Risk factors for premature mortality in patients with diabetic foot ulcers: a one-year retrospective study from a multidisciplinary clinic

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Abstract

Background: Diabetic foot ulcers (DFUs) are associated with high morbidity and mortality. This study examined factors associated with earlier death in patients managed within a multidisciplinary foot clinic.

Methods: We performed a retrospective study of 138 patients with DFUs who died in the year 2024. Cause of death assessed through Medical Certificate of Cause of Death (MCCD). Complementary multivariable linear and logistic regression analyses were used to identify factors associated with younger age at death and premature mortality (age < 70 years).

Results: Cardiovascular disease was the leading cause of death (28.3%). Smoking, poor glycaemic control, renal replacement therapy, and prior lower-limb amputation were independently associated with premature mortality, while prior revascularisation was associated with lower odds of early death.

Conclusion: Patients with DFUs who are actively smoking with adverse severity markers are at high risk of premature death. Multidisciplinary foot clinic should also include cardiovascular risk optimisation.

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Key words: diabetic foot ulcer, premature mortality, smoking, cardiovascular disease

Introduction

Diabetic foot ulcer (DFU) is a severe end-stage complication of diabetes mellitus and is associated with substantial morbidity and premature mortality. Globally, DFU affects an estimated 18.6 million individuals each year and is strongly linked to lower limb amputation and reduced life expectancy.[1] Reported five-year mortality rates among patients with DFU approach 50%, highlighting that DFU represents not only a limb-threatening condition but also a marker of advanced systemic disease.[2]

The burden of DFU extends beyond clinical outcomes to significant healthcare resource utilisation. In the UK, the annual cost of managing diabetic foot disease and related amputations has been estimated at £837 million and £962 million, respectively. The Midlands region, including Leicester City, has a particularly high prevalence of diabetes at 9.6%, exceeding the national average of 7.1%, reflecting local demographic factors such as higher rates of obesity and a large South Asian population. These characteristics contribute to a high-risk population frequently managed within multidisciplinary foot services.

Despite advances in multidisciplinary care, mortality among patients with DFU remains high, and factors associated with earlier age at death and premature mortality, rather than overall mortality alone, are incompletely characterised in real-world clinical cohorts. Examining age at death as a continuous outcome alongside a clinically defined threshold for premature mortality may provide complementary insights into disease burden and potential targets for service-level intervention. The aim of this retrospective study was therefore to examine causes of death and to identify clinical, behavioural and service-related factors associated with earlier death and premature mortality (defined as death before the age of 70 years) among patients with DFU managed in a multidisciplinary foot clinic.

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Methods

This retrospective observational study identifies factors associated with earlier death among decedents and does not estimate mortality risk in the broader DFU population. Patients included died during the calendar year 2024 and were managed within the Leicester Diabetes Centre Multidisciplinary Foot Clinic. The clinic is staffed by diabetologists, podiatrists, an advanced nurse practitioner/diabetes specialist nurse, an experienced podiatric surgeon, vascular surgeons, a microbiologist and orthotists. Patients referred primarily for non-diabetic leg ulcers were excluded. Clinical data were extracted from a standardised electronic foot clinic proforma capturing patient demographics and co-morbidities.

Biochemical variables were obtained from routine laboratory testing performed within one year prior to death. Chronic kidney disease was classified using the Kidney Disease: Improving Global Outcomes (KDIGO) criteria based on estimated glomerular filtration rate (eGFR); the use of renal replacement therapy, including haemodialysis, was recorded. Peripheral arterial disease was recorded descriptively. However, it was not included as a standalone covariate in the regression models because its ascertainment was heterogeneous across records, ranging from clinical examination findings and Doppler assessment to vascular imaging or prior intervention. Other biochemical markers included haemoglobin, HbA_{1c}, and lipid and liver profiles. These biochemical markers were summarised descriptively to characterise the cohort but were not included in the primary multivariable linear regression models, with the exception of HbA_{1c}, to minimise multicollinearity and reverse causation.

Cause of death was obtained from the Medical Certificate of Cause of Death (MCCD), using information from Section 1a, which records the condition directly leading to death. Socioeconomic status was assessed using the English Index of Multiple Deprivation (IMD) 2019, with IMD deciles assigned according to residential postcode (decile 1 representing the most deprived and decile 10 the least deprived). Premature mortality was defined as death occurring before the age of 70 years, in accordance with the World Health Organization definition for premature mortality from non-communicable diseases.

Where data were missing, diabetes duration was imputed using the cohort median and smoking status using the modal category. Variables with substantial missingness, including urinary albumin–creatinine ratio, were excluded from analysis to minimise bias.

Statistical analysis

Continuous variables are reported as mean ± standard deviation or median with interquartile range, as appropriate. Categorical variables are presented as frequencies and percentages.

Two complementary analytical approaches were used to examine mortality outcomes in this cohort. First, age at death was analysed as a continuous outcome using nested multivariable linear regression models. This approach enabled exploration of factors associated with earlier age at death and assessment of how associations changed with sequential adjustment for demographic, clinical and disease-related variables.

Second, multivariable logistic regression was performed with premature mortality, defined as death before the age of 70 years, as a binary outcome. This analysis was undertaken to complement the linear regression findings by examining whether factors associated with earlier age at death were also associated with premature mortality. Concordance between the two approaches was used to strengthen confidence in the robustness of observed associations.

