), both with and without its usual footwear. Check the longitudinal and transverse arches, the alignment (inpointing or ‘pigeon toed’; outpointing or ‘duck feet’) and for bunions or clawed toes (often associated with motor neuropathy).

It is often easier to see ‘odd shaped feet’ and inappropriate footwear if the person is watched walking barefoot and then in his or her usual footwear. Odd shaped feet in a person with diabetes need assessment by a podiatrist and/or an orthotist with an interest and experience in diabetes. Surgical intervention may be indicated if conservative measures fail to accommodate the feet.

Conclusion

Patients with diabetes need differing intensities of foot care. Some need general education and regular podiatry, others need specialist team care to successfully manage their foot ulcers, and some will need amputation as their circulation deteriorates to the stage of being adequate only to maintain health and not heal damage.

The framework of foot care in people with diabetes can be summarised as:

- check the ABCS – sensation, pulses, skin and nail care and misshaped feet – every six months as part of the SIP cycle

- use the 5 A's (ask, assess, advise, assist, arrange) to review foot care risk
- organise a Team Care Arrangement and specialist referral if there are existing or potential problems. **MT**

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The ABCS of foot care in diabetes: A is for anaesthesia

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This second article on risk factors for foot problems in people with diabetes discusses the various aspects of peripheral neuropathy and provides guidelines for patients on caring for feet with nerve damage.

The ABCS of foot care refer to the major risk factors for foot problems in people with diabetes – A, anaesthesia (i.e. peripheral neuropathy); B, blood supply (i.e. peripheral vascular disease); C, care (i.e. routine preventive foot care); and S, structure (i.e. abnormal foot structure). This article reviews the first of these, peripheral neuropathy, and includes a patient handout on nerve damage. The previous article in this series, published in the November 2008 issue of *Medicine Today*, discussed the assessment of the podiatric ABCS, and future articles will discuss the other three risk factors.¹ A patient handout on foot care for people with diabetes, ‘Your foot report’, will conclude the series.

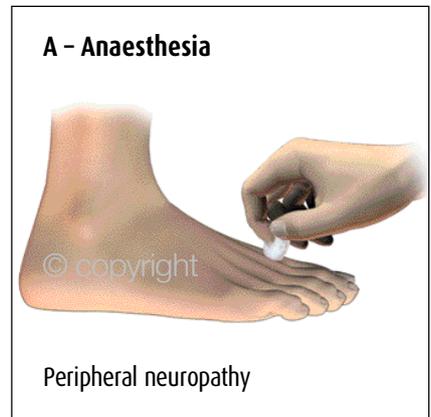
The foot factor traffic lights

A person with diabetes and normal sensation and circulation in their feet and normal foot structure needs the same foot care and footwear as a person without diabetes. But if the person has one or more of the risk factors for foot problems, more intense foot care and monitoring and special footwear will probably be necessary.

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This will reduce the likelihood of a problem developing and enable detection of problems that do occur so intervention can be prompt.

The podiatric ABCS can be thought of as a series of traffic lights: if all four are green then there is little risk of foot problems, but the risk increases steadily as more of the lights turn yellow and then red. Table 1 summarises the principle.¹ When there has been sufficient long-term damage to the foot to break the skin and form an ulcer, tissues are at risk of infection. The occurrence of a foot ulcer signals a very high risk of further ulcers and should trigger a review of all the ABCS and



the patient’s understanding and application of appropriate protection, detection and response plans. Referral to a specialist foot clinic should be considered, if one is available.

Peripheral neuropathy

Several clinical syndromes are associated with peripheral neuropathy in patients with diabetes, and patients often have multiple or overlapping syndromes. Sensory loss (anaesthesia) associated with diabetic peripheral neuropathy becomes progressively more common with increasing duration of diabetes (Figure 1).² Early sensory nerve damage is often associated

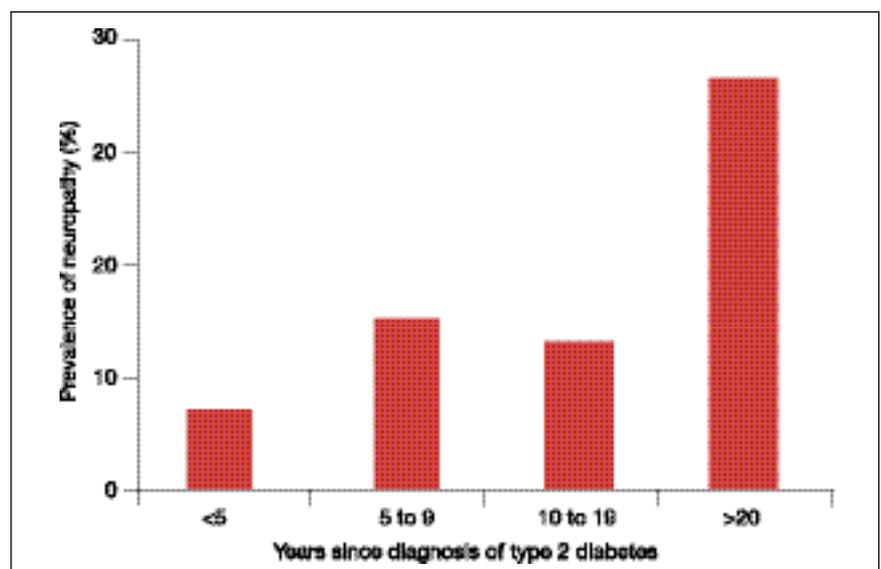


Figure 1. Prevalence of diabetic neuropathy.²

Table 1. Foot factor traffic lights and patient risk assessment

Foot factor traffic lights			
Foot factor assessment	Red lights – ‘Danger’	Amber lights – ‘Caution’	Green lights – ‘Healthy’
Anaesthesia – Pinprick, light touch – Reflexes	No stimuli felt No reflexes	Reduced stimuli Reduced reflexes	All stimuli felt Normal reflexes
Blood supply – Pulse palpation	No pulses	Reduced pulses	Normal pulses
Care – Questioning – Observation	–* Skin breakdown	Foot care, footwear could be better Threatened skin breakdown	Appropriate foot care, footwear Normal skin
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All ‘green lights’	Low risk	General foot care advice	
* Inadequate foot care in the absence of any other red or amber traffic lights is not a major risk factor for severe foot problems.			

with abnormal sensation (dysaesthesia) as well as anaesthesia. As the neuropathy progresses, anaesthesia dominates and two other syndromes – motor neuropathy and autonomic neuropathy – become clinically significant. Motor neuropathy with skeletal muscle atrophy and weakness is associated with secondary foot deformities. Autonomic neuropathy has a wide range of manifestations but most often causes dry skin and peripheral oedema because of damage to the sympathetic nerve fibres that supply the sweat glands and arterioles in the skin.

The patterns of progression of diabetic peripheral neuropathy and of symptoms are very variable. Generally, however, neuropathy progresses, although the four components (dysaesthesia, anaesthesia, motor neuropathy and autonomic neuropathy) may not progress at the same rate.

This article reviews the four aspects of diabetic peripheral neuropathy and discusses their implications for general

practice. The assessment of peripheral neuropathy was discussed in detail in the previous article in this series.¹ Briefly, sensation is checked by light touch (with cottonwool or, ideally, a 10 g monofilament) and abnormalities are confirmed by checking for sensation to pinprick and checking reflexes.

Abnormal sensation

‘At night armies of ants march up and down my legs. Sometimes the ants decide to burn instead and my legs feel like they are on fire.’

Annie, who has had type 2 diabetes for five years.

The presence of abnormal sensations is the most distressing symptom of neuropathy for patients and may limit their activities during the day and their sleep during the night. The sensations include burning, prickling pain, tingling, electric shock-like feelings, aching, tightness and hypersensitivity to touch. As the neuropathy progresses, the sensations also include

numbness, and loss of balance and painless injuries may occur.

The disturbed sensations are caused by early damage to sensory (or afferent) nerves, with the healing process causing nerve fibres (axons) from one sensory receptor to connect to fibres that previously carried signals from a different sensory receptor. Usually this starts in the small unmyelinated or lightly myelinated fibres of the afferent nerves in the distal lower limb, which are particularly susceptible to damage because of their long length. The nerve damage results from prolonged hyperglycaemia leading to accumulations of metabolites in neurons and the nerve fibres ultimately losing the ability to conduct electrical impulses. The severity of the abnormal sensations is, therefore, generally related to the degree of hyperglycaemia. Improving glycaemic control may, therefore, improve symptoms.

Abnormal sensation may not be limited to the lower limbs. As the nerve

Table 2. Nondiabetes-related causes of peripheral neuropathy

- Nutrition, ethanol, vitamin deficiency (thiamin, vitamin B₁₂ and folic acid, especially with the 'tea and toast' diet of many older people)
- Medical problems – especially entrapment neuropathies (e.g. carpal tunnel syndrome); rarely myeloma, hypothyroidism, paraneoplastic disorders
- Medications (e.g. sulfasalazine, perhexiline, isoniazid)

Note: Radicular leg pain caused by lumbar spine/disc disease has a different distribution: unilateral and in the nerve root distribution. Pain may occur at the appropriate level of the back.

damage progresses, the upper limbs may become affected (the so-called 'glove and stocking' distribution, which describes the lesser involvement of the upper limbs compared with the lower limbs).

Sometimes there is the 'double whammy' of pressure and diabetes-related damage for the nerves that negotiate various 'tunnels' – for example, the median nerve at the wrist, the ulnar nerve at the elbow and possibly the peroneal nerve at the knee. For these nerves, a single cause of damage may not cause problems but combination does.

Nondiabetes-related causes of neuropathy are listed in Table 2. The double whammy of diabetes-related and nondiabetes-related causes of neuropathy can be associated with any or all of the clinical syndromes occurring with diabetic peripheral neuropathy.

In the early stages of dysaesthesia, discomfort from painful neuropathy can be an occasional nuisance when a benign stimulus (such as putting on a sock) results in a disturbing sensation or pain. In the later stages, the pain often becomes

more generalised and more severe, typically occurring at night and keeping patients awake.

