



# **Best practice pathway of care for people with diabetic foot problems. Part 1: The ‘at-risk’ foot**

**A report from a roundtable discussion held on Tuesday 11 July 2006 in Birmingham. The meeting was supported by an unrestricted educational grant from KCI Medical.**

## Introduction

Outcomes in terms of healing rate, infection and amputation, among others, for the diabetic foot vary greatly across the UK. This is due, in part, to the differences in care provided across the country. In order to identify these differences and to try to devise a 'best practice' pathway of care for people with diabetic foot related problems, a series of four roundtable meetings will be held over the next 12 months. This is a report from the first. The healthcare professionals present reflected many of the individuals involved in the multidisciplinary foot care team:

- Paul Chadwick (Principal Podiatrist, Salford)
- Mike Edmonds (Consultant Physician, London)
- Alistair McInnes (Senior Lecturer, Brighton, and Editor of *The Diabetic Foot*)
- Duncan Stang (Chief Podiatrist, Lanarkshire)
- Lynne Watret (Tissue Viability Nurse, Glasgow)
- Matthew Young (Consultant Physician, Edinburgh, Associate Editor of *The Diabetic Foot* and Chair of this session).

The aim of the final care pathway will be to mirror the flow of individuals from being 'at risk' to 'ulceration' to 'healing' to 'after care'.

**O**f the approximately 2 million people with diabetes in the UK 20–40% have neuropathy, peripheral vascular disease (PVD), or both (Diabetes UK, 2004), depending on the definition criteria used. Five per cent of people with diabetes are estimated to develop a diabetic foot ulcer in any given year (Diabetes UK, 2004). These ulcers can become infected. Infected ulcers can lead to avoidable amputations and are associated with a significantly higher mortality rate than those without ulcers (Boyko et al, 1996). It is, therefore, crucial for healthcare professionals involved in the prevention and care of diabetic feet to have a suitable, easily accessible and logical pathway of care for people

### with problems.

This roundtable discussion took place with the sole purpose of devising such a pathway. The first meeting covered the following topics.

- Which professional is responsible for screening?
- What to screen for.
- How to screen.
- What tools to use for screening.
- How to define the at-risk foot.
- Which service (primary care, secondary care or a mixture) should be screening?
- Which service should be treating the diabetic foot?

### Who should be responsible for screening?

Strong evidence for screening in the prevention of future complications, such as ulceration, is lacking, agreed the panellists. One study

from Liverpool demonstrated that screening did not reduce the future ulceration rate significantly (McCabe et al, 1998). However, the authors stated that this may have been because of a lack of adherence to sufficient self-care.

Therefore, more robust studies need to be conducted. Although the rate of ulceration was not reduced in this case there was evidence that amputation rates were, perhaps as a result of organised foot care (McCabe et al, 1998; also demonstrated by El Sakka et al, 2006).

The National Institute for Health and Clinical Excellence (NICE) recommends that the annual inspection of people with diabetic foot complications be carried out 'by trained personnel' (NICE, 2003). The Scottish Intercollegiate Guidelines Network (SIGN) states that: 'Patients with diabetes should be assessed annually by a diabetologist, GP, chiropodist, diabetes nurse specialist, or practice nurse with training in diabetes to look for the presence of neuropathy, ischaemia or deformity' (SIGN, 2001). The roundtable group echoed the NICE and SIGN recommendations: 'Any appropriately trained healthcare professional should be able to carry out assessment or screening. But how to define or identify such appropriately trained personnel? A starting point would be to disassociate screening from the specialist podiatrists, who have traditionally carried out most foot screening, and to share the role with anyone

who has been trained to do so, for example, healthcare assistants, practice nurses, GPs or consultant physicians' said Alistair McInnes. This would leave the specialist podiatrist to get involved in the care pathway if and when the person with diabetes has developed foot complications.

GPs, under the new General Medical Services Contract's Quality and Outcomes Framework, get three points if the percentage of patients with diabetes with a record of the presence or absence of peripheral pulses in the previous 15 months is between 40% and 90% (Kenny, 2006). In certain areas GP surgeries have been employing podiatrists to do the screening and achieve the points for the practices. This is uncommon and the consensus at this roundtable was that perhaps these practices should put some of the money earned through the screening back into podiatric care.

