We need to talk about screening

Matthew Young
Consultant Diabetologist and General Physician, Department of Diabetes, Royal Infirmary of Edinburgh, Scotland

There are two excellent articles in this quarter's journal that question our fundamental approach to screening and risk factor assignment in patients with diabetes. The Cardiff article (pp231–8) concentrates on refining our current screening paradigm and the Manus article (pp218–23) aims to streamline referral pathways with decision trees.

I believe both are great papers to start to question the status quo and our approach to foot risk allocation and care. However, I would like to open the debate further and talk about the value of foot screening and what it actually tells us about patients and the risk of ulceration and amputation.

I was fortunate to enter the field of diabetes foot care in the early 1990s. This was a time of great discovery and progress, particularly in the area of predicting risk of ulceration. Many of the papers produced around this time have informed the screening levels we use today and were recently amalgamated and re-analysed by the PODUS group led by Fay Crawford (Crawford, 2017). Having analysed the results from 16,000 patients, the paper reports that, in patients without prior ulceration, the inability to feel a 10-g monofilament and the absence of a foot pulse were both able to predict individuals at 2–3 times increased risk of foot ulceration compared to those who have normal pulses or intact 10-g monofilament sensation. This is, of course, good news as these are the standard tests applied in screening around the world.

Unfortunately, screening for increased risk of foot ulceration only predicts a group of individuals who have a 3–5% chance of developing foot ulceration in the next year (Young et al, 1994; Crawford et al, 2011). This is significantly greater than the 0.2% of patients who ulcerate without established risk factors (Leese et al, 2004), but even with reduced protective sensation or absent pulses, 95–97% do not develop a foot ulcer in the coming year. At present, screening alone cannot predict exactly which individuals will ulcerate, but merely a comparatively large population of patients of whom only a relatively small number will go on to experience problems.

In addition, in keeping with most studies, the best predictor of future foot ulceration is having had a previous foot ulcer. Once an individual, for whatever reason, moves from no previous ulcer to having had an ulcer, then they tend to ulcerate repeatedly over time (Maciejewski et al, 2004). Whether this is behavioural or environmental is not clear, but instead of 1 in 30 ulcerating because they have risk factors and no previous ulcer, around 1 in 2 patients who have healed an ulcer will re-ulcerate in the next year.

This almost certainly explains why studies of primary prevention of foot ulceration have very mixed results or no clear benefit in preventing ulceration. In order to have an 80% chance of detecting a clinical effect of primary prevention to halve the number of expected ulcers in patients with risk factors, but no previous ulcer would require around 3,000 patients split equally between intervention and no intervention. There are no clinical trials of that size in the podiatry world. I am not even sure it would be considered ethical to not provide podiatric support to patients with risk factors for foot ulceration so this trial is unlikely to be done, at least in the UK, Europe or America.

Curiously, secondary prevention of re-ulceration in previously ulcerated patients also has very poor or mixed results in preventing ulceration but again most studies have been under powered as they would require around 100–110 patients to have a reasonable chance of detecting a difference and the only study I know of this size has not been published in a peer-reviewed journal (Joanne McCardle — personal communication).

So why is screening still advocated? Firstly, the patients with no evidence of increased risk of foot ulceration can be assigned to supported self care and advised who to contact in the unlikely event that they do develop an ulcer.

Patients with factors that increase their risk of foot ulceration, but who have not yet ulcerated, can be considered primary prevention patients if we use similar terms to cardiovascular risk reduction. In my view, and this is supported by the published literature, these patients should be reviewed by a podiatrist as this has been shown to improve outcomes for those who ulcerate and, in particular, lessen the risk of amputation. Any preventive care, such as callus reduction, emollient advice, smoking cessation and cardiovascular risk management etc, can then be actioned. This will hopefully have an impact on future ulceration even if it is not proven in the literature to date.

However, the biggest effect on improving outcomes in patients at risk of foot ulceration appears to be due to earlier referral of new ulceration to multidisciplinary foot ulcer clinics (MDFC) for those patients who are known to the foot protection team. Being reviewed by a podiatrist, and even better if the patient then self refers to the MDFC, ensures that the ulcers are less severe when first seen in the MDFC. This, in turn, improves outcomes including survival, healing rate, reduced hospital admissions and amputations as demonstrated in the series published by Gibson (2014) and in the recent results of the National Diabetes Foot Care Audit (NHS Digital, 2018).

Primary prevention foot protection teams are, therefore, important, but resources still need to be allocated to MDFCs, as these are still not universal in NHS Trusts and health boards across the UK and worldwide (NHS Digital, 2018). It is the establishment of MDFCs that will further reduce the likelihood of foot ulceration going on to amputation and potentially impact upon the secondary prevention of re-ulceration in those patients who heal. If we get this right then we can simplify referral and care pathways, speed access to MDFCs and hopefully we stem the rising numbers of amputations in the diabetes population (Diabetes UK, 2017). ■

If you have any comments regarding this editorial, please email the journal editor, Adam Bushby, at abushby@omniamed.com.

Crawford, F, McCowan, C, Dimitrov, BD et al (2011) The risk of foot ulceration in people with diabetes screened in community settings: findings from a cohort study. *QJM* 104(5): 403–10

Crawford, F, Cezard, G, Chappell, F et al (2015) A systematic review and individual patient data meta-analysis of prognostic factors for foot ulceration in people with diabetes: the international research collaboration for the prediction of diabetic foot ulcerations (PODUS). *Health Technol Assess* 19(57): 1–210

Diabetes UK (2017) *Record Levels of Diabetes-Related Amputations*. Available at: https://bit.ly/2E8qDQLs (accessed 09.10.2018)

Gibson TB, Driver VR, Wrobel JS et al (2014) Podiatrist care and outcomes for patients with diabetes and foot ulcer. *Int Wound J* 11(6): 641–8

Leese GP, Reid F, Green V et al (2004) Validation of a clinical tool to predict foot ulceration in a population based study. *Diabetic Med* 21(Suppl 2): 36–108

Maciejewski ML, Reiber GE, Smith DG et al (2004) Effectiveness of diabetic therapeutic footwear in preventing reulceration. *Diabetes Care* 27(7): 1774–82

NHS Digital (2018) *National Diabetes Foot Care Audit*. Available at: https://bit.ly/2C5i0na (accessed 09.10.2018)

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

"It is the establishment of multidisciplinary foot ulcer clinics that will further reduce the likelihood of foot ulceration going on to amputation and potentially impact upon the secondary prevention of re-ulceration in those patients who heal."