Patients may find ways to relieve the discomfort by trial and error. Sleeping with the feet outside the covers is often reported, and is effective because the feet become cold and numb and the covers no longer stimulate the skin. A range of complementary medicines is often tried, especially vitamin preparations. However, in the absence of a specific deficiency, vitamin supplements have not been shown to be effective in clinical trials.

Fortunately some interventions do help at least some people (Table 3). They seem to work in various ways, including by:

- reducing the perception of abnormal sensation – e.g. tricyclic antidepressants and transcutaneous electrical nerve stimulation (TENS)
- reducing receptor responses to stimuli – e.g. capsaicin (Zostrix HP), which depletes substance P, a neurotransmitter and neuromodulator in pain perception
- putting a physical barrier between the skin and the environment – e.g. a film dressing such as Opsite Spray, or silicone stockings.

Combining interventions is much more effective than any single intervention alone.

Various other prescription medications are promoted as being effective, such as aldose reductase inhibitors, but evidence for their effectiveness in peripheral diabetic neuropathy is lacking.³ Apart from potential side effects, financial costs for the patients may be considerable if the medications are not subsidised by the PBS for painful diabetic neuropathy.

Loss of sensation

'I feel like I walk on cotton wool. Sometimes my feet are like slabs of wood and just slap down on the ground.'

Annie, six years later.

The sensations of walking on cotton wool or with feet that slap down on the ground like pieces of wood may be disturbing for

Table 3. Intervention options for painful neuropathy

Local measures

- Film dressing (Opsite Spray) – wrapping the foot reduces sensory stimulation and dysaesthesia
- Capsaicin (Zostrix HP) 0.075% cream three to four times per day – depletes skin substance P, a neuropeptide involved in pain perception
- Transcutaneous electrical nerve stimulation (TENS) – may reduce central appreciation of the abnormal nerve impulses

Systemic measures

- Antidepressants – low-dose tricyclics such as amitriptyline (Endep), 25 to 150 mg at night, are traditional; selective serotonin re-uptake inhibitors may also be effective
- Nerve stabilisers – antiepileptics can be effective, particularly gabapentin (e.g. Neurontin) 900 to 3600 mg per day; in severe cases, a combination of gabapentin and up to 20 mg per day of oxycodone (Endone, OxyContin, OxyNorm) should be trialled; pregabalin (Lyrica) may also be used

patients but are usually much less distressing than abnormal painful sensations. Patients may prefer loss of sensation but they should be aware that the change from dysaesthesia to anaesthesia marks progression of nerve damage, and not improvement.

Anaesthesia is the major contributor to the foot problems that rank second only to cardiovascular disease in terms of direct health care costs in patients with diabetes.⁴ The 'high profile' diabetic complications of nephropathy and retinopathy cost less than foot problems (largely ulcers) and much less than cardiovascular disease (including peripheral vascular disease).



Figure 2. Callus can be a sign of excess pressure that has not been noticed through the sensation of pain by a person with peripheral neuropathy.

Loss of sensation means that the risk of foot problems has increased considerably. The patient may have lost the discomfort but is now unable to detect damage to the foot and has therefore lost the normal protection against injury. Once a patient has lost sensation, he or she and his or her carers must establish systems to protect the feet, detect foot problems early, and respond promptly and appropriately. Patients should be advised about:

- protection – appropriate foot care and footwear
- detection – a daily routine of checking footwear and foot health
- response – clear indications for action and contacting health professionals.

Redness of the skin is an early signal that extra foot protection is needed, and thickened skin (callus) or thickened nails are later signs of excess pressure that does not cause the pain that would have prompted preventive action to reduce the risk of ulceration in a person with normal sensation (Figure 2).

The patient handout on page 67 provides guidance for patients who have sensory loss. It may be that a carer or visiting health professional is the appropriate person to be informed if the patient is not physically and/or mentally able to understand the requirements of adequate foot

care, provide the necessary care or respond to early problems.

All too often preventable precipitants cause problems that are not detected and progress to disasters. For example, educating a patient and/or his or her carer may prevent a drawing pin piercing the sole of a slipper and entering the foot, causing considerable tissue damage and facilitating an infection that may spread to the deeper tissues and cause life-threatening sepsis requiring a below-knee (or, even worse, above-knee) amputation. This scenario is illustrated by the story of Amanda in the box on this page. It should be remembered that most nontraumatic lower extremity amputations are caused by diabetes, and that most are associated with sensory loss and are potentially preventable.²

Motor neuropathy

‘My feet have become so ugly, my toes are like claws and the tops are red and callused from rubbing on my shoes.’

Annie, a few years later.

The motor (or efferent) nerves supplying skeletal muscle are made up of large, heavily myelinated nerve fibres and are affected later in the progression of diabetic peripheral neuropathy than the smaller non- or less-myelinated fibres for sensations and autonomic function. However, the gamma motor fibres (also known as gamma efferent fibres), which regulate the stretch reflex responses of muscles, are small, lightly myelinated fibres that are affected quite early in the process of neuropathy.

Once pain sensation has been lost, it is likely that motor neuropathy will be present. Loss of peripheral tendon reflexes is an early sign, with atrophy and weakness occurring much later. In advanced neuropathy, the toe flexors become dominant and fix the toes in flexion, forming clawed toes (Figure 3).

As motor neuropathy progresses, patients may notice weakness. This may be particularly apparent in the hand, where a

Prevention of diabetic complications is better than treatment

The story of Amanda’s left foot

Amanda was diagnosed with type 2 diabetes about 10 years ago and now has no sensation in her feet but as yet not extensive peripheral vascular disease.

Monday: Shopping for new shoes.

Tuesday: Guided tour of the botanical gardens wearing new shoes; blister on left big toe noticed that evening.

Wednesday: Left foot redness and discharge noted, with discovery of a new ‘sore’ on the sole of the left foot.

Thursday and Friday: Worsening of swelling and redness, development of fever, GP review and referral to hospital.

Friday: Left below-knee amputation.

Most nontraumatic lower extremity amputations in patients with diabetes are associated with sensory loss.² In this case, although the patient had normal circulation, severe infection in the lower limb required below-knee amputation because there was extensive tissue sepsis/necrosis.

weak handgrip can make opening jars or bottles difficult. Changes in foot structure can cause changes such as thickening of the skin and nails of the feet from pressure. The clawed toes and loss of foot arches redistribute the load on the foot, concentrating the load on the metatarsophalangeal area and the tips of the toes. The dorsal surface of the toes may also rub on the underside of the shoe upper. Callus is likely to form over the raised metatarsal heads, and dorsal toe ulceration may result.

Fortunately, clinically significant consequences of motor neuropathy occur late in the course of peripheral diabetic neuropathy. Unfortunately though, when they do occur they can be associated with considerable discomfort and functional



Figure 3. Clawed toes are a sign of advanced motor neuropathy. The toe flexors have become dominant and fixed the toes in flexion. Note the dilated veins caused by autonomic neuropathy.

disability. Podiatrists and occupational therapists can offer useful advice to patients, including appropriate footwear and orthotics and various aids to improve functional capacity. The more abnormal the foot structure, the more important specialised assessment and individualised footwear and orthotics become.

Autonomic neuropathy

'I use special soap and moisturiser and still my skin is dry and cracked and itches like mad. I just can't stop scratching, and of course that makes things worse.'

Annie, in response to your suggestions about foot care.

The postganglionic efferent fibres of autonomic nerves are small and unmyelinated. Like the sensory nerve fibres and the gamma motor fibres, these autonomic nerve fibres are also affected early in peripheral diabetic neuropathy. They are affected in the lower limb before the upper limb, and distally before proximally.

As peripheral neuropathy progresses, autonomic control of the sweat and sebaceous glands is lost and the skin becomes dry and less flexible. Drying of the skin of the feet may be hastened in patients who wear open shoes or thongs.

Dry and cracked skin often becomes uncomfortable and itchy. Scratching, however, only aggravates the damage and itchiness. Patients may find that wetting

the skin is the only thing that relieves their discomfort. But this too aggravates the problem, accelerating the drying process. The 'itch/scratch' and 'dry/wet' cycles can be very difficult to break. Breaking the cycles early not only provides symptomatic relief but also reduces the risk of fungal or bacterial infections occurring once the skin is damaged. The principles of caring for dry skin are listed in Table 4 and also summarised in the patient hand-out on page 31.

The loss of the smooth muscle nerve supply rarely causes obvious problems. The erection of hairs under the control of the sympathetic nervous system acting on the erector pili muscles is gone, but this is not particularly a cause of concern. The dilation of the arterioles within the foot caused by loss of control of the arteriolar smooth muscle may, however, produce postural hypotension or reduce tissue perfusion if another contributor (such as hypotensive medication or arterial disease) is present. Arteriolar dilation also increases capillary and venular pressure. This increases plasma filtration into the interstitial space and may cause oedema. Venules and veins also dilate, sometimes spectacularly – as shown in Figure 3.

Patients with type 2 diabetes often already have reasons for peripheral oedema, such as overweight/obesity, incompetent veins, cardiac and/or renal dysfunction and medications such as peripheral calcium-channel blockers. Although it is tempting to manage this fluid imbalance with a loop diuretic, this is not the best option. A diuretic dose in the morning will provide diuresis, but fluid will accumulate later in the day. Further diuretic doses may also have gratifying effects but are still unlikely to control the problem.

