

# Best practice pathway of care for people with diabetic foot problems. Part 4: Aftercare.

*A report from a roundtable discussion held on Saturday  
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## Introduction

The previous roundtable meeting in this series of four on the care of people with diabetic foot problems aimed to address wound care and management, and how to manage the non-healing wound. Professional input by the hospital-based vascular team is often necessary at this stage. This was discussed at this meeting and is summarised herein. The main focus of this roundtable discussion was 'aftercare': or how to keep the patient healed post-ulceration or post-amputation.

Present at this roundtable discussion were:

- Paul Chadwick (Principal Podiatrist, Salford)
- Duncan Ferguson (Orthotic Director responsible for quality assurance, Peacocks Medical Group, Newcastle)
- Joanne McCardle (Podiatrist, Edinburgh)
- Alistair McInnes (Senior Lecturer, Brighton; Editor of *The Diabetic Foot Journal*)
- Duncan Stang (Podiatrist and National Diabetes Foot Co-ordinator for Scotland)
- Stella Vig (Vascular Surgeon, London)
- Matthew Young (Consultant Physician, Edinburgh; Associate Editor of *The Diabetic Foot Journal*).

All healthcare practitioners strive to practice evidence-based medicine at all times. However, a problem with diabetic foot care is the dearth of truly randomised controlled trial evidence, or even cohort controlled trial evidence, that can inform and underpin daily practice. The variable nature of the patients and their ulcers, with regard to origin, site and infection and oft delay in treating the patient or the, perhaps, uninformed care he or she has received in the past all make the diabetic foot more variable than treating, for example, dysglycaemia, hypertension or dyslipidaemia. Therefore, much practice in this field is based on previous practice, information from personal

communications and specialist meetings, and anecdotal evidence. This meeting, the final instalment of this series of roundtable discussions, focused upon the dysvascular foot and how to care for the person post-ulcer and post-amputation.

### The dysvascular foot

Peripheral arterial disease (PAD) is, alongside neuropathy, crucial to the outcome of any diabetic foot ulcer. PAD is relatively easy to identify by the experienced healthcare professional: the skin will be discoloured; the skin temperature will be lower than normal; and there may be hair loss in the foot, however, there is no formal evidence for this, just anecdotal. There may also be dependent rubor, which may

have resulted from vasodilation secondary to ischaemia – this indicates the presence of significant vascular disease.

Healthcare professionals responsible for screening people with diabetes should be aware that PAD is a relatively simple condition to identify. The absence of the pedal pulses (for example, the popliteal, posterior tibial and dorsalis pedis pulses) indicates the presence of PAD. The pulses should be graded as normal or absent. However, it must be noted that calcification of the arteries does not affect perfusion, rather the stiffness of the artery walls – calcification does give false positives. Calculation of the ankle-brachial pressure index also helps identify those at risk of or having existing PAD; however, ABPI results must be considered within the overall context of the patient's history.

### Intermittent claudication

Intermittent claudication is arguably the most important symptom of PAD. When this is suspected the patient should be referred immediately to the vascular triage service. Cramps, pain or fatigue are experienced by the patient upon light exercise such as walking, if the pain is relieved by resting, intermittent claudication can be diagnosed. The Edinburgh claudication questionnaire is highly specific (91%) and sensitive (99%) for the condition and has been shown to reduce referrals (Leng and Fowkes, 1992).

Claudication occurs when exercise increases the demand

for blood flow but the blood vessels, due to atherosclerosis, are unable to cope with this increased demand.

However, owing to the large numbers of people that may be affected nurses could be upskilled to screen for the severity of claudication, therefore cutting down the number of referrals to the vascular team. The panel members agreed that the GP does not have the time to be able to assess a patient's vascular status fully during an appointment. See *Table 1* for a list of risk factors and their targets that healthcare professionals need to be aware of when managing the person with intermittent claudication.

Aggressive risk factor management should be independent of initial cholesterol and blood pressure. Statin therapy should include at least 40 mg of simvastatin or pravastatin, all patients should be on anti-platelet therapy and all should have a blood pressure below 140/80 mmHg. Smoking cessation should be a priority for this group. Similarly all of these measures should be

used in the patient following ulceration, whether neuropathic or ischaemic due to the high mortality rates seen in these patients and the potential to improve this as demonstrated by Young et al (2007).

The roundtable panel members stated that the vascular service is often missed out from the diabetic foot multidisciplinary care team, however, they need to be included if the patient is to receive truly multidisciplinary care.

Adam et al (2005) found that in patients presenting with severe limb ischaemia who are suitable for surgery and angioplasty, a bypass-surgery-first and a balloon-angioplasty-first strategy are associated with broadly similar outcomes in terms of amputation-free survival, and in the short-term, surgery is more expensive than angioplasty. This further supports the input the vascular team can and should have on the care of the patient with diabetic foot problems.