Screening for diabetic retinopathy is very well established in the UK and, in the opinion of those present at this roundtable, 'is way ahead of screening for diabetic foot problems'. As blindness is a very emotive condition the UK Government has targeted retinopathy as one complication of diabetes that should be screened for; therefore, screening networks have been set up. These networks are well placed to provide full and relevant training to healthcare professionals who are suitably placed in the pathway of care of

the person with diabetes.

### What to screen for

Screening for risk factors such as neuropathy and PVD is crucial for people with diabetes who have not yet had an ulcer, felt the discussion group – the onset of the first ulcer is widely considered to be the 'point of no return'. After the onset of the first ulcer people are at high risk of reulceration, which further increases the risk of infection, amputations and morbidity (Peters and Lavery, 2001).

### Frequency of screening

Although there is a lack of evidence on the frequency of screening the roundtable panel believes that, from the time when diabetes is diagnosed, annual screening for neuropathy and peripheral vascular disease should be carried out as a minimum. This is in keeping with the SIGN and NICE guidelines (NICE, 2003; SIGN, 2001).

Based on the work of McGill and colleagues (2005) and others, the higher the risk category the greater the risk of future foot ulceration; therefore, the existing guidelines need to be modified to include more regular care for those at higher risk. The NICE guidelines recommend four to six podiatry contacts a year for people at high risk (NICE, 2003).

### What tools to use for screening and how to use them

#### Neuropathy

The panel decided that the best evidence-based methods for the assessment of neuropathy are:

- the vibration pressure



From left to right: Matthew Young (Consultant Physician, Edinburgh); Mike Edmonds (Consultant Physician, London); Paul Chadwick (Chief Podiatrist, Salford).

threshold

- the 10 g monofilament
- medical history to assess past and present ulceration status. (evidence for these is discussed in: SIGN, 2001; Peters and Lavery, 2001.)

#### Vibration pressure threshold

The use of vibration perception thresholds has, in cross-sectional and prospective studies, proved to be one of the most accurate of the screening modes for predicting neuropathic foot ulceration. The uptake of vibration screening is, however, limited by the cost of the tools required or the inability to quantify tuning forks in routine use (Young et al, 1994).

#### 10 g monofilament

The 10 g monofilament is the most commonly recommended tool for screening for foot ulceration. Confusion is made between diagnosing neuropathy and foot ulcer risk. While a 1 g monofilament is suitable for detecting low levels of

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**Table 1. Proposed new diabetic foot risk classification system.**

<b>Low risk</b>	People with no diagnosed neuropathy or peripheral vascular disease (PVD) and with no history of ulceration
<b>High risk</b>	People with diagnosed neuropathy or PVD and a history of previous ulceration, but no current ulceration
<b>Active ulceration</b>	People with current ulceration

neuropathy, it is the failure to perceive a 10 g monofilament that delineates increased risk of foot ulceration (Pham et al, 2000).

The SIGN guidelines document (SIGN, 2001) states that it is not necessarily the method of screening rather that screening is carried out on a regular basis that is important.

### Ischaemia or PVD

Robust clinical evidence for tests for the assessment of peripheral vascular disease (PVD) are uncommon; therefore, most of their use is based on anecdotal evidence. However, the absence of two or more pedal pulses is indicative of PVD (Apelqvist et al, 1990) and should be used as a first test. The ankle-brachial index is commonly used as a

screening test, although it must be noted that it can be falsely raised in people with diabetes, due to calcification of the blood vessels (Young et al, 1993).

### Callus

Formation of callus is a hallmark of the neuropathic foot (Murray et al, 1996). Callus development increases focal foot pressures and is associated with a greater than 70-fold increase in ulceration at callus sites (Murray et al, 1996). Therefore, the detection and removal of callus remains a key part of preventative screening and treatment for the diabetic foot.

### Biomechanical assessment

Assessment of an individual's gait can also reveal much about possible underlying problems such as neuropathy, so who should be responsible for the biomechanical assessment of the person at risk of becoming ulcerated? The roundtable panelists believe that all hospital or community-based podiatrists are best placed to perform biomechanical screening, or once the individual has developed ulcers, to advise on and prescribe off-loading devices.