As local pressure effects are causing the problem, the use of support stockings is a logical and effective measure for oedema. The stockings should be worn all day and, for best effect, should be put on before getting out of bed in the morning. Patients should be encouraged to shower in the

Table 4. Caring for dry skin

Washing

- Limit frequency
- Use minimal amounts of tepid (not hot) water
- Only soap the areas that need cleaning, e.g. groin and axillae every two to three days, hair weekly
- Moisturise the skin after bathing – a helper may be needed to get to inaccessible areas such as the back

Moisturisers

- Use moisturisers frequently
- Choose the thicker preparations that are still easily spread (thicker preparations have lower water and higher fat content)
- Consider the more expensive but more effective moisturisers that contain urea and/or organic acids if the skin on the heels is cracked. Urea-containing moisturisers specifically indicated for the feet include DermaDrate Cracked Heel Treatment, Eulactol Heel Balm and FootSmart

Clothes and footwear

- Wear clothes made of materials containing non-irritant fibres (e.g. cotton and cotton/polyester mixes); avoid totally synthetic materials as they are too hot and trap moisture
- Wear closed shoes made of leather or canvas (i.e. not synthetic materials), and socks made with at least some natural fibre (e.g. cotton or wool)

evening as having a morning shower before putting on the stockings allows fluid to accumulate in the unsupported tissues and reduces the effectiveness of the stockings. The help of a carer or a device such as the Ezy-As compression stocking applicator may be needed to get the stockings on.⁵ Fortunately, medium strength knee-high support stockings are usually

adequate, and are not too difficult to put on; full length or firmer stockings can be very difficult.

Patients who are concerned about the stockings being uncomfortable or hot should be reassured that the reduced leg swelling resulting from correctly used stockings increases leg comfort and that not much heat is lost through the lower limbs anyway. The additional protective benefits of stockings should be stressed to patients. Stockings protect the skin of the legs against knocks that might otherwise break the skin and lead to sores that may be slow to heal and might leak oedema fluid, further impairing healing. (Before effective diuretics became available one treatment for severe peripheral oedema was to insert tubes [Southey tubes] into the tissues of the lower limb to drain the oedema fluid.)

Advanced peripheral neuropathy

As noted earlier, diabetic peripheral neuropathy is associated with progression from the small, unmyelinated or lightly myelinated pain and temperature afferent fibres, gamma motor fibres and autonomic nerve fibres being damaged to the larger, more myelinated afferent fibres and the large, heavily myelinated efferent fibres becoming damaged. Once the sensations of touch and pressure are affected (ideally assessed by a monofilament), effects on muscle function as well as loss of proprioception should be expected.

The distribution of the neuropathy also progresses, moving proximally up the lower limbs and then the upper limbs. As a rough guide, neuropathy will start to affect the fingers when neuropathic signs are detected in the mid-calf of the leg, and earlier if the double whammy of pressure and diabetes-related damage has occurred at the wrist or elbow. As the neuropathy spreads to affect other sensory and motor modalities and other parts of the body, a wide range of clinical symptoms, signs and problems can occur, including the neuroarthropathies. These

however, apart from a brief discussion of Charcot's neuroarthropathy, are beyond the scope of this article.

It is important to remember that all neuropathy occurring in a person with diabetes may not be caused by the diabetes. Neuropathy in the absence of other microvascular complications or rapid progression should prompt review of other potential contributors (Table 2). Referral of the patient for a second opinion and advice on further management should be considered.

In the final stages of neuropathy, the so-called 'Charcot foot' develops, in which the function of the foot in absorbing and transmitting load is lost. The whole foot and most or all of the lower leg becomes insensate, the foot arches collapse and the toes claw. Gait is disturbed by the loss of normal foot structure, the loss of protective reflexes, the loss of position sensation and co-ordination and the loss of motor function. The patient walks with a slow, high-stepping, foot-slapping gait that further destroys foot structure and causes recurrent lesions in areas of high load. Bisphosphonates may slow the progressive bone destruction and prevent clinical fractures.

A Charcot foot is an extreme risk for future problems, particularly undetected plantar ulcers and fractures – both of which can present as a painless but acutely swollen red foot. Referral to a specialist foot clinic will give the patient access to the necessary protective footwear, orthotics and total contact casting, and to ongoing specialised monitoring and management. Early consideration of the possibility of the occurrence of neuroarthropathy and early referral give the best outcomes.

Conclusion

Four syndromes associated with peripheral neuropathy pose special problems for patients with diabetes and the health professionals caring for them. These syndromes and the problems are:

- abnormal sensation

- coping with the discomfort
- being aware that a loss of the discomfort is not a good sign
- loss of sensation
 - developing strategies to avoid excess pressure, systems to monitor foot health and action plans for potential problems
- motor neuropathy
 - dealing with secondary deformities, clawing of toes, flattened feet
 - developing strategies for activities of daily living affected by loss of strength
- autonomic neuropathy
 - maintaining skin health
 - dealing with peripheral oedema.

It should be remembered that all the conditions that can be caused by diabetes may not actually be caused by diabetes. Therefore, other causes should be considered before attributing neuropathy to diabetes.

MT

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Dr Phillips has received research and travel grants, acted on advisory boards and been involved with clinical trials and seminars sponsored by a range of pharmaceutical companies. He does not think these associations have influenced the content of this article.

The ABCS of foot care in diabetes: B is for blood

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This third article on risk factors for foot problems in people with diabetes discusses the common clinical problems associated with peripheral vascular disease.

The major risk factors for foot problems in people with diabetes are anaesthesia (i.e. peripheral neuropathy), decreased blood supply (i.e. peripheral vascular disease [PVD]), inadequate routine preventive foot care and abnormal foot structure. Together these factors are known as the ABCS of foot care, or the podiatric ABCS – A, anaesthesia; B, blood; C, care; and S, structure. This article reviews the second of these factors – decreased blood supply. Two previous articles in this series discussed the assessment of the ABCS and the various aspects of peripheral neuropathy (published in the November and December 2008 issues of *Medicine Today*, respectively), and future articles will discuss the other risk factors.^{1,2} A patient handout on foot care for people with diabetes, ‘Your foot report’, will conclude the series.

The foot factor traffic lights

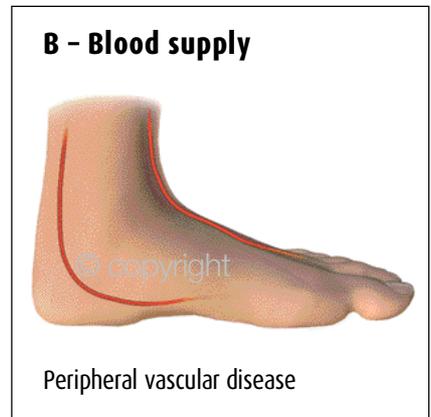
As discussed in the previous articles in this series, a person with diabetes and normal sensation, circulation and structure needs the same foot care and footwear as

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someone without diabetes.^{1,2} However, if one or more of the risk factors for foot problems are present then more intense foot care and monitoring and special footwear may be necessary to reduce the likelihood of a problem developing and to detect problems early and intervene promptly. The podiatric ABCS can be thought of as a series of ‘traffic lights’ that provide a practical framework for assessing foot risk: the more amber and red ‘lights’, the higher the risk (Table 1).^{1,2}

PVD – seek and you shall find

PVD becomes progressively more common with the duration of type 2 diabetes and can cause problems ranging from



nuisance value to limb-threatening ischaemia. It affects about one in five patients who have had diabetes for five or more years and one in three who have had diabetes for over 20 years (Figure 1).³

Any patient with diabetes and a foot ulcer and/or leg or buttock pain could have PVD. Such patients should have their symptoms assessed and their peripheral pulses checked. If peripheral pulses are not readily palpable or there is a high suspicion of PVD, the circulation should be objectively assessed. Many podiatrists can measure ankle brachial pressure indices – the systolic pressure of the ankle artery (pedal artery) divided by the systolic pressure of the brachial artery. An index

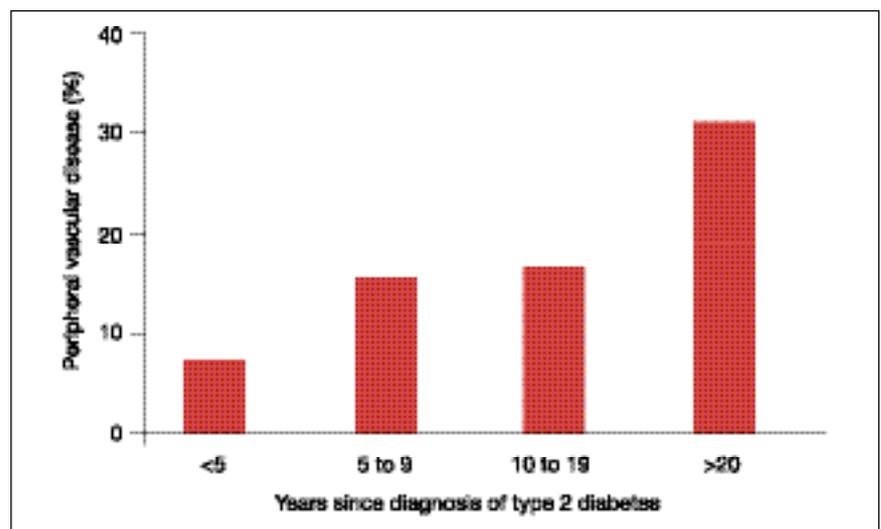


Figure 1. Prevalence of peripheral vascular disease in diabetes.³

Table 1. Foot factor traffic lights and patient risk assessment

Foot factor traffic lights			
Foot factor assessment	Red lights – ‘Danger’	Amber lights – ‘Caution’	Green lights – ‘Healthy’
Anaesthesia – Pinprick, light touch – Reflexes	No stimuli felt No reflexes	Reduced stimuli Reduced reflexes	All stimuli felt Normal reflexes
Blood supply – Pulse palpation	No pulses	Reduced pulses	Normal pulses
Care – Questioning* – Observation	– Skin breakdown	Foot care, footwear could be better Threatened skin breakdown	Appropriate foot care, footwear Normal skin
Structure – Observation	Weight-bearing ulcer	Callus or corn	No skin lesions
Patient risk assessment			
Traffic lights	Risk assessment	Recommended action	
One or more ‘red lights’	High risk	Refer promptly to a podiatrist	
One or more ‘amber lights’	Moderate risk	Regular podiatry care and assessment	
All ‘green lights’	Low risk	General foot care advice	
* Inadequate foot care in the absence of any other red or amber traffic lights is not a major risk factor for severe foot problems. Adequate foot care in the presence of one or more red or amber traffic lights is essential and can prevent otherwise inevitable and severe foot problems.			

of less than 0.9 is an indicator of PVD and should prompt referral to a vascular surgeon. More detailed investigation such as lower limb ultrasound and/or angiography may be indicated and a vascular surgeon could advise on the potential benefits of revascularisation.