Dosluoglu et al (2006) found that preferential use of endovascular interventions in

patients presenting with critical limb ischaemia resulted in a decreased number of primary major amputations, improved limb survival, and decreased length of stay, without a difference in survival.

### Post ulcer and amputation care

It is estimated that people with diabetes have a 15% lifetime risk of getting a foot ulcer (Reiber et al, 1998). There is a 2–6% annual incidence of diabetic foot ulcers in the UK (Abbott et al, 2002). Recurrence rates of diabetic foot ulcers have been shown to be between 50 and 70% (Apelqvist et al, 1993; Mantey et al, 1999; Connor and Mahdi, 2004). William Jeffcoate and colleagues demonstrated that people who have had their first diabetic foot ulcer have a less than 50% chance of remaining ulcer free 1 year after the first ulcer is healed (Jeffcoate et al, 2006).

A typical profile of a person with a diabetic foot ulcer was briefly discussed, he or she may:

- have diabetic retinopathy.
- have erectile dysfunction.

**Table 1. Targets for management of risk factors in people with diabetes. Smoking cessation is recommended by all guidelines.**

	HbA <sub>1c</sub> (%)	LDL-c (mmol/l)	Total cholesterol (mmol/l)	HDL-c (mmol/l)	Blood pressure (mmHg)
NICE (2002)	–	<3	<5	–	<140/80
nGMS contract (BMA and NHS Employers, 2006)	≤7.4	–	≤5.0 mmol/l (in 60% of patients with CHD, diabetes or stroke)	–	<145/85
JBS 2 (British Cardiac Society et al, 2005)	≤6.5	<2	<4	≥1.0	<130/80
BHS-IV (Williams et al, 2004)	<7	<3	<5	–	<130/80

*'Studies show the effectiveness of appropriate footwear and that the multidisciplinary team should work with the patient to explore individual strategies to decrease events that lead to further foot ulcerations.'*

- have cardiovascular disease.
- have atherosclerosis.
- have  $\beta$ -cell failure.
- renal failure, or progressing toward it.
- be insulin resistant.

Similarly the person with a recurring diabetic foot ulcer may:

- have an increased severity of neuropathy.
- have an increased alcohol intake.
- have poor glycaemic control.
- have, more commonly, macrovascular disease
- wear inappropriate footwear.

When is a person with diabetes likely to re-ulcerate once healed? The following are some that were agreed upon by the panellists.

- In the absence of a multidisciplinary team: wherever it is based and one that is supported by a rapid referral network, and one that also includes the specialist vascular service (Morbach, 2006).
- When the patient wears inappropriate footwear (McCabe et al, 1998).
- As an inpatient when their care may be suboptimal owing to a lack of knowledge and expertise in the diabetic foot. For example, lying supine on a bed generates heel-to-bed pressures of between 50 and 94 mmHg, which exceeds the normal capillary filling pressure (Younes et al, 2004).
- When the individual is depressed and, therefore, perhaps non-concordant (Peyrot et al, 2005).
- When the patient is on

holiday (Armstrong et al, 2003).

It is now quite widely accepted that the multidisciplinary team that works together and keeps all of its members informed achieves better outcomes with regard diabetic foot ulcers: whether it is quicker healing times or better quality-adjusted life years post-amputation.

The roundtable panel agreed that the utopian professional multidisciplinary team consists of the following.

- The podiatrist at its centre.
- The consultant diabetologist.
- The microbiology team.
- Nurses with specialist knowledge and experience of diabetes.
- The specialist orthopaedic service.
- The orthotist and the shoemaker.
- The plaster technician.
- The specialist vascular service.
- And of course, the patient.

### Offloading

There are a wide variety of offloading techniques available to the diabetic foot multidisciplinary team, these range from the specialist insole to the custom-made shoe. In an analysis of published studies, Maciejewski et al (2004) concluded that several studies show the effectiveness of appropriate footwear and that the multidisciplinary team should work with the patient to explore individual strategies to decrease events that lead to further foot ulcerations. However, owing to the

persistent non-concordance with wearing prescribed footwear, no statistical significance was reached in any of the identified studies. For example, Edmonds et al (1986) found that the recurrence rate of diabetic foot ulcers was 26% when appropriate footwear was prescribed and worn, compared with 83% for inappropriate footwear.

### Orthotics

Bus et al (2004) found that, in 20 patients with diabetes and neuropathy, custom-made orthotic insoles significantly reduced peak pressures in the heel and first metatarsal head regions.

