

Lower limb complications

Keep on moving (the evidence base for diabetic foot care forward)



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The main paper in this quarter's round up is by Fay Crawford et al (summarised on right) and is a systematic review and meta-analysis of predictive risk factors for foot ulceration. This paper is chosen not just because I had a hand in 6 of the 39 references, but because it helps to answer a few important questions at this time of change for diabetes services, particularly in England and Wales.

Annual screening of people with diabetes to predict increased risk of foot ulceration is a recognised and rewarded part of the new GMS contract. Dr Crawford's study reviews 16 papers with sufficient quality to be compared. Of the suggested possible risk factors for foot ulceration, only those that detect peripheral neuropathy and predict increased foot pressure were reproducibly able to predict future ulceration. Given the bias

towards neuropathic ulceration by most research teams, it is not surprising that measures of vascular disease were not reproducibly predictive. I still believe that foot pulses are as good as any measure. Perhaps we can finally dispense with measures such as skin colour, temperature and visual acuity, which are not evidence based, from screening forms and concentrate on what is clearly demonstrated to be important.

The second paper from Rao and Lipsky (summarised below) deals with antimicrobial therapy for diabetic foot ulceration. Again, this area has been filled with conjecture, bias and misinformation and it appears that not an issue of this journal goes by without a new review of this area. Fortunately, most are starting to give similar messages: the diabetic foot should have infection treated quickly and at the earliest minimal signs. Treatment might need to continue for longer than perhaps that of a chest or urinary tract infection to ensure that eradication is complete and osteomyelitis does not always lead to surgery.

QJM

Predicting foot ulcers

Readability	✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 Diabetic foot ulcers (mainly caused by peripheral neuropathy) have a prevalence of 1.3–4.8% in people with diabetes and result in substantial health care costs.

2 The authors conducted a meta-analysis of online databases and literature to measure the ability of diagnostic tests, physical signs and patient history to predict ulcer formation.

3 Five case-control and 11 cohort studies satisfied the inclusion criteria. The incidence of foot ulcers was in the range 8–17% within the cohort of studies.

4 Future diabetic foot ulceration was predicted by diagnostic tests such as peak plantar pressure, ankle-brachial indices and a high vibration perception threshold as well as by physical signs including cutaneous sensation, absent ankle reflexes and visual acuity.

5 A trend for people who had a longer duration of diabetes to develop ulcers was observed in five case-control studies but this was not statistically significant. A history of foot ulceration, lower-limb bypass or amputation also predicted future foot ulceration.

6 Following inconsistent findings for some of the measured predictive factors, the authors recommend further evaluation of factors such as patient history and physical examination and their association with the development of ulceration. This should include other variables such as levels of exercise, calluses, Charcot deformity or choice of footwear.

7 The authors conclude that diagnostic tests and clinical signs can predict ulceration risk and should therefore be incorporated into foot screening procedures.

Crawford F, Inkster M, Kleijnen J, Fahey T (2007) Predicting foot ulcers in patients with diabetes: a systematic review and meta-analysis. *QJM* 100: 65–86

DRUGS

Antimicrobial therapy for diabetic foot infections

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! factor	✓✓✓

1 Ulcerations following trauma to a neuropathic foot often lead to infections, the most severe of which are commonly polymicrobial.

2 A broad spectrum of antimicrobials, along with appropriate medical and surgical treatments, are needed to treat severe infection. There is no single superior antibacterial regimen.

3 *Staphylococcus aureus*' resistance to methicillin is also increasing, highlighting the need for an effective antibacterial treatment.

4 Comprehensive guidelines have been developed recently for the diagnosis and treatment of diabetic foot infections.

5 Infection is diagnosed based on the presence of purulent secretions or at least two indications of inflammation (redness, warmth, swelling or pain).

6 Careful assessment of the infection severity, medical comorbidities and history of intolerance or allergies to antimicrobials are required for optimal treatment.

7 In order to select an appropriate antimicrobial treatment, the spectrum of micro-organisms covered, route of administration required, available culture results, knowledge of recent therapies, epidemiological information and local antibacterial resistance patterns should be considered.

8 Appropriate intervention from a multidisciplinary team of healthcare specialists along with effective antibacterial therapy is the best way to treat infections of the foot.

Rao N, Lipsky BA (2007) Optimising antimicrobial therapy in diabetic foot infections. *Drugs* 67: 195–214

FOOT AND ANKLE INTERNATIONAL

Operative management of ankle fractures

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓

- 1 The aim of this study was to review the complications associated with the treatment of ankle fractures in people with diabetes.
- 2 Participants (n=84; 51 men and 33 women) had open reduction and internal fixation for acute, closed ankle fractures and were followed up for an average of 4.1 years.
- 3 Diabetes was managed by either insulin (n=39) or oral hypoglycaemic agents plus diet (n=45).
- 4 Chi-square, ANOVA and univariate analyses were used to assess diabetes management, fracture classification and complications.
- 5 Postoperative complications developed in 12 people, 10 of whom developed infections. Charcot arthropathy affected four participants.
- 6 Of 12 individuals with absent preoperative pedal pulses, 10 developed complications, as did 11 out of 12 of those with peripheral neuropathy. Both these associations were significant ($P<0.0001$ for both).
- 7 Hypertension also showed a trend towards complications, whereas patient age, fracture classification, open fractures and insulin dependence did not predict further symptoms.
- 8 The authors concluded that unless peripheral neuropathy is present or pedal pulses are absent, open reduction and internal fixation surgery on ankle fractures should be possible without complications.

Costigan W, Thordarson DB, Debnath UK (2007) Operative management of ankle fractures in patients with diabetes mellitus. *Foot and Ankle International* 28: 32–7.

CLINICAL BIOMECHANICS

Soft tissue strain decreased by orthotic inserts

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓

- 1 The aim of this study was to investigate the effect of custom-made orthotic inserts and therapeutic footwear on pressure and soft tissue strain along the second ray of the plantar foot.
- 2 In total, 20 participants (12 male, 8 female; mean age: 57.3 years; mean BMI: 32.5 kg/m²) with diabetes and a history of peripheral neuropathy and foot ulcers participated.
- 3 CT scans were used to measure pressure conditions at the second metatarsal head and 15 other points along the second ray under the following conditions: barefoot; shoe; shoe plus total-contact insert; and shoe plus total-contact insert plus metatarsal pad.
- 4 At the second metatarsal head, there was a significant difference between all four conditions for pressure ($P<0.004$) and soft-tissue strain ($P<0.042$).
- 5 An association between pressure and soft tissue strain was also detected for all conditions, as demonstrated by correlation coefficients.
- 6 The authors concluded that there is a strong correlation between pressure and soft tissue strain and the tested footwear and orthotic inserts were effective in reducing the severity of these outcome measures.
- 7 Further study could investigate ways in which orthotic devices could be modified to reduce the incidence of ulceration, based on a better understanding of the role tissue strain plays in distributing plantar forces.

Lott DJ, Hastings MK, Commean PK et al (2007) Effect of footwear and orthotic devices on stress reduction and soft tissue strain of the neuropathic foot. *Clinical Biomechanics* 22: 352–9.