Table 2. The ABCss of diabetic care

Diabetic care goal	Target
A – controlling A _{1c}	<7%
B – controlling blood pressure	<130/80 mmHg*
C – controlling cholesterol	<4 mmol/L†
s – quitting smoking	0
s – taking salicylates	75 to 150 mg/day
* <125/75 mmHg if proteinuria >1 g per day exists. † Corresponding to LDL cholesterol <2.5 mmol/L.	

Review correctable PVD risk factors

‘His feet are like blocks of ice – we have to sleep with a pillow between us to keep his feet away from me.’

Betty, Bill’s wife.

Most people with type 2 diabetes have one or more of the fixed risk factors for PVD: personal or family history of cardiovascular events, age over 50 years for men or over 60 years for women and, for women, being postmenopausal. Many also have one or more modifiable PVD risk factors, and treatment of these may allow the peripheral circulation to remain adequate to maintain healthy feet.

Most patients with diabetes are not achieving the target values of the main goals of diabetic care (which aim to control the risk factors for the complications of diabetes), the ‘ABCss’ of diabetes care (Table 2). Getting closer to these targets will improve the modifiable PVD risk factors of high cholesterol, cigarette smoking and hypertension.

Statins decrease cholesterol levels by 1 to 2 mmol/L and decrease the risk of cardiovascular events by 25% (33% in those who adhere to therapy).⁴ In this high-risk group of patients with diabetes, the absolute risk reduction is considerable (e.g. 5 to 15% reduction over five years, with a number-needed-to-treat [NNT] of 7 to 20). Statins are now PBS-subsidised for people with type 2 diabetes and symptomatic PVD.

The majority of people with diabetes and symptomatic PVD are current or ex-smokers. Quitting smoking is always a good idea and especially so in someone with symptomatic PVD. The real threat of losing a limb may tip the balance towards a patient successfully quitting.

The presence of vascular disease in one circulation (peripheral) usually means that the other circulations (cerebral and coronary) are also affected. Carotid bruits should be sought, and a recent ECG checked for the presence of an unsuspected

infarct. As many as one in five infarcts are not recognised as such in the general population, and the proportion in people with type 2 diabetes is even higher (40%).⁵

Symptoms that may not have been recognised as angina (such as chest discomfort, indigestion or shortness of breath with exercise) or TIAs (such as transient loss of vision or use of a limb) should also be sought. If these symptoms are present, the patient should be warned of the possibility of a heart or brain 'attack'. The likely symptoms should be reviewed with the patient and the importance of seeking help early and/or calling an ambulance should be emphasised.

If cerebrovascular disease is present, the combination of aspirin and dipyridamole (Asasantin SR) may be more appropriate than aspirin alone. If coronary heart disease is present, adding a β -blocker may be indicated for cardioprotection. It is now recognised that the previous belief that β -blockers reduce peripheral circulation is not true.⁶

Other specific interventions that are worth considering are:

- haemoglobin level measurement – treating anaemia will increase oxygen availability; treating polycythaemia with venesection will reduce viscosity and improve blood flow
- consideration of treatment with oxpentifylline (Trental 400), which can improve blood flow by reducing blood viscosity.

Claudication can be a pain in the butt

'I'm okay on the flat but give me a wind, a cold day, a big lunch or a slope and I'm exhausted. Can't walk much more than 20 metres before the pain makes me stop.'

Bill, describing his leg pain.

A patient often first notices claudication when leg pain occurs while he or she is doing something unremarkable, such as walking up a hill rather than on the flat (see the box 'Situations when claudication may become apparent' on this page). At

Situations when claudication may become apparent

- Walking against a wind or uphill – the increased work increases oxygen requirements
- Walking after a meal – muscle blood flow is reduced as postprandial gut blood flow increases
- Being cold – vasoconstriction further depletes peripheral blood flow

first the pain may be dismissed as a 'bit of a cramp', particularly as it goes away after a brief stop. Sometimes, either consciously or unconsciously, people progressively limit their activities to things they can do without pain. It is not obvious to them, or anyone they know, that the 'bit of a cramp' they are getting in their calf or, less likely, their buttock is caused by exercising their muscles. After all, it may occur one day (for example, when walking against the wind) but not on the next (for example, when walking on a calm day). Unfortunately, limiting activity only makes the problem worse and the claudication distance (the distance walked before pain occurs) shorter.

When claudication is identified as being caused by PVD, factors to consider include:

- modifiable medical factors – those influencing vascular disease, blood flow and oxygen delivery (as noted above)
- smoking – which not only accelerates vascular disease but also directly decreases the availability of oxygen. It should be explained to patients that smoking is equivalent to inhaling carbon monoxide and that the immediate benefits of quitting are considerable and ongoing
- activity – walking more, not less, improves the claudication distance. Although blood supply does not improve, extraction of oxygen by the muscles does. A walking program may greatly extend or maintain

A walking program for a person with claudication

Mobility and function that might otherwise be progressively limited in a patient with claudication can be extended or maintained by participation in a walking program.

Advise the patient to:

- Walk until the leg or buttock pain is moderate to severe
- Stop and wait for the pain to pass
- Repeat the cycle.

The patient should exercise for 10 to 20 minutes each day initially, and then increase the duration over a period of weeks to months to 40 to 60 minutes per day.

mobility and function that might otherwise be progressively limited (see the box 'A walking program for a person with claudication' on this page).⁷

At some stage it will become clear that the claudication distance and functional capacity are progressively decreasing and are affecting the person's quality of life. It would then be time to involve the vascular surgeon. The patient may have a single, proximal, short stenosis with good peripheral run-off, in which case an angioplasty (with or without a stent) would be likely to increase blood flow and functional capacity. Sometimes the improvement in circulation with such treatment is remarkable (Figure 2). Alternatively, a bypass graft might be possible and may be the best option (for example, a femoro-popliteal or femoro-pedal bypass). If angioplasty or bypass is not possible, claudication pain may be reduced by a regional sympathectomy.

Preserving threatened feet

'The doctor said I'm between a rock and a hard place. Nothing more can be done to improve the blood supply. I don't want to lose a leg but it seems I have no choice.'

Bill, seven years later.



Figure 2. Pre- and post-angioplasty.

PVD sometimes continues to progress despite the best lifestyle management achievable by the patient (quitting smoking, walking more and adhering to medication) and the best medical management achievable by the doctor (review of the diabetes ABCs and other interventions specific for PVD). Surgery may become the only escape from the ischaemia. Sometimes the vascular surgeon will have a solution (as above). However, the stenoses are often multiple, distal, prolonged and without good peripheral run off, and therefore unsuitable for bypass surgery. An optimistic long bypass to an apparently patent peripheral artery might be tempting but the realistic assessment is that this surgery will not help. Eventually, amputation of the affected foot or leg may be necessary.

When angioplasty or bypass surgery is not an option, it becomes a matter of preserving for as long as possible those feet where the diminished circulation is adequate to maintain foot health but not adequate to heal even minor wounds. The integrity of the skin becomes paramount in such cases. The simple action of applying emollient can prevent skin cracks and foot wounds and ward off the demand for increased blood supply for healing, which cannot be met.

A foot protection package can be based

on the podiatric ABCS. These foot care risk factors should be assessed to see if management of the others (A, C or S) could be improved (Table 1):

- A – if sensation is reduced then the normal protection against injury is also reduced and the early detection and action program should be reviewed
- C – if there are deficiencies in foot care and/or footwear, these should be remedied by improved self-care or by involving a lay or professional carer
- S – if there are structural problems, podiatry assessment should provide access to appropriate footwear and orthotics to protect the foot.

In some centres there are multidisciplinary high-risk foot clinics to which patients with acute diabetes-related foot complications can be referred for assessment, monitoring and ongoing management of their feet. Where such clinics are not available, patients should be referred to a podiatrist for monitoring of foot health status and access to appropriate footwear and orthotics. The goal is to maintain the health of both feet so ‘one pair’ does last a lifetime.⁸

Worldwide, an amputation because of diabetic foot disease occurs every 30 seconds. More than half of these amputations are preventable.⁹ If a patient with diabetes requires an amputation, they will need psychological support and intensive rehabilitation. Although below or above knee amputation may be required in some cases, more distal amputations (forefoot or ‘ray’ amputation of a digit) are usually possible. Orthotics and walking aids help patients retain function. Even if a below or above knee amputation is required, most patients can be rehabilitated, use a prosthetic device and walk again.

Patients facing amputation should be reassured that this is not ‘the end of the road’ and that much can still be done to maintain their quality of life. Patients, professionals and carers should promote a positive proactive attitude with the expectation of successful rehabilitation.

Summary

Monitoring and active intervention for the risk factors for PVD (which are the same as those for the complications of diabetes – that is, ABCs) and the markers of foot risk (the podiatric ABCS) can delay or prevent the onset of ischaemia, symptoms and extensive amputations in people with type 2 diabetes. Remember: ‘Give diabetes an inch, and it will take a foot.’ **MT**

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The ABCS of foot care in diabetes: C is for care

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This fourth article on risk factors for foot problems in people with diabetes discusses the need for adequate routine foot care and provides a patient handout on appropriate foot care and footwear.

Inadequate routine preventive foot care is one of the major risk factors for foot problems in people with diabetes. Peripheral neuropathy (anaesthesia), peripheral vascular disease (decreased blood supply) and structure (abnormal foot structure) are other risk factors. Together they are known as the ABCS of foot care, or the podiatric ABCS – A, anaesthesia; B, blood; C, care; and S, structure.