### History of ulceration

Out of all the risk factors for foot

ulceration the most important appears to be a previous foot ulcer or amputation. While many people with diabetes have neuropathy or vascular disease for years without problems, once an ulcer develops, recurrent ulceration is observed in more than 50% of cases (Peters and Lavery, 2001). Therefore the development of an ulcer is a watershed event for a particular patient (Peters and Lavery, 2001).

### How to define the at-risk foot

All people with diabetes carry a small risk of ulceration above the population without diabetes. However, it is not until significant neuropathy or vascular disease develop that this risk is increased, agreed the panel. Therefore, the next step in risk classification includes those at high risk: with PVD, neuropathy or both and no current ulceration (see *Table 1* for the proposed new classification system). This departure from the traditional risk groups of low, medium and high risk more closely reflects the pathway of care of the person with diabetes, as exemplified in *Figure 1*. These new risk classifications are a modification of all other published ones, which tend to be based on four distinct categories of risk (see *Table 2* for an example).

The panelists believe that the new risk categories vastly simplify the process of screening so that healthcare professionals not particularly au fait with diabetic foot screening can

**Table 2. An example of the classic four-stage risk classification of the diabetic foot (adapted from Peters and Lavery, 2001).**

Risk status	Description
Low risk ('0')	No neuropathy
Increased risk ('1')	Neuropathy
High risk ('2')	Neuropathy and peripheral vascular disease or deformity
Ulcerated foot ('3')	Previous ulcer or lower extremity amputation

# RoundtableDISCUSSION

easily determine an individual's risk status. They recognise that although a large number of individuals have at-risk feet only a small percentage of them develop ulcers. However, once an individual develops an ulcer the risks of recurrent ulceration are over 50% and this creates a new high-risk group with particular care needs. These will be discussed in the fourth roundtable document in this series.

## Which service (primary care, secondary care or a mixture)?

The second part of the roundtable discussion focused upon which service (primary or secondary care, or a mixture of both) should care for people within each of the risk categories outlined in *Table 1*. There was some debate as to whether people with past or present ulceration should always be seen in specialist diabetic foot clinics, or could they be seen by community podiatry teams? All should be seen by a member of a specialist diabetic foot clinic was one suggestion, or should community-based podiatrists see them first, followed by specialist podiatrists?

The current situation is that there is a mixture of approaches across the country; there is no single agreed route for people at high risk of developing diabetic foot problems. The panel felt that this is due, in part, to the large differences between NHS trusts' funding of diabetic foot care. For example, Salford PCT is able to afford 36 podiatrists