The panellists agreed with published literature in that the heel is a common site of foot ulceration (Boulton et al, 2006) and low pressures applied over prolonged periods of time will cause cumulative damage. Therefore, post single leg amputation, the heel of the contralateral limb must be closely monitored when the patient is in hospital, for example: they must be provided appropriate heel offloading and a pressure relieving mattress. Patients in this position need to be monitored by whosoever is skilled and knowledgeable to do so – the diabetes specialist nurse or the specialist podiatrist, for example.

It is well known that not many people with diabetes adhere to their medication, whether it be oral antidiabetic agents, insulin or prescribed footwear. McCabe et al (1998) found that only 36% of

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responding patients claimed to use their footwear as prescribed and that 27% never wore them; this study discovered that as footwear was viewed as being sturdy, they were only used when gardening and even for long walks only.

## The renal foot

Identification of risk factors does not only inform the practitioner who is at risk, but also informs treatment options and likely prognosis. For example the diabetic patient with end-stage renal failure and PAD who presents with a foot ulcer has a high risk of infection and a poor prognosis (Boufi et al, 2006).

Established renal failure in diabetes is associated with a high incidence of foot ulcers and gangrene. This problem may be particularly associated with the onset of renal replacement therapy.

There is evidence that haemodialysis causes hypoxaemia and this can be reflected in the subsequent decrease in lower limb transcutaneous oxygen tension (Hinchcliffe et al, 2006). These patients are liable to be prescribed immunosuppressant drugs and are therefore at greater risk of infection. This patient group will have underlying advanced diabetic microangiopathy and often have concomitant PAD and are hypertensive. Clearly the assessment of all of the risk factors has to be considered to evaluate risk factor status for possible future ulceration. The hospitalised renal patients

with diabetes have to be closely monitored to avoid foot ulceration. Inspection of heels is most important and should prompt the use of preventative off-loading devices.

A point to note for practice is that chronic renal insufficiency can be identified by the following criteria: creatinine levels are  $>4.0$  mg/dl; the patient is currently on dialysis; the patient has a history of renal transplantation.

## Concluding points

In order to keep the patient healed the multidisciplinary foot care team must be well coordinated and the specialist podiatrist is best placed to do this. This team must be well-resourced with clear care pathways and treatment protocols in place. The team must aggressively manage all risk factors.

Figure 1 illustrates the similarities of this fourth discussion between what was

discussed and the fourth part of the *National Minimum Skills Framework for Commissioning of Foot Care Services for People with Diabetes* (FDUK et al, 2006). The fourth part of the National Minimum Skills Framework document discusses the management of the patient whose foot ulcer or lesion has resolved and this fourth discussion discusses 'aftercare'. Both agree that continued surveillance is necessary to minimise further complications and that footwear and orthoses are key in doing so, also that the patient should be provided relevant specialist education for the patient and the carer. Both also agree that the impact of PAD should be minimised with the intervention of the vascular team.

This series of roundtable discussions has aimed to provide a best practice pathway of care for the person with diabetic foot problems, in doing so it has also proposed