This article, the fourth in a series on foot care in people with diabetes, reviews the need for adequate routine foot care and includes a patient handout on appropriate foot care and footwear. Previous articles in the series have discussed the assessment of the ABCS and the various aspects of peripheral neuropathy and peripheral vascular disease, and a future article will discuss foot structure.¹⁻³ A patient handout summarising the podiatric ABCS, 'Your foot report', will conclude the series.

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The foot factor traffic lights

Sometimes diabetes health professionals may overstate the case for meticulous foot care and tell everyone 'do this, don't do that, always do the other and never do...'. A person with diabetes who has normal sensation, circulation and structure needs the same foot care and footwear as a person without diabetes. But if a person with diabetes has a foot risk factor then more intense foot care and monitoring and special footwear may be necessary to reduce the likelihood of a problem developing, to detect problems early and to intervene promptly. The foot factor 'traffic lights' provide a practical framework to assess foot risk: the more amber and red 'lights', the higher the risk (Table 1).⁴

Inadequate foot care

'They hurt like mad. The little cracks don't worry me but when they get deep they make life unbearable and they take ages to heal.'

Mark, who has had type 1 diabetes for 15 years and is wearing thongs.

In a way Mark is lucky: at least he is getting a warning that something is wrong. If he'd had neuropathy, the first thing he may have noticed might have been a red swollen foot and deep tissue infection.²

The indicators of inadequate foot care are easily assessed – look at the footwear, the skin (especially the weight-bearing areas, the heels and the interdigital spaces)



ILLUSTRATION © CHRIS WIKOFF, 2008

and the toenails (Table 2). Having available a checklist of the podiatric ABCS can help with the six-monthly foot check component of the diabetes annual cycle of care supported by Medicare.⁵ Identifying a problem prompts suggesting the appropriate care and noting the need to check its effectiveness at the next visit.

Mark has basically healthy feet in that he has no A (anaesthesia) or B (blood) risks. In Mark's case, the appropriate care would be for him to replace the thongs with more covered footwear, such as a sports shoe (Figure 1), and to gently use a pumice stone on his feet after showering to reduce the callus build up and then to use an emollient to stop the skin from cracking. The patient handout on page 83 provides guidelines for day-to-day foot care for people with diabetes.

Priorities for foot care

'There was no pain. It didn't hurt at all, even though there was a hole deep into my foot. I just know that my sock had a whole lot of muck in it. Pretty scary, I tell you.'

Mark, five years later, with an ulcer under the first metatarsophalangeal head. Fortunately Mark's circulation was intact and his ulcer healed. If he'd had vascular disease as well as neuropathy, he could have lost the foot.³

Healthy low-risk feet are remarkably tough. They absorb the impact of striking the ground (several hundred kg/cm² each

Table 1. Foot factor traffic lights and patient risk assessment

Foot factor traffic lights			
Foot factor assessment	Red lights – ‘Danger’	Amber lights – ‘Caution’	Green lights – ‘Healthy’
Anaesthesia – Pinprick, light touch – Reflexes	No stimuli felt No reflexes	Reduced stimuli Reduced reflexes	All stimuli felt Normal reflexes
Blood – Pulse palpation	No pulses	Reduced pulses	Normal pulses
Care – Questioning* – Observation	– Skin breakdown	Foot care, footwear could be better Threatened skin breakdown	Appropriate foot care, footwear Normal skin
Structure – Observation	Weight-bearing ulcer	Callus or corn	No skin lesions
Patient risk assessment			
Traffic lights	Risk assessment	Recommended action	
One or more ‘red lights’	High risk	Refer promptly to a podiatrist	
One or more ‘amber lights’	Moderate risk	Regular podiatry care and assessment	
All ‘green lights’	Low risk	General foot care advice	
* Inadequate foot care in the absence of any other red or amber traffic lights is not a major risk factor for severe foot problems. Adequate foot care in the presence of one or more red or amber traffic lights is essential and can prevent severe foot problems.			

step) and progressively distribute the load from the impact (foot-strike) to weight-bearing and then to the push-off that drives the body forward. The distribution of the force on a normally shaped foot during a step is shown in Figure 2. In a foot with a low arch (a flat foot), the pressure is concentrated on the inner medial side; in a foot with a high arch, the pressure is concentrated on the lateral side. Normal sensation and circulation ensure that the pain of tissue damage prompts protective behaviour and that minor damage heals promptly.

When we started the process of ‘civilisation’ we also started the process of eating more, doing less, getting fatter and less fit and hiding our feet – cramming them into ‘fashionable’ footwear. Even so, severe foot problems are unusual in low-risk feet: people might get blisters, corns, calluses and thickened skin and nails, but they keep their feet.

If sensation or circulation is impaired, however, or if the foot structure is abnormal, then certain self-care practices become a priority (Table 3). Relating these to the podiatric ABCS:

- a neuropathic foot will remain healthy if the protection and early detection systems that are lost with nerve damage are replaced by careful protection and regular inspection
- an ischaemic foot may have a circulation adequate to maintain healthy tissues but not sufficient to heal damage³ – the priorities then are to protect against damage and to minimise the risk of infection, such as through skin cracks on the heels or in the interdigital spaces
- healthy skin can be a leg-saving barrier, so maintaining skin health is important to reduce the risk of cracking and subsequent infection and to increase healing capacity – regular,

frequent and generous application of a moisturiser is a cheap and highly effective way of maintaining skin integrity

- an abnormal foot structure will result in abnormal distribution over the foot of the forces of foot-strike,

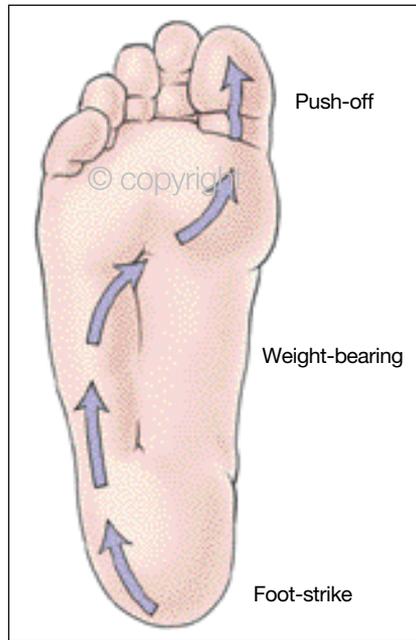
Table 2. Indicators of inadequate foot care

- Dirty feet
- Inadequate or inappropriate footwear
- Dry/cracked skin
- Soggy/dirty interdigital spaces
- Thickened skin (corn, callus)
- Long/deformed/thick/ingrown nails
- ‘Garter’ effect (causing vascular obstruction)

continued



Figure 1. Sports shoes are often appropriate footwear for patients with diabetes who are at risk of foot complications. The features to look for when choosing a pair include laces, room for the toes, a flexible front foot region, a firm mid-sole, a firm heel counter and a leather or mesh upper.



Betty, who has type 2 diabetes and whose Figure 2. The distribution of force on a foot with a normal arch during a step.

ensure they have the right equipment for the job in their foot care kit (Figure 3). A guide as to who should be performing routine foot care is given in Table 4.

Cutting the nails correctly and safely may meet the foot care needs of low-risk feet but if sensation or circulation are impaired or the foot has become deformed, more frequent (even daily) foot checks may be needed to ensure that the self-care priorities listed in Table 3 are met.

Action plans

'Last time I had an ulcer on my foot I spent four weeks in hospital, had to go to a special clinic for three months and had a total of six months off work. I was lucky to get my job back. This time when I noticed the skin on my foot getting thicker, I saw the podiatrist as soon as I could. She cut the skin away, changed the lining of my shoes and, Bob's your uncle, I was back at work the next day.'

Mark, who developed an action plan after his first ulcer.

weight-bearing and push-off, and may overload certain parts of the foot – regular inspections will pick up both the early and later signs of overload (early – redness; later – callus, corns, thickened nails) and prompt a review of footwear.

Self-care and provided care

'I know they are a bit long but I missed my last podiatry appointment. Even if I could get at them, my scissors would be useless. The podiatrist always has to use great big shears to cut my toenails.'

nails fold over the tops of her toes. Betty is not alone. There are many people who cannot reach or see their nails, cannot manage their own normal nails or would be at high risk should they damage their toes while cutting their nails.

In most cases, a relative or carer will be able to cut thickened nails on toes with normal circulation. However, podiatrist care will be required for nails that are very thick or deformed or when vascular deficit is extensive because special care and/or equipment will be needed. General practices involved with nail care should

The biggest risk factor for a future foot ulcer is a history of a preceding one. Both feet have at least the same risk factors as before and the affected foot is even more at risk because of the scarring and any damage to the normal foot structure. In Mark's case, the previous ulcer occurred in an area of overload. Without well-selected footwear and/or orthotics to redistribute some of this load and a monitoring schedule to pick up and respond to early problems, a second ulcer in the same or a different area is highly likely.

Health professionals have monitoring schedules for chronic disease (for example, the Service Incentive Program annual cycle of care for diabetes) and triggers for action (for example, chest pain and an abnormal ECG). Patients with risk factors and/or a history of foot problems need to know when and how to look for indicators of possible complications. They also need to have practical guidelines on appropriate responses, including agreed indications for seeking professional help

Table 3. Priorities for patient self-care

Presence of risk factor	Self-care required*		
	Hygiene	Inspection	Protection
Peripheral neuropathy	++	+++	++++
Peripheral vascular disease	++++	+	++++
Structural abnormality	++	++++	++++

* +, ++, +++, +++++ indicate increasing order of priority.



Figure 3. General foot care equipment: pumice stone, mild antiseptic, moisturiser, nail file and toenail clipper.

and easy access to such help. The patient handout on pages 33 and 34 includes some action plans for patients.

Triggers for patients to take action include the occurrence of the following on the feet:

- small cuts – to avoid cellulitis
- thickened skin – to avoid ulcer development
- inflammation – indicating infection or fracture.

