



Diabetic foot ulceration as a marker of increased frailty

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First, may I wish all our readers a very happy and fulfilling 2017. I would like to ask you all to try to raise awareness of diabetic foot disease and suffering this coming year.

My attention when scanning through some recently published papers was drawn to several, with one, in particular, that I felt it was important to highlight.

When diabetic foot complications are raised and discussed, the marker that is most frequently highlighted is lower-extremity amputations. Of course, these are devastating and every effort should be employed and sustained to help reduce them. However, mortality associated with diabetic foot ulcers is often left in the shadows. A recent paper published in *Diabetic Medicine* by Walsh and colleagues (summarised alongside) examined mortality associated with diabetic foot ulceration (DFU). It was a population-based cohort study within the UK that analysed data from 414,523 people with diabetes enrolled in practices associated with The Health Improvement Network (THIN) in the UK. Data from coded activity were collected between 2003 and 2012 from GP practices. All participants were at least 25 years old and the study focused upon type 2 diabetes. The primary aim of this paper was to examine the relationship between DFUs and mortality. Within the population cohort, 20,373 (5%) developed a DFU. Mortality risk variables, including cardiovascular disease, myocardial infarction, cerebral vascular accident, peripheral arterial disease, chronic renal failure (stages 3–5) and the Charlson comorbidity index, were collected. Other factors evaluated included gender, age, history of smoking,

malignancy, HbA_{1c} values and regional variations. Data were analysed using proportional hazard models, with death as the primary outcome and DFUs as the primary exposure.

The mortality data showed that 5.0% of people with new ulcers died within 12 months and 42.2% died within 5 years. This is not very surprising given data from other published studies.

The authors hypothesised that when risk-factor variables were considered, the association between DFUs and death would diminish (i.e. resulting in a DFU hazard ratio of ≥ 1), as we have always assumed that mortality in DFU patients was due principally to existing comorbidities. However, when they did control for these variables, the correlation between DFUs and death was surprisingly still strong, with a fully adjusted hazard ratio of 2.48. These data are concerning, as they suggest that DFUs may be a significant independent mortality risk factor.

Furthermore, those with a DFU were three times more likely to die at any time compared to those with diabetes alone. Of further interest was the regional variation showing death rates in the first year of between 2.8% and 12.0%, with the highest clustering in a leg-shape up the western side of the UK. Could this suggest some environmental influence?

This is a fascinating paper worthy of reading. It clearly states that patients with DFUs are medically frail, with poorer prognoses than most cancer patients. Optimising medical care, unhindered access to specialist centres with more funded research and raising awareness of diabetic foot disease should be our goal. ■

Diabet Med

Association between DFUs and death: a UK cohort study

Readability /////

Applicability to practice ////

WOW! Factor /////

1 This study set out to understand the strong association between diabetic foot ulcers (DFUs) and an increased risk of death, and whether the complications of diabetes can explain this relationship.

2 Data from a UK cohort of 414,523 people with diabetes from The Health Improvement Network (THIN) between 2003 and 2012 were analysed. Most of those included had T2D or adult-onset diabetes.

3 Among the cohort, 20 737 people (5.0%) developed DFUs and 77 520 (18.7%) died. Of those with a new DFU, 8.1% died within 12 months of their first DFU visit to a GP and 42.2% of people with a DFU died within 5 years. Geographical variance was significant but was not spatially correlated.

4 The unadjusted hazard ratio (HR) of DFU with death was 3.43 (95% confidence interval [CI], 3.37–3.50). After controlling for major known risk-factor variables for diabetes, the HR reduced to 2.48 (95% CI, 2.43–2.54).

5 The risk factors that had the greatest individual effects on the association between DFU and death were age >65 years and the Charlson comorbidity index.

6 The increased risk of death linked to DFUs cannot be explained by other common risk factors. It is unlikely that a DFU itself is the cause, but unknown risk factors may be involved.

7 The authors conclude that a DFU may be a marker of increased medical frailty that necessitates increased medical vigilance.

