

# The value of evidence-based foot screening in diabetes in the primary care setting

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## Article points

1. Preventative measures have been shown to be cost-effective, and even cost-saving, if targeted at those patients with the greatest risk of foot complications.
2. Various risk factors have been identified that indicate individuals who are at risk of diabetic foot ulceration.
3. Clinical risk stratification tools can be, and are being, used in routine clinical practice.
4. Screening is only one part of improving care for people with diabetic foot problems, but can at least be delivered with a good evidence base behind it.

## Key words

- Foot ulceration
- Evidence-based screening
- Clinical-risk scores

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In the UK, 1.4 % to 2 % of people with diabetes have an active foot ulcer (Abbott, 2002; Kumar, 1994), and about 5 % of patients have had an ulcer (Kumar, 1994). For an individual with diabetes in the US, the lifetime risk of developing an ulcer may be as high as 25 % (Singh, 2005). In this article, the author examines the value of an evidence-based approach to diabetic foot screening in primary care.

Foot ulcers are the usual precursor of amputation, and worldwide, someone loses their leg every 30 seconds due to diabetes (IDF, 2005). It has been estimated that 20 % of all diabetes-related health care costs may be attributable to the diabetic foot (Boulton, 2005), and amputation has many additional 'knock-on' social costs for the individual and society.

Preventative measures have been shown to be cost-effective, and even cost-saving, if targeted at those patients with the greatest risk of foot complications (Ragnarson-Tennvall and Apelqvist, 2001). The number of people with diabetes is increasing at epidemic proportions (Zimmet, 2001), but the increase in health care resources does not match this. This is particularly evident in the area of foot problems, where podiatrists, especially those with an interest and expertise in diabetes, are becoming a relatively scarce resource. Thus, we need to use whatever resources we do have

efficiently. The best way of achieving this is to target resources towards those at greatest need: by identifying those at the greatest risk of complications by, perhaps, primary care teams.

## Risk factors for foot ulceration

A variety of risk factors can identify individuals who are at risk of diabetic foot ulceration – perhaps the most important of these is a previous ulceration. Other risk factors include: neuropathy, especially when associated with increased plantar pressure; vascular disease; foot deformity; poor vision; poor glycaemic control and ill-fitting shoes (Abbott, 2002; Boyko, 2006). The neuropathy disability score is also a useful predictor (Abbot, 2002). When assessing risk of ulceration, clinicians may examine for pulses and neuropathy, but many may not formally consider other risk factors such as a history of previous ulceration.

### Integrated clinical risk scores

The multiple individual risk-factors described above can be integrated into a single clinical-risk score. Such clinical-risk scores can be particularly useful for the generalist to simplify the task of identifying those at risk. The Tayside clinical-risk tool (see *Figure 1*) was developed in order to categorise patients as at low, moderate or high risk of foot ulceration. For practical use such clinical-risk tools have to be kept simple if they are to be implemented widely, and the Tayside tool uses five clinical criteria and an assessment of ability to self-care, which are:

- previous ulcer
- absence of sensation to a 10g monofilament (neuropathy)
- absent foot pulses
- foot deformity or presence of callus
- inability to care for feet due to poor eyesight or physical disability.

Two studies have validated the Tayside tool – 3526 (Leese et al, 2006) and 7184 (Leese et al, 2007) people from community and hospital diabetes services were enrolled in what were prospective studies of routine clinical services representing a ‘real-world’ situation. These studies found that 63–65% of people with diabetes were at low risk, 22–24% were at moderate risk and 13–14% were at high-risk of foot ulceration. The figures from each study were remarkably similar from these population-based cohorts.

In the 2006 paper, individuals were followed up for an average of 1.7 years, during which time high-risk individuals were 83 times more likely, and moderate-risk individuals 6 times more likely to develop a foot ulcer than low-risk individuals (Leese et al, 2006). In a sub-study of individuals followed up for a minimum of 2 years, the results were very similar. Those who were low-risk had a 99.6% (95% confidence interval 99.5–99.7%) chance of remaining ulcer-free during follow-up (Leese et al, 2006). In the high-risk group, 19.1% died during follow-up, while this figure was 8.7% in moderate risk and 3.4% in low risk individuals (Leese

et al, 2006).

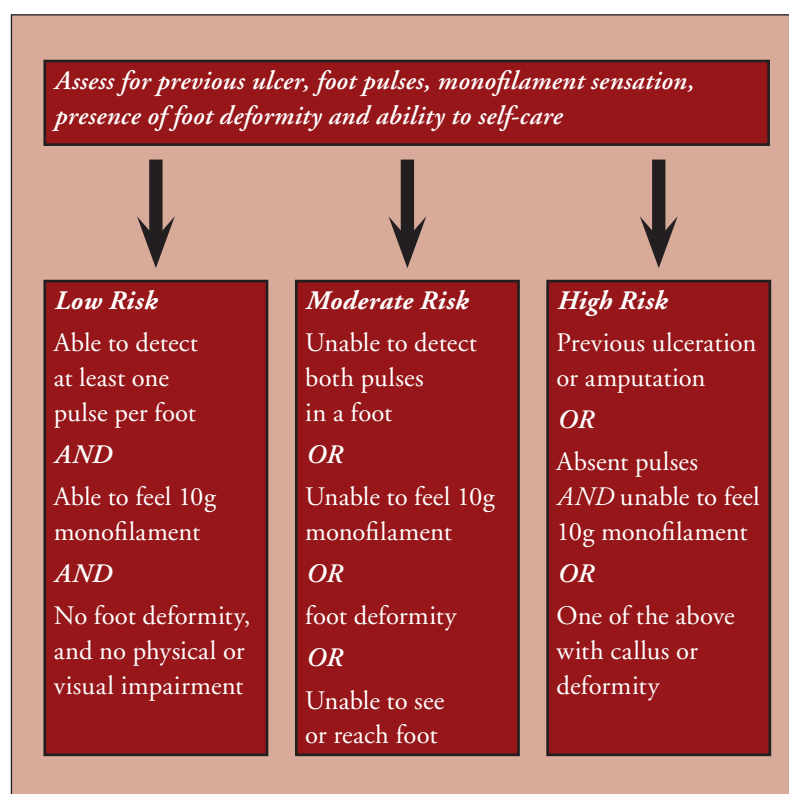
For those who developed a foot ulcer, if they were high-risk the ulcer was less likely to heal than if moderate or low-risk (68% vs 93%;  $P < 0.001$ . Leese et al, 2007). Presence of neuropathy, absent pulses, age of the individual and ulcer depth were the best predictors of healing in a multifactorial analysis of all factors addressed (Leese et al, 2007).