Actions to be taken by the patient include simple first aid, seeing a podiatrist for advice about footwear and foot care, and seeing a doctor or podiatrist for treatment of fungal or other infections. Podiatrists can treat fungal and non-extensive bacterial infections and can refer patients for treatment of more severe infections.

Conclusion

People with diabetes who have normal

Patient self-care	Relative/supporter care	Podiatrist care
Patient: <ul style="list-style-type: none"> • can see feet and nails • can reach feet and nails • has normal nails • has no PVD 	Patient: <ul style="list-style-type: none"> • cannot see feet and nails • cannot reach feet and nails • has normal nails • has no PVD 	Patient: <ul style="list-style-type: none"> • has abnormal nails • has PVD
ABBREVIATION: PVD = peripheral vascular disease.		

sensation, circulation and structure need the same foot care and footwear as people without diabetes. The presence of one or more of the foot risk factors, however, calls for more intense foot care and monitoring and possibly for special footwear to reduce the likelihood of problems developing. Even though the foot risk factors may be irreversible or even progressive, severe complications like infections and amputation can be delayed or avoided by appropriate foot care, early detection of problems and prompt intervention.

Patients with neuropathy should be made aware of potential foot complications and should wear appropriate protective footwear and monitor their feet for signs of abnormal pressure or damage. Patients with decreased circulation, and therefore impaired ability to heal any damage, should practice appropriate skin and nail care, wear protective footwear and watch for and respond to breaks in the skin of their feet. Patients with abnormal foot structure should watch for signs of increased pressure (skin redness or thickened skin or nails) and seek advice on ways to remove the

excess pressure, even (or especially) when no pain is felt. MT

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The ABCS of foot care in diabetes: S is for structure

PAT PHILLIPS MB BS, MA(Oxon), FRACP, MRACMA, GradDipHealthEcon(UNE)

ANGELA EVANS PhD, DipAppSc(Pod), GradDipSocSc(ChildDev), FAAPSM

This article on risk factors for foot problems in people with diabetes reviews the more intensive foot care and special footwear that is often necessary in patients who have odd-shaped feet because they have worn ill-fitting shoes, have complications of their diabetes, or have flat feet or high arches.

Sensation and blood flow are rightly focused on when examining the feet of a patient with diabetes because peripheral neuropathy and ischaemia can both (especially in combination) threaten the person's limb and life.^{1,2} Foot care is well recognised as an important preventive aspect of diabetes complications involving the foot and lower limbs.^{3,4} Foot structure, however, is often overlooked or poorly understood, although it is a major risk factor for foot problems, both in people with diabetes and those without the condition.

A person with diabetes who has normal foot sensation, circulation and structure needs the same foot care and

footwear as a person without diabetes. But a person with 'odd shaped' or 'misshaped' feet may need more intensive foot care and monitoring and special footwear. The foot factor 'traffic lights', which address the podiatric ABCS of anaesthesia, blood supply, foot care and foot structure, provide a practical framework to assess foot risk: the more amber and red 'lights', the higher the risk (Table 1).^{5,6}

This article, the fifth in a series on foot care in people with diabetes, outlines a simple assessment of foot structure, footwear and gait, the effects of common foot structures and the likely signs of problems, with steps to address them. A patient handout summarising the podiatric ABCS, 'Your foot report', accompanies the article (see pages 35 and 36). Previous articles in the series have discussed the assessment of the ABCS in people with diabetes and the various aspects of peripheral neuropathy, peripheral vascular disease and routine foot care.¹⁻⁵

Don't go soft on callus!

'It doesn't matter what shoes I wear, I get this thick skin that hurts like hell. I have learnt to cut it off with scissors. I reckon I would have been a good surgeon!'

Jack, describing his calluses.

Calluses and corns are signs of increased pressure and need to be regarded as

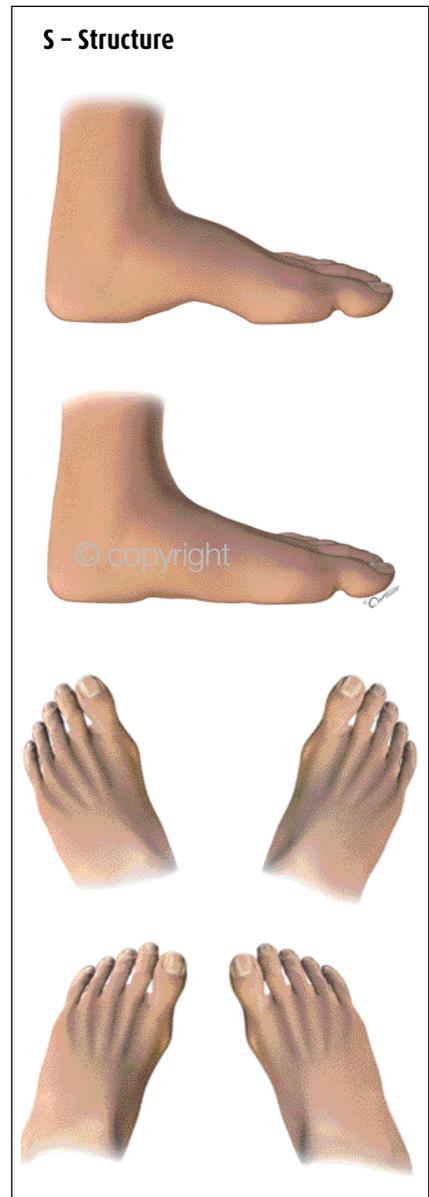


ILLUSTRATION © CHRIS WIKOFF, 2008

potential ulcer sites in people with diabetes. Additional signs of increased pressure may include skin redness, thickened nails and skin breakdown. It is a good sign if these areas of increased pressure hurt because then there is a protective pain feedback that gets people to alter their gait, change their shoes and off-load the forces. The risk of ulcers escalates when calluses do not hurt.

When a person has recurrent calluses or corns, GPs should consider the possible

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ABCS assessment	Red lights – ‘Danger’	Amber lights – ‘Caution’	Green lights – ‘Healthy’
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* Inadequate foot care in the absence of any other red or amber traffic lights is not a major risk factor for severe foot problems. Adequate foot care in the presence of one or more red or amber traffic lights is essential and can prevent severe foot problems.			

causes of the increased pressure. These include:

- footwear – some shoes are not meant for usual feet
- foot structure – some feet are not meant for usual shoes
- neuropathy – some feet do not feel any shoes.

Of these possible causes, inappropriate and/or ill-fitting footwear are usually



Figure 1. High-heeled, narrow shallow-toed shoes can cause excessive pressure in many areas of the foot.

obvious (Figure 1), and neuropathy will be apparent on clinical examination.¹ The contribution of foot structure to excess local pressure will need to be assessed, but this is easily done, as indicated below and summarised in Table 2.

- Look at the feet. When standing barefoot, do the feet roll in (flat) or out (high arch)? A normal foot distributes the load evenly across the foot, a flat foot concentrates the load on the medial side and a high-arched foot concentrates the load to the lateral heel and metatarsophalangeal area.
- Look at the shoes. Are the soles worn unevenly or the uppers distorted? Uneven wear of the soles indicates high load; distortion of the uppers indicates pressure from enclosed feet.
- Look at the gait. When walking barefoot, do the feet roll in (flat) or out (high arch)? Do shoes improve or worsen the barefoot gait pattern?

Some shoes are not meant for usual feet

‘My feet are killing me. At the end of the day I’m hobbling. I can get comfortable shoes but they are so ugly!’

Sally is 63 years old, smartly dressed and was diagnosed with type 2 diabetes at age 48 years when she was (as she says) ‘fair, fat and forty’. She hopes to continue working until she is 65 years old to maximise her superannuation benefits, but she is having trouble with her feet. Although she has minimal sensory neuropathy, she unfortunately has bad hammer toes and thick painful calluses beneath her metatarsal heads from years of high heels. She is hobbling by the time she gets home from work, and her feet are so sore she is reluctant to go for the walks that have previously so assisted her health, including keeping her weight down.

Her GP looks at her feet, notices the many calluses and the fashionable shoes, and suggests she see a podiatrist.

continued

Table 2. Foot structure checklist

Factors	Feet	Footwear	Gait
Nonweight-bearing factors (i.e. when sitting)	Are there: <ul style="list-style-type: none"> • plantar calluses and/or • dorsal pressure areas? What is the arch shape?	Uppers: Is the shape distorted? Soles: Is there uneven wear?	–
Weight-bearing factors (i.e. when standing)	Is the arch shape: <ul style="list-style-type: none"> • normal • flat • high? 	Barefoot: Are there pressure areas over the toes? Shoes on: Does the foot lean in or out?	Barefoot: Do the feet roll in or out, or stay straight? Shoes on: Do the shoes change the barefoot gait pattern? If so, do they make it better or worse?

Table 3. Sally’s foot care and footwear options

Factor	Option		
	Stay as is	Compromise and survive	The ideal
Shoe heel height	8 to 10 cm heel height	4 to 5 cm heel height	1 to 2 cm heel height
Shoe type	High-fashion court shoe	Less stylish lower heeled shoe with extra depth in toe area	Laced duty shoes
Calluses	Thick calluses	Calluses treated each 4 to 6 weeks	Calluses treated each 6 to 12 weeks
Exercise	Reduced ability to exercise	Runners worn for exercise	Runners/walking shoes worn all the time
Pain	Painful	Manageable pain	Minimal pain
Ulcers	Risk of ulceration	Reduced ulcer risk	Minimised ulcer risk

‘I’m not wearing clodhoppers’ is Sally’s opening statement to the podiatrist. Ideally, Sally would get out of her high-heeled fashionable shoes and into low-heeled, cushioned, well-fitting, laced

shoes. Any reduction in heel height and any increase in shoe fit are worthwhile – the forces at the metatarsal heads will be reduced with every centimetre of heel height reduction, and the extra depth

shoes will reduce pressure over the toes (Figure 2).