Walsh JW, Hoffstad OJ, Sullivan MO, Margolis DJ (2016) Association of diabetic foot ulcer and death in a population-based cohort from the United Kingdom. *Diabet Med* 33(11): 1493–8

Int J Low Extrem Wounds

Anaemia and adverse DFU outcomes

Readability ✓✓✓✓
Applicability to practice ✓✓✓✓
WOW! Factor ✓✓

- 1 This retrospective cohort study conducted in China investigated the characteristics of people with diabetic foot ulcers (DFUs) with anaemia, and assessed the relationship between anaemia and DFU outcome.
- 2 The study involved 353 inpatients with a DFU. Individuals under 18 years and those with acute complications of diabetes were excluded. DFUs were graded according to the PEDIS classification system.
- 3 Participants were divided into those who were anaemic ($n=236$; haemoglobin [Hb] <13 g/100 mL for men and <12 g/100 mL for women) and those who were non-anaemic ($n=117$). The former group was further divided into those with mild, moderate or severe anaemia.
- 4 Individuals with a DFU and anaemia were significantly male (69.1%), more likely to smoke, had a lower level of serum albumin and worse kidney function. They were more likely to use at least two types of antibiotic and had worse perfusion of the lower limb, a larger and deeper ulcer and a more severe infection compared to those without anaemia.
- 5 Multivariate analysis indicated that anaemia was significantly and independently associated with adverse DFU outcomes. Hb levels of 12.3 g/100 mL for women and 12.1 g/100 mL for men were established as cut-offs to identify those at high risk of an adverse DFU outcome.
- 6 It is unclear whether anaemia is a marker or the underlying mechanism of adverse DFU outcomes. However, there may be benefit in using blood Hb level as a prognostic biomarker for those with a DFU.

Chuan F, Zhang M, Yao Y et al (2016) Anemia in patients with diabetic foot ulcer: prevalence, clinical characteristics, and outcome. *Int J Low Extrem Wounds* 15(3): 220–6

Plast Reconstr Surg

Dressings and DFUs: a review of the evidence

Readability ✓✓✓✓
Applicability to practice ✓✓✓✓
WOW! Factor ✓✓

- 1 Outcomes for diabetic foot ulcers remain poor and, for this to improve, there is an urgent need for the development of interventions. However, the evidence base to support many commonly used interventions, including wound dressings, is poor.
- 2 This article summarises a series of three consecutive systematic reviews of the subject published between 2006 and 2014 by the International Working Group on the Diabetic Foot (IWGDF). The reviews (of 207 articles that met predefined inclusion criteria) aimed to find evidence to justify the use of a wide range of treatments to promote wound healing in clinical practice.
- 3 While the reviewed data suggests that some newer therapies show promise, confirmation of their effects is required. Few of the published studies were of high quality and the majority were susceptible to bias.
- 4 More work is required to assess the benefits and cost-effectiveness of available dressings and wound-care products in day-to-day clinical practice. Future studies need to be performed to a higher standard than many of those covered by the IWGDF reviews.
- 5 The authors contrast this with the good evidence to support the use of interventions other than wound-care products, including offloading for plantar neuropathic ulcers and pathways to achieve early expert assessment by skilled multidisciplinary teams.

Game FL, Jeffcoate WJ (2016) Dressing and diabetic foot ulcers: a current review of the evidence. *Plast Reconstr Surg* 138(Suppl 3): 158S–64S

J Diabetes Sci Technol

Plantar shear stress and callus formation

Readability ✓✓✓✓
Applicability to practice ✓✓✓✓
WOW! Factor ✓✓✓✓

- 1 The prevention of callus formation in people with diabetes is effective in preventing foot ulcers. Callus formation may be related to pressure and shear stress.
- 2 This Japanese study aimed to identify whether plantar shear stress in people with neuropathic diabetes with callus is increased compared to those without callus. Of 50 participants from an outpatient clinic, 9 were callused.
- 3 Differences in foot deformity, limited joint mobility, repetitive stress of walking and ill-fitting shoes between those with and without callus were also examined. An in-shoe system was developed to measure plantar pressure and shear stress.
- 4 Plantar shear stress adjusted for weight was increased by 1.32 during the push-off phase in those with callus compared to those without ($P=0.031$). Pressure variables were not significantly different between the groups.
- 5 Participants with callus were significantly lighter than those without. Weekly walking time was not significantly different between the groups, but those with callus wore shoes with significantly higher heels.
- 6 Hallux valgus deformity showed a five-fold increased risk for callus formation. Dorsiflexion of the ankle joint was significantly reduced in the callus group, while plantar flexion was significantly increased.
- 7 Foot deformity and limited joint mobility cause gait change that may lead to callus formation through increased plantar shear stress. Cushioned and low-heeled shoes may be beneficial interventions.

Hamatani M, Taketoshi M, Oe M et al (2016) Factors associated with callus in diabetic patients, focused on plantar shear stress during gait. *J Diabetes Sci Technol* 10(6): 1353–9

“Patients with DFUs are medically frail, with poorer prognoses than most cancer patients.”

