

# Foot ulcer location is an independent risk determinant of mortality in people with diabetes

In a recently published study in the journal *Diabetic Medicine*, we reported a very high long-term mortality rate in individuals presenting with a diabetes foot ulcer, with mortality rates greater for those with a hind foot ulcer than foot ulcers in other locations (Schofield et al, 2021). We also reported a close relation between risk of sepsis/renal failure and mortality in people with a foot ulcer.

The increased mortality rate associated with hind foot versus fore foot ulcers highlights the more serious nature of ulcers at that location – likely associated with poorer tissue perfusion in patients with such an ulcer location. Also, hind foot ulceration is a marker of poorer overall health, with reduced mobility being a consequence of that poor health.

It has previously been demonstrated that the 5-year mortality rate for diabetes with foot ulceration is around 40% (Apelqvist et al, 1993; Walsh et al, 2016). The results in our study are of a similar order of magnitude. It is likely that the higher mortality rates observed occur as a result of cardiovascular and non-cardiovascular complications of diabetes, such as sepsis, as reported here.

There are some substantive things that we can do to reduce the risk. Notably, a study by Young et al (2008) showed that an aggressive programme of cardiovascular risk management can reduce mortality rates to as low as 26% in individuals with diabetes foot ulceration. The programme included treatment with aspirin or clopidogrel, unless otherwise contraindicated, and targeted antihypertensive treatment with an angiotensin-converting enzyme (ACE) inhibitor or angiotensin receptor blocker, plus beta-blockers for all patients with existing cardiovascular disease or in whom blood pressure was still uncontrolled despite ACE inhibition.

Our findings again provide evidence in support of addressing all risk factors as soon as people present with a foot ulcer. All measures must be taken to achieve and sustain good glycaemic control. It is incumbent on all healthcare professionals involved in looking after people with diabetes to bear this in mind if they meet someone with a foot ulcer. ■

Apelqvist J, Larsson J, Agardh CD (1993) Long-term prognosis for diabetic patients with foot ulcers. *J Intern Med* 233: 485–91

Schofield H, Haycocks S, Robinson A et al (2021) Mortality in 98 type 1 diabetes mellitus and type 2 diabetes mellitus: foot ulcer location is an independent risk determinant. *Diabet Med* 27 Mar: e14568 [Epub ahead of print]. <https://doi.org/10.1111/dme.14568>

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: 1493–8

Young MJ, McCauley JE, Randall LE, Barclay JI (2008) Improved survival of diabetic foot ulcer patients 1995–2008: possible impact of aggressive cardiovascular risk management. *Diabetes Care* 31: 2143–7



Adrian Heald  
Department of Diabetes and Endocrinology, Salford Royal Hospital



George Dunn  
Department of Podiatry, East Cheshire NHS Trust

Citation: Heald A, Dunn G (2021) Foot ulcer location is an independent risk determinant of mortality in people with diabetes. *Journal of Diabetes Nursing* 25: [early view publication]

Received 4 October 2020 | Accepted 24 March 2021  
DOI: 10.1111/dme.14568

**RESEARCH: COMPLICATIONS**

**Mortality in 98 type 1 diabetes mellitus and type 2 diabetes mellitus: Foot ulcer location is an independent risk determinant**

Heather Schofield<sup>1</sup> | Samantha Haycocks<sup>1</sup> | Adam Robinson<sup>2</sup> | Michael Edmonds<sup>3</sup> | Simon G Anderson<sup>4</sup> | Adrian H. Heald<sup>5,6</sup>

<sup>1</sup>Department of Podiatry, Salford Royal Hospital, Salford, UK  
<sup>2</sup>Department of Diabetes and Endocrinology, Salford Royal Hospital, Salford, UK  
<sup>3</sup>Department of Diabetes, King's College Hospital, London, UK  
<sup>4</sup>University of the West Indies, Cavehill Campus, Barbados, Barbados, UK  
<sup>5</sup>School of Medicine and Manchester Academic Health Sciences Centre, University of Manchester, Manchester, UK

**Abstract**  
**Introduction:** We previously demonstrated in both a longitudinal study and in meta-analysis (pooled relative risk (RR), 2.45) that all-cause mortality is significantly higher in people with diabetes foot ulceration (DFU) than with those without a foot ulcer. In this prospective study, we looked at the factors linked to mortality after presentation to podiatry with DFU.  
**Methods:** Ninety-eight individuals recruited consecutively from the Salford Royal Hospital Multidisciplinary Foot Clinic in Spring 2016 were followed up for up to 48 months. Data concerning health outcomes were extracted from the electronic patient record (EPR).  
**Results:** Seventeen people (17) had type 1 diabetes mellitus, and 81 had type 2 diabetes mellitus. Thirty-one were women. The mean age (range) was 63.6 (28–90) years with maximum diabetes duration 45 years. Mean HbA1c was 72 (5% CI: 67–77) mmol/mol; 97% had ischaemopathy (International Working Group on the Diabetic Foot (IWGDF) monofilament); 62% had vascular insufficiency (Doppler studies); 69% of ulcers were forefoot, and 23% of ulcers were hind foot in location.  
**Conclusion:** This prospective study has indicated a very high long-term mortality rate in individuals with DFU, greater for those with a hind foot ulcer and shows a close relation between risk of sepsis/renal failure and DFU mortality, highlighting again the importance of addressing all risk factors as soon as people present with a foot ulcer.

**KEYWORDS**  
diabetes, foot ulcer, location, mortality, prospective

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.  
© 2021 The Authors. *Diabetic Medicine* published by John Wiley & Sons Ltd on behalf of Diabetes UK.

<https://doi.org/10.1111/dme.14568> | <http://onlinelibrary.wiley.com/doi/10.1111/dme.14568> | 147

[Click here](#) to read the study in full.