Sally’s footwear and foot care options and the foot problems associated with each are summarised in Table 3. The podiatrist suggests a compromise to see Sally through her last two years of work. Sally accepts this middle option.

The podiatrist debrides the calluses adjacent to the metatarsal heads, and shows Sally how to use digital shields and metatarsal padding to reduce pressure from shoes. Sally starts wearing shoes with a lower heel and more depth in the toe area. Soon her feet are more comfortable and she is able to walk regularly again, and also is less at risk of a future ulcer. Over the next three months, she loses the 3 kg she had put on recently.

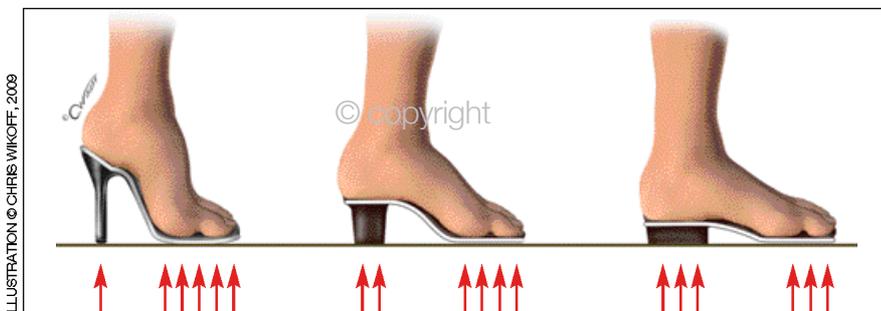


Figure 2. High fashion to high comfort. The pressure forces at the metatarsal heads are reduced with every centimetre of heel height reduction, and the forces over the toes are reduced by the extra depth and width of better fitted shoes.



Figure 3. The gait cycle of a normal foot.

Some feet are not meant for usual shoes

'I have had flat feet all my life. It has always been hard to find comfortable shoes. Now my toes are curling up and it's getting harder still. I have calluses from my flat feet and now I have got problems with the tops and bottoms of my toes.'

Ron, who is 66 years old and has had diabetes for 14 years.

The foot skeleton is a complex array of bones, ligaments, muscles and tendons encased in soft tissues and skin. It is weight-bearing and subject to large forces associated with gait, ground reaction and footwear. The foot skeleton varies in its architecture and some irregular types are particularly vulnerable to focal pressures – which in diabetes, and especially if there is neuropathy, equals an ulceration site. Add in ischaemia, infection and neglect and it is not difficult to see why some 2500 Australians lose a leg each year.

With a normal foot and normal gait, the central–lateral heel strikes the ground and cushions the load, which is distributed to the lateral mid foot until the heel lifts. Then the load is transferred medially to the first metatarsal head and great toe, which push forward into the next step (Figure 3). A normal foot transfers forces smoothly across the foot in an S-shaped arc (Figure 4a).

With odd-shaped feet, the force lines are abnormal and pressure peaks in certain areas, causing the skin to thicken in those areas (Figures 4b and c). Calluses and

corns are signs that foot structure and gait need to be reviewed. The areas of excess pressure need to be cushioned and the loads distributed to reduce peak forces and avoid corns, calluses and ulcers. Footwear and weight-bearing loads are the two main sources of excess local pressure; other causes are bunions and clawed toes, complaints which often arise in people with diabetes and motor neuropathy.^{5,6} Orthotics and specially fitted or 'extra depth' shoes may be needed to off-load high-pressure areas.

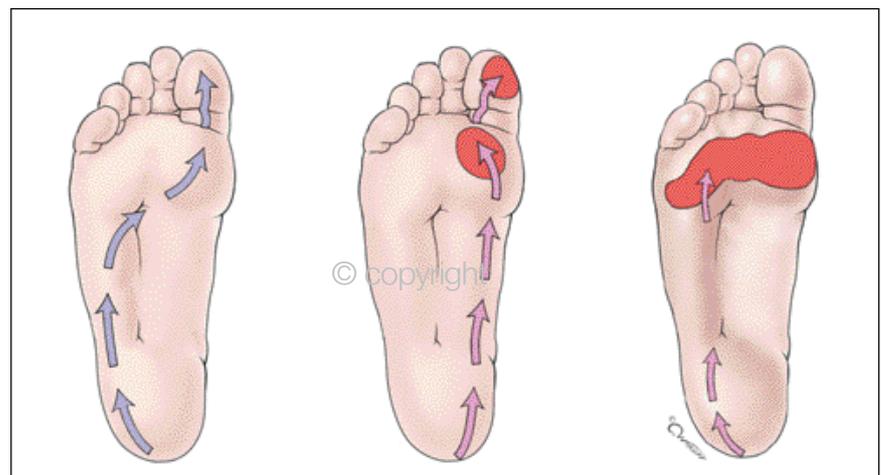
The 5 A's for foot structure

The odd-shaped foot is an important traffic light for foot risk. Remember that the abnormally shaped foot will often have calluses from weight-bearing and/or

footwear. If these calluses are painless or if the circulation is compromised, three of the four traffic lights are signalling high risk – that is, weight-bearing callus, no stimuli felt and no pulses (Table 1). Such patients need meticulous self-care and self-monitoring, appropriate footwear, close professional monitoring and clear action plans (Table 4).⁷

The 5 A's – Ask, Assess, Advise, Assist and Arrange – provide a practical framework for foot care that can be applied in the six-monthly foot check part of the diabetes annual cycle of care supported by Medicare. The 5 A's as applied to the S part of the podiatric ABCS are (Table 4):

- Ask about sore feet and shoe fit
- Assess foot shape and look for calluses
- Advise regarding shoes and good



Figures 4a to c. Force distributions during walking in a normal foot (a, left), a flat foot (b, centre) and a high-arched foot (c, right).

Table 4. The ABCS and the 5A's - a framework for foot care

ABCS	The five A's				
	Ask about symptoms	Assess signs	Advise about foot care and/or footwear	Assist by involving other carers	Arrange reviews and/or referrals
Anaesthesia	Any tingling, numbness?	Sensation Painless/undetected injuries	Care for feet daily Wear appropriate footwear	Possibly a relative or other carer, a visiting nurse or a podiatrist	Podiatry assessment and review, action plan
Blood supply	Any claudication? Are feet cold?	Pulses	Care for feet daily Wear appropriate footwear	Possibly a relative or other carer, a visiting nurse or a podiatrist	Podiatry assessment and review, action plan
Care	What foot care routines are followed? Do shoes fit well?	Nails and skin (thickening, drying, cracking)	Care for feet daily Wear appropriate footwear	Possibly a relative or other carer, a visiting nurse or a podiatrist	Education, ongoing review
Structure	Any foot soreness? Are shoes comfortable?	Foot arches, angles and abnormalities – when standing Weight-bearing calluses (pre-ulcers)	Debride calluses (podiatrist) Use digital shields and metatarsal padding Reduce shoe heel height Wear laced shoes Special footwear	Possibly a relative or other carer, a visiting nurse or a podiatrist	Podiatry review, for foot care and insoles/orthotics Consider orthotic and/or physiotherapy review

- shoe-fitters, and also callus treatment
- Assist by involving family, carers, home nurse and podiatrist
 - Arrange for podiatry review and follow up at the next visit.

Conclusion

People with diabetes may have odd-shaped feet as a result of wearing ill-fitting shoes or complications of their diabetes (clawed toes and loss of foot arches) or because they have flat feet or high arches. Patients with abnormal foot structure should watch for signs of increased pressure (skin redness and thickened skin or nails) and seek advice on ways to remove the excess pressure, especially when no pain is felt or the circulation is compromised. **MT**

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Foot care in diabetes: nerve damage

Prepared by Dr Angela Evans, a Podiatrist in private practice, Adelaide, and Lecturer in Podiatry, University of South Australia, Adelaide, and Dr Pat Phillips, Senior Director, Endocrinology, North Western Adelaide Health Service, The Queen Elizabeth Hospital, Woodville, SA.

People with diabetes are prone to nerve damage and blood vessel damage. The damage usually begins in the feet and can lead to minor foot injuries developing into foot ulcers that can take months to heal.

The first symptoms of nerve damage in the feet are abnormal sensations such as burning, prickling pain, tingling, electric shock-like feelings, aching, tightness, hypersensitivity to touch and feelings of things crawling on the skin. As the damage to the nerves supplying the feet increases, the feet become numb and all sensation is lost. Symptoms can move up the leg and can also occur in the fingers and hands.

The nerves supplying the muscles, the sweat glands and the small blood vessels are also affected. Damage to these nerves results in less secretion from the sweat glands and the skin becoming dry and cracked, and more fluid leaking from the blood vessels and the feet and ankles becoming swollen (known as oedema).

This handout provides guidelines on foot care for people with type 2 diabetes who have the diabetes complication of nerve damage.



ILLUSTRATION © CHRIS WIKOFF, 2008

If you have abnormal sensation in your feet

- Symptoms are worse when blood glucose levels are high, so aim for blood glucose levels before meals of 6 mmol/L or less.
- Some prescription medications can help alleviate the abnormal sensations.
- Podiatrists can apply special dressings or recommend socks to reduce discomfort.

If you have little or no sensation in your feet

- Damage to your feet causes little or no pain, so wear shoes that protect your feet and give your toes plenty of room to move.
- Check your feet daily; you may need to use a mirror to see the soles.
- Before you put on your shoes, check there isn't anything in them that might damage your feet or limit their movement.
- If you notice any red or thick skin, thick nails or breaks in the skin, contact your doctor, nurse or podiatrist immediately.
- If you have normal nails and you can reach them easily and see clearly, cut the nails carefully yourself; otherwise a carer or podiatrist should cut them for you.

If you have dry skin on your feet

- Wash your feet using warm (not hot) water and only a small amount of soap.
- Pat the skin dry and use lots of moisturiser.
- Wear socks or stockings made of natural fibres such as wool or cotton, and preferably with no seams.
- Wear shoes that have a low heel and a shock absorbing sole, and which hold the heel firmly, fasten over the foot and leave plenty of room for toes to move.