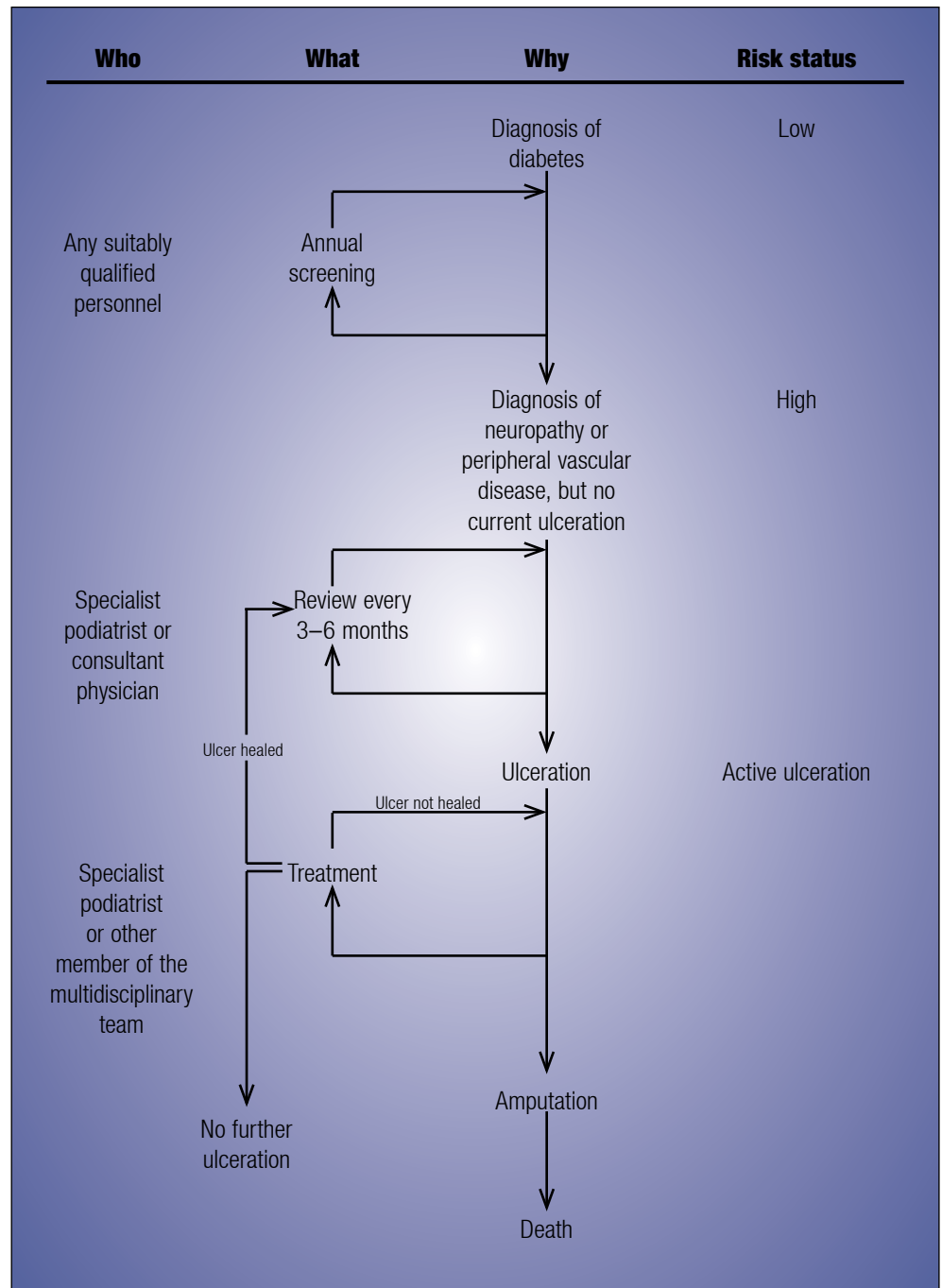


Figure 1. Flow chart showing the progression of people with diabetic foot complications from diagnosis of diabetes to specific endpoints such as no further ulceration, amputation and death. The risk statuses are those that are proposed by the roundtable panelists.

(of whom seven [whole-time equivalent] specialise in the high-risk foot) for a population of approximately 9 000 people with diabetes with 938 ulcers in 2005 (data from a recent internal audit); a rarity among NHS trusts. On balance all

high-risk individuals who have not yet ulcerated should be seen for routine care by a podiatrist with additional skills in the management of the high-risk diabetic foot whether in community or secondary care.

Figure 1 outlines a flow

**‘While screening and preventative care are not proven to reduce the incidence of foot ulceration, if performed in a regular and systematic way, they remain our best hope of preventing patients from crossing the rubicon to recurrent ulceration, amputations and premature death.’**

chart of patient progression and healthcare professional involvement based on the panel’s discussion.

People with a history of ulceration should be seen on a regular basis by healthcare professionals who are adequately trained in managing diabetic feet. The panel believe that the training available to healthcare professionals is, on the whole, adequate, but it is possibly the lack of experience of dealing with diabetic foot ulcers that can cause problems with, for example, healing rates. If people simply at risk of developing foot ulcers are seen regularly by community-based healthcare professionals, then there must be in place systems to ensure that they are suitably qualified or have the relevant knowledge to provide suitable annual screening or follow-up care. They should be able to react if the individual’s risk status changes and have access to an adequate support network to ensure that the individual is

not placed at any further risk.