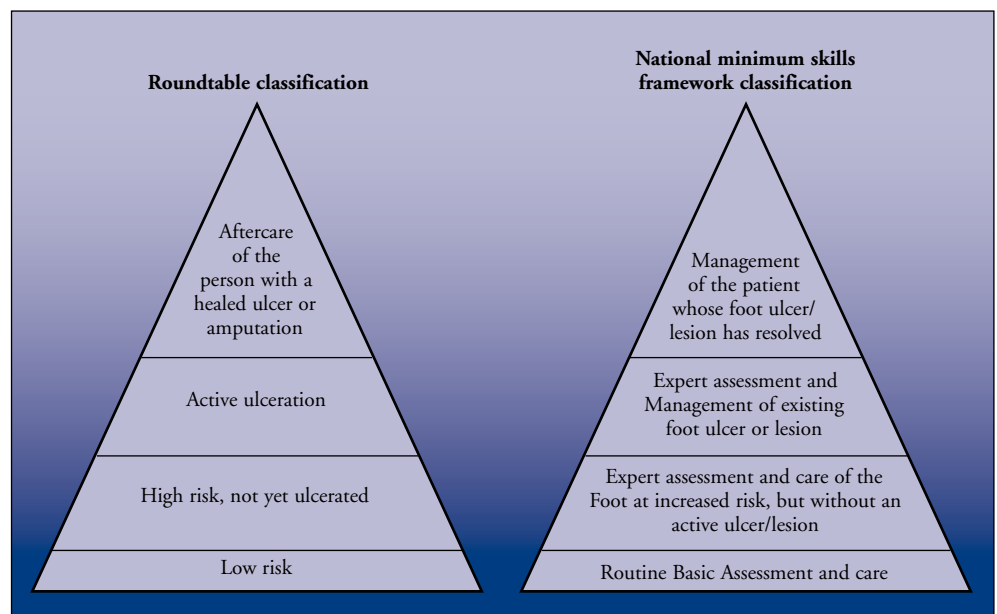


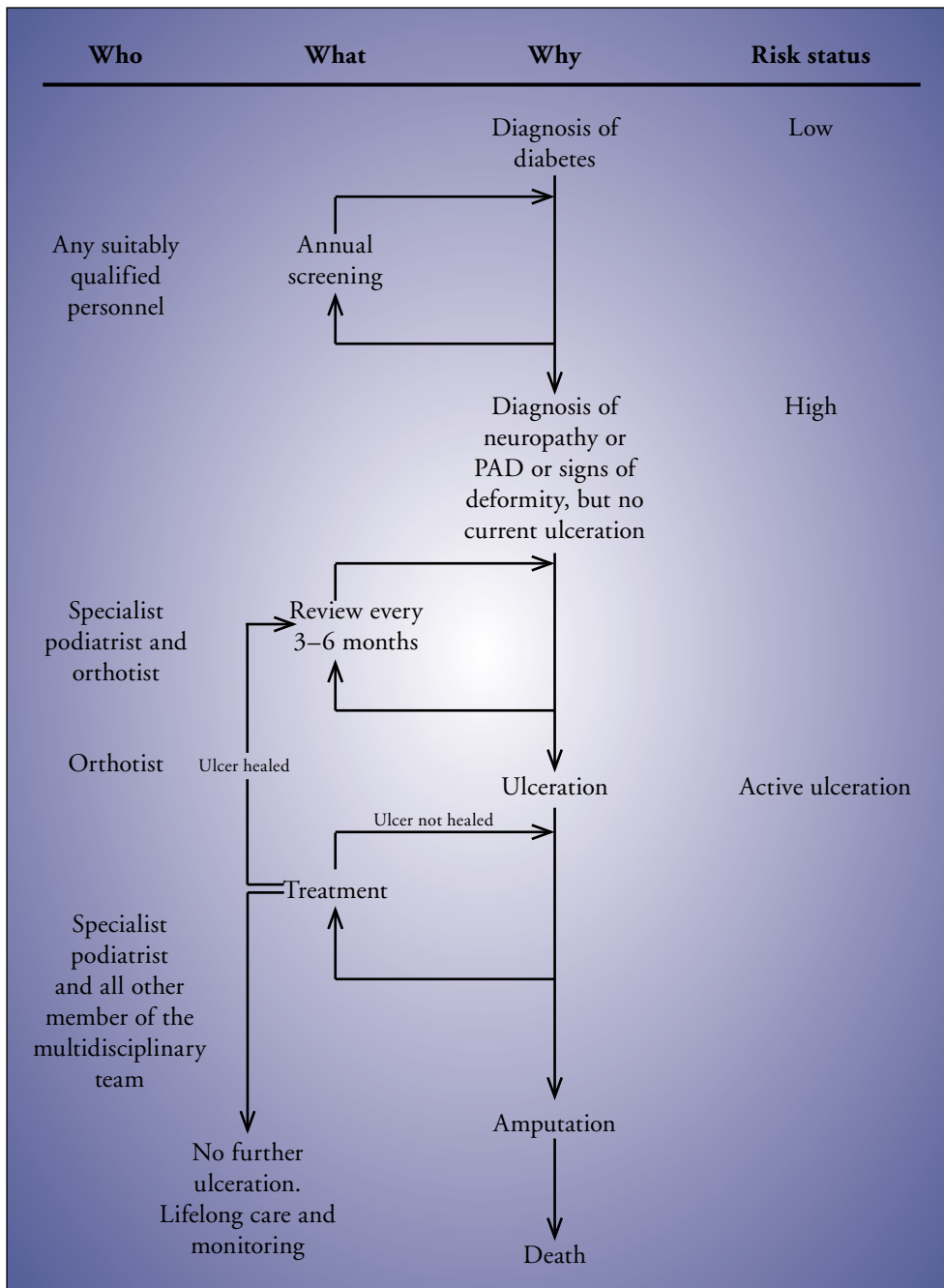
Figure 1. The similarities between the National Minimum Skills Framework and the care pathway that evolved from the roundtable.



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a modified diabetic foot ulcer risk classification. It is the hope of the panellists that the four discussion write-ups will add to the ongoing debate about how best to care for this clinically vulnerable group of people. *Figure 2* was initially published in the first roundtable

discussion write-up and further modified in the second, now the panellists have added to it the vascular team and the orthotist. ■



*Figure 2. Flow chart showing the progression of people with diabetic foot complications from diagnosis of diabetes to specific endpoints such as no further ulceration, amputation and death. Risk status is that proposed by the roundtable panellists.*

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