This foot-screening tool is now available on paper and electronically, and it is part of the Scottish Care Information – Diabetes Collaboration (SCI-DC). It is being used in routine clinical practice, and has been found to be useful to practising clinicians (Leese et al, 2006; McCardle and Young 2006; Leese et al, 2007).

The International Working Group for the Diabetic Foot published screening guidelines in 1999 (Apelqvist et al, 1999) which used very similar clinical criteria to produce a four-level risk score (IWGDF, 2003). This

### Page points

1. Any patient with a previous foot ulcer is categorised as high risk.
2. Presence of any one of the clinical factors listed above categorises a person as moderate risk.



*Figure 1. The Tayside Foot-Risk Stratification Scheme (Leese et al, 2006; 2007).*

**Page points**

1. Screening is frequently performed by trained practice nurses and podiatrists, but is performed by GPs, diabetologists and other health professionals.
2. Risk stratification tools can be used to direct scarce podiatric resources towards those who need them most.
3. The competence, knowledge and interests of the general podiatrist are more important than where they are located.

tool was shown to predict the likelihood of foot ulceration during the follow up of 213 patients over 29 months (Peters and Lavery, 2001) with ulceration rates of 5 %, 14 %, 19 % and 56 % respectively for each risk group. It was updated in 2003 (IWGDF, 2003).

**Impact of risk stratification in clinical practice**

These clinical risk stratification tools can be, and are being, used in routine clinical practice. Screening is frequently performed by trained practice nurses and podiatrists, but is also performed by GPs, diabetologists and other health professionals looking after people with diabetes. Appropriate training of these staff is important. The author recommends annual foot screening; however, there is little evidence to establish what the ideal time interval between screening visits should be.

Risk stratification tools can be used by primary care practitioners to direct scarce podiatric resources towards those who need them the most. People identified as low-risk can be educated (by either the practice nurse or GP) as to how to look after their own feet, and also when and how to seek help if any problems develop. For such an approach it is important that referral pathways are clear, easily accessed and rapid when they need to be (for example an emergency phone number as those with active ulcers/Charcot feet should be urgently referred to the multidisciplinary team). Those identified as moderate-risk can be offered a general podiatrist (NHS grade) or a footcare assistant depending on the patient requirement and the local healthcare professional resource available. For instance, a footcare assistant could be used for toenail care in obese individuals without other risk factors who cannot reach their feet. High-risk individuals should be referred to podiatrists with a knowledge and expertise in diabetic foot problems, which could be in a hospital or a community setting, depending on the local health care organisation.

The competence, knowledge and interests of the general podiatrist are more important than where they are located. All individuals,

whatever their level of risk, should have access to a multidisciplinary diabetic foot clinic in case they develop ulcers, especially if they are non-healing, or if they develop other problems, such as Charcot joints.

The access should either be direct, especially for previously known patients, or via rapid referral from other healthcare professionals. The category of moderate-risk can be useful for healthcare planners, as it allows some flexibility depending on the healthcare resources available to them in their locality. Using such an approach would enable podiatrists to focus on the one-third of patients who are at risk, and specifically the 13 % of patients with diabetes at high-risk of foot ulceration (Leese, 2006). They would also be attending the 2 % of patients who have an active foot ulcer, the majority of whom would already be known to be high-risk (Abbott, 2002). In the authors' opinion, this approach can improve the efficiency of healthcare delivery. Closer liaison between general practice and available podiatry and orthotics will also help. However, the drive for improved efficiency should not overshadow the need for more podiatrists and orthotists to meet the demands of the increasing number of people with foot problems.

**Prediction of ulcer healing**

The work above demonstrates relevant predictors of ulcer development. Once an ulcer has developed there are various predictors of non-healing, including ischaemia, increased age, ulcer depth and size, and sepsis (Adler, 1999; Oyibo, 2001; Margolis, 2003 and 2005; Treece, 2004; Beckert, 2006). Various clinical tools have been established to assess, monitor and predict healing including the Wagner, Texas and S(AD)SAD scores (Wagner, 1987; Armstrong, 1998; Treece 2004; respectively).

**Summary**

This evidence-based approach has been incorporated into the refreshed *Scottish Diabetes Framework: Action Plan* (2006). The diabetic foot has become a priority area, and among other issues, foot screening has

been highlighted as an important issue. The Action Plan has issued the challenge of having 75% of people with diabetes in Scotland screened using the SCI-DC evidence-based approach by April 2008. The Action Plan has highlighted other issues such as the need for quality multidisciplinary foot clinics, rapid referral pathways, synchronised patient information and training, all of which need developing.

Screening is only one part of improving care for people with diabetic foot problems; but can at least be delivered with a good evidence base behind it, unlike many other areas of diabetic foot care, where the evidence base still needs to be established. ■

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