If the locality does not have a responsive specialist podiatry team, then the accident and emergency department will probably see the patient. In the experience of the panelists, most accident and emergency departments do not have direct access to or adequate ‘in-house’ knowledge of diabetic foot problems. Care can sometimes be a ‘lottery’ as only a few accident and emergency staff may have the relevant knowledge and experience to refer appropriately or to treat appropriately.

A further problem posed with people with diabetic foot problems attending the accident and emergency department, after perhaps having stood on a nail, is that they may have to wait for a few hours before being fully assessed and treated. This is not good for the individual’s diabetes or his or her wound – the wound could get infected which could cause further problems in the future with the wound becoming non-healing or, at the worst, it could lead to an amputation.

Timely referral pathways for ulcerated individuals will form the basis of the next roundtable document.

## Concluding remarks

Malone and colleagues (1989) conducted a study where they ‘frightened’ participants with diabetes into caring for their feet by showing them photographs of what could happen to their feet. This is perhaps not the best method of ensuring people with diabetes look after their

feet. However, while screening and preventative care are not proven to reduce the incidence of foot ulceration, if performed in a regular and systematic way, they remain our best hope of preventing patients from crossing the rubicon to recurrent ulceration, amputations and premature death, concluded the panel. ■

Apelqvist J, Larsson J, Agardh CD (1990) The importance of peripheral pulses, peripheral oedema and local pain for the outcome of diabetic foot ulcers. *Diabetic Medicine* **7**(7): 590–4

Boyko EJ, Ahroni JH, Smith DG, Davignon D (1996) Increased mortality associated with diabetic foot ulcer. *Diabetic Medicine* **13**(11): 967–72

Diabetes UK (2004) *Diabetes in the UK 2004. A report from Diabetes UK*. Diabetes UK, London

El Sakka K, Fassiadi N, Gambhir RP et al (2006) An integrated care pathway to save the critically ischaemic diabetic foot. *International Journal of Clinical Practice* **60**(6): 667–9

Kenny C (2006) How changes to the QOF will affect diabetes care. *Diabetes and Primary Care* **8**(1): 22–30

Malone JM, Snyder M, Anderson G et al (1989) Prevention of amputation by diabetic education. *American Journal of Surgery* **158**(6): 520–3

McCabe CJ, Stevenson RC, Dolan AM (1998) Evaluation of a diabetic foot screening and protection programme. *Diabetic Medicine* **15**(1): 80–4

McGill M, Molyneux L, Yue DK (2005) Which diabetic patients should receive podiatry care? An objective analysis. *Internal Medicine Journal* **35**(8): 451–6

Murray HJ, Young MJ, Hollis S, Boulton AJ (1996) The association between callus formation, high pressures and neuropathy in diabetic foot ulceration. *Diabetic Medicine* **13**(11): 979–82

National Institute for Health and Clinical Excellence (NICE; 2003) *Prevention and Management of Foot Problems in Type 2 diabetes: Clinical Guidelines and Evidence*. NICE, London

Peters EJ, Lavery LA; International Working Group on the Diabetic Foot (2001) Effectiveness of the diabetic foot risk classification system of the International Working Group on the Diabetic Foot. *Diabetes Care* **24**(8): 1442–7

Pham H, Armstrong DG, Harvey C et al (2000) Screening techniques to identify people at high risk for diabetic foot ulceration: a prospective multicenter trial. *Diabetes Care* **23**(5): 606–11

Scottish Intercollegiate Guidelines Network (SIGN; 2001) *Management of Diabetes. A national clinical guideline*. SIGN, Edinburgh

Young MJ, Adams JE, Anderson GF, Boulton AJ, Cavanagh PR (1993) Medial arterial calcification in the feet of diabetic patients and matched non-diabetic control subjects. *Diabetologia* **36**(7): 615–21

Young MJ, Breddy JL, Veves A, Boulton AJ (1994) The prediction of diabetic neuropathic foot ulceration using vibration perception thresholds. A prospective study. *Diabetes Care* **17**(6): 557–60



From left to right: Duncan Stang (Chief Podiatrist, Lanarkshire); Lynne Watret (Tissue Viability Nurse, Glasgow); Alistair McInnes (Senior Lecturer, Brighton); Matthew Young (Consultant Physician, Edinburgh); Mike Edmonds (Consultant Physician, London).