If you have swollen feet and/or ankles

- Wear medium strength knee-high support stockings from as soon as you get out of bed in the morning until you go to bed at night to help prevent the swelling. For best effect, put them on before getting out of bed; shower in the evening rather than in the morning.
- You may need the help of a carer or a device such as the Ezy-As compression stocking applicator when you are putting on the stockings.
- Stockings also protect the skin of the legs against knocks that might otherwise break the skin and lead to sores.

This MedicineToday handout is provided only for general information purposes. The information may not apply to everyone and the handout is not a substitute for professional medical care and advice. Please discuss the information with your doctor.



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Foot care in diabetes: foot care and footwear for healthy feet

This handout provides guidelines on day-to-day foot care, including the choice of suitable footwear, for people with diabetes.

Prepared by Dr Angela Evans, a Podiatrist in private practice, Adelaide, and Lecturer in Podiatry, University of South Australia, Adelaide, and Dr Pat Phillips, Senior Director, Endocrinology, North Western Adelaide Health Service, The Queen Elizabeth Hospital, Adelaide, SA.

If you have diabetes it is important that you take good care of your feet because you are at increased risk of developing foot problems such as ulcers and odd-shaped feet. Daily routine care of your feet will help keep them healthy and will allow you to notice any signs of damage and take the appropriate action.

Routine foot care

Following these guidelines will enable you to reduce the likelihood of a foot problem developing and to detect any problems early so they can be treated.

- **Hygiene.** Wash and dry your feet every day. Pay special attention to the areas between your toes, and be gentle.
- **Skin.** Your skin acts as a barrier to infections. People with diabetes tend to have dry skin, so use a moisturiser on your feet each day after bathing to prevent dry skin and skin cracks. Avoid moisturising between your toes, but apply plenty around your heels. Gentle use of a pumice stone on your feet after showering and before moisturising will help reduce callus build up.
- **Nails.** Your toenails should be cut 'straight across'. If you cannot see and reach your toenails, you will need help. See the box on care providers (over the page) for guidance on when a relative or other carer can look after your feet and when a podiatrist should be doing so.
- **Corns and callus.** Areas of thickened skin are the result of increased pressure in the area and can become ulcers. If you find any areas of thickened skin see a podiatrist and pay attention to your choice of footwear. A callus generally refers to a wide area of thickening of the skin whereas a corn is a thicker and smaller area over a bony region. Thickened nails and areas of redness on the foot are also signs of pressure.
- **Shoes.** Footwear is meant to protect your feet from injury. Protective footwear is especially important if nerve damage has reduced your sense of feeling in your feet. Shoes must fit your feet and not rub. Finding shoes that fit well is more difficult but more important if your feet are a funny shape.
- **Socks, garters.** Check that your socks or pull-up stockings are not acting like 'garters' around your legs and reducing the flow of blood to your feet.
- **Keep walking.** Your feet need to be in good shape to walk, and you need to walk to help your diabetes, weight and blood pressure. Enjoy the fresh air!

Action plans for what you should do if you see a cut, a pressure area, abnormal nails or inflammation during your daily foot care routine are given in the box over the page.



General foot care equipment includes a pumice stone, mild antiseptic, moisturiser, a nail file and toenail clippers.



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Who does the caring?

Are you able to look after your feet? Do you need help from someone else or a podiatrist? Use the guide below to check.

Care providers in feet and toenail management		
Patient self-care	Relative/supporter care	Podiatrist care
You can care for your own feet if you: <ul style="list-style-type: none"> • can see your feet and nails • can reach your feet and nails • have normal nails • have normal circulation 	You should have a relative or other carer look after your feet if you: <ul style="list-style-type: none"> • cannot see your feet and nails • cannot reach your feet and nails • have normal nails • have normal circulation 	You should have a podiatrist look after your feet if you: <ul style="list-style-type: none"> • have abnormal nails • have decreased circulation

Action plans to protect feet from further damage		
Warning	Cause	Action
Cuts or abrasions	Damage	Simple first aid: wash and dry the area, apply mild antiseptic and cover with a sterile dressing See doctor if wound is not healing in 48 hours, worsens, becomes inflamed or discharges
Pressure areas – as indicated by: <ul style="list-style-type: none"> • recurrent local symptoms • transient redness • blisters • skin and/or nail thickening 	Excess pressure	See podiatrist for footwear advice
Crumbly brittle nails	Fungal infection	See a doctor or podiatrist
Moist or macerated skin between toes	Fungal infection	See a doctor or podiatrist
Inflammation – as indicated by: <ul style="list-style-type: none"> • redness • warmth • swelling 	Infection	See a doctor or podiatrist

What should you be particularly aware of?

- If you have nerve damage, you should be aware of potential foot complications. You should wear appropriate protective footwear and monitor your feet for signs of abnormal pressure or damage.
- If you have decreased circulation, and therefore reduced ability to heal, you should make sure you carry out the appropriate skin and nail care, wear protective footwear and watch for and respond to breaks in the skin of your feet.
- If you have abnormally shaped feet, you should watch for signs of pressure – skin redness and thickened skin and nails – and seek advice on ways to reduce the pressure.

Remember, look after your feet – one pair must last a lifetime!



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Your foot report

Prepared by Dr Angela Evans, a Podiatrist in private practice, Adelaide, and Lecturer in Podiatry, University of South Australia, Adelaide, and Dr Pat Phillips, Senior Director, Endocrinology, North Western Adelaide Health Service, The Queen Elizabeth Hospital, Adelaide, SA.

Your foot report

Name: _____

Date: _____

Healthy feet are happy feet

This care chart is based on a traffic lights scale that directs your foot care. Your doctor has marked in your current status regarding each of the risk factors for foot problems. This gives you guidance on the appropriate foot care for your feet:

Foot care traffic lights: your current status			
	RED	AMBER	GREEN
A – Anaesthesia			
B – Blood			
C – Care			
S – Structure/Shoes			

- RED** = Stop – Danger Be very careful about this area of your feet
- AMBER** = Caution Be careful now to avoid problems later
- GREEN** = Go – Healthy Be sure to check again in six months

More on A, B, C and S

A Anaesthesia

'Feet that cannot feel'

The nerves are 'asleep' – the signals of harm (e.g. heat, pain, injury) are 'off'. Your feet need extra protection.

- Check your feet every day – or have someone else do this if you can't see your feet clearly.
- Make sure that shoes are worn to protect your feet from injury.
- Make sure your shoes fit and protect your feet.

B Blood

'Feet that may not heal'

You may have reduced circulation and your blood flow may not be enough to heal any skin wounds or fight infections.

- Moisturise your feet and legs every day to keep the skin supple and a strong barrier.
- Keep moving to pump the blood to your feet; make 'circles' with your ankles if walking is not easy.
- Avoid any blood vessel 'blockers', such as smoking, high-fat foods, inactivity, high blood glucose or high blood pressure.

This handout provides a chart for patients with diabetes to help their day-to-day foot care, and also a summary of the essential points in the care of feet and the choosing of footwear.



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C Care

'Feet need a good deal'

If your feet are generally healthy (green lights), follow the foot care described in the panel below to keep your feet healthy.

- Remember to have your feet assessed every six months.
- Your feet and your foot care needs will change over time, so you need to keep a step ahead.

S Structure/Shoes

'Feet on an uneven keel'

Your feet are an odd shape – not on an even keel – and more likely to have corns, calluses and 'bumps' that rub against shoes. This may lead to skin wounds, which can become infected or form ulcers that may take months to heal.

- Have well-fitted shoes that do not rub.
- You may need an insole or orthotic to take the pressure off certain areas of your foot.
- You may need regular podiatry care.

Remember

If you can't feel your feet properly (anaesthesia – A) or they have reduced blood flow (B) or are an odd shape (S), you will need to have shoes carefully fitted to avoid rubbing and injury that can lead to ulcers.

- Ulcers are a big risk to your feet and can lead to amputation if they do not heal.
- If you have already had a foot ulcer, you need to be very careful to avoid another one.

Foot care and footwear for healthy feet

Hygiene

Wash and dry your feet every day. Special attention is needed between your toes. Be gentle.

Skin

Your skin acts as a barrier to infections. People with diabetes tend to have dry skin, so use a moisturiser on your feet each day after bathing to prevent skin cracks and infections. Avoid putting moisturiser between your toes, but apply plenty around your heels. Gentle use of a skin abrasive such as pumice stone after showering and before moisturising will help reduce callus build up on your feet.

Nails

Your toenails should be cut 'straight across'. If you cannot see or reach your nails or you have abnormal nails or reduced circulation then you will need help.

Corns/callus

These areas of thickened skin indicate

pressure areas and can become ulcers. See a podiatrist and pay attention to footwear choices. Thickened nails and areas of skin redness are also signs of increased pressure.

Shoes

Shoes are meant to protect your feet from injury. Such protection is vital if your feet have lost nerve function and feeling. Shoes must fit your feet and not rub. Finding shoes that fit well is more difficult but more important if your feet are an odd shape.

Socks, garters

Check that your socks or pull-up stockings are not acting like 'garters' around your legs and reducing blood flow to your feet.

Keep walking

Your feet need to be in good shape to walk, and you need to walk to help your diabetes, weight and blood pressure. Enjoy the fresh air.



General foot care equipment includes a gentle skin abrasive, mild antiseptic, moisturiser, a nail file and nail clippers.

Who should be caring for your feet?

Are you able to look after your feet? Do you need help from someone else, or a podiatrist? Use the guide below to check.

Patient

You can care for your own feet if you:

- can see your feet and nails
- can reach your feet and nails
- have normal nails
- have normal circulation.

Relative/supporter care

You should have a relative or other carer look after your feet if you:

- cannot see your feet and nails
- cannot reach your feet and nails
- have normal nails
- have normal circulation.

Podiatrist

You should have a podiatrist look after your feet if you:

- have abnormal nails
- have decreased circulation.

Remember, look after your feet – one pair must last a lifetime!

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