Survival analysis techniques were not employed because reliable time-to-event data, including dates of first presentation to the foot clinic, were not available for all patients. In the absence of such data, regression analyses based on age at death and premature mortality were considered the most appropriate methods to address the study aims. All statistical analyses were performed using Stata version 19 (StataCorp, College Station, TX, USA).

Table 1. Characteristics of patients who died prematurely (<70 years) and non-prematurely

Characteristics	Premature death (<70 years) (n = 40)	Non-premature death (≥70 years) (n = 98)
Age at death, years	60.3 ± 5.9	82.3 ± 5.9
Male sex, n (%)	33 (82.5)	69 (70.4)
Body mass index, kg/m²	30.2 ± 9.4	26.7 ± 6.7
Marital status, n (%)		
Married	26 (65.0)	80 (81.6)
Single	8 (20.0)	8 (8.2)
Widowed / divorced	6 (15.0)	10 (10.2)
Smoking status, n (%)		
Current	9 (22.5)	8 (8.3)
Ex-smoker	20 (50.0)	49 (50.0)
Never	11 (27.5)	41 (41.7)
Ethnicity, n (%)		
White	33 (82.5)	81 (82.7)
South Asian	6 (15.0)	15 (15.3)
Other	1 (2.5)	2 (2.0)
Index of Multiple Deprivation (IMD), n (%)		
High deprivation	16 (40.0)	42 (42.9)
Moderate deprivation	15 (37.5)	37 (37.8)
Low deprivation	9 (22.5)	19 (19.4)
Type of diabetes, n (%)		
Type 1	8 (20.0)	6 (6.1)
Type 2	30 (75.0)	92 (93.9)
Secondary (Type 3c)	2 (5.0)	0
Insulin treatment, n (%)	23 (56.3)	43 (43.9)
HbA_{1c}, % / mmol/mol	8.54 ± 1.97 % 70 ± 22 mmol/mol	7.38 ± 1.29 % 57 ± 14 mmol/mol
Peripheral arterial disease, n (%)	20 (50.0)	56 (57.1)
History of revascularisation, n (%)	11 (27.5)	39 (39.7)
Cardiovascular disease, n (%)	20 (50.0)	43 (43.9)
History of foot amputation, n (%)	20 (50.0)	25 (25.5)
Osteomyelitis, n (%)	26 (65.0)	66 (67.3)
Chronic kidney disease (any stage), n (%)	36 (90.0)	88 (89.8)
Renal replacement therapy, n (%)	8 (20.0)	6 (6.1)
Haemoglobin, g/L	100.7 ± 18.1	107.3 ± 19.2
Albumin, g/L	32.2 ± 7.1	33.3 ± 6.3

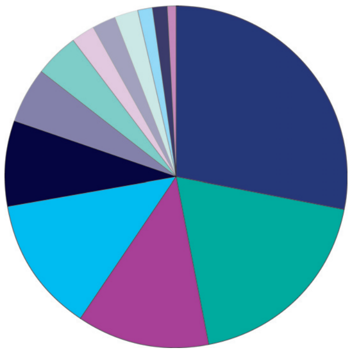
Data are presented as mean ± standard deviation or n (%). Premature mortality was defined as death before the age of 70 years. IMD categories were grouped as high, moderate and low deprivation for descriptive purposes.

Results

The final cohort comprised 138 deceased patients with diabetic foot ulcers. Four patients were excluded from analysis as they were referred primarily for non-diabetic leg ulcers. The cohort was predominantly male (74%; 102 men and 36 women), with a mean age of death of 76 ± 11.5 years.

Most patients had type 2 diabetes mellitus (T2DM) (88%),

Figure 1. Distribution of recorded causes of death among patients with diabetic foot ulcers. Cardiovascular causes were the most frequent, followed by respiratory disease, malignancy and sepsis.



while 10% had type 1 diabetes (T1DM) and 2% had secondary (Type 3c) diabetes. The mean age at death was lower among patients with T1DM compared with those with T2DM (69 ± 12.4 years vs. 77 ± 11.1 years). Overall, 56.3% of patients were treated with insulin, and the median duration of diabetes was 17 years (interquartile range 11–24 years).

Chronic kidney disease was the most prevalent diabetes-related complication, affecting 90% of the cohort, with 16.3% reaching stage G5 disease. Fourteen patients (10.4%) were receiving haemodialysis prior to death. Cardiovascular disease, defined as a history of acute coronary syndrome, congestive cardiac failure, or both, was present in approximately half of the cohort. Peripheral arterial disease was identified in 55% of patients.

One third of patients (33%; n = 45) underwent lower-limb amputation during their clinical course. These were predominantly minor amputations, although 12 patients underwent major amputation and two had both minor and major amputations. Prior osteomyelitis was documented in 28% of cases. With respect to socioeconomic status, 20% of patients resided in areas classified within the most deprived IMD decile.

The distribution of causes of death within the cohort is shown in Figure 1; statin use, SGLT2 inhibitor use and lipid profile are tabulated in Table 2. Cardiovascular disease was the most common cause of death, accounting for 28.3% of cases, followed by respiratory causes (18.8%), malignancy (12.3%) and sepsis (12.3%). Deaths directly attributable to foot-related infection or osteomyelitis accounted for 5.1% of cases, with the remainder classified as other causes.

Among deaths attributed to cardiovascular disease, congestive cardiac failure was the most frequently recorded cause, representing 54% of cardiovascular deaths. Seven patients were documented as having suffered out-of-hospital cardiac arrest. In 11 cases, the cause of death could not be determined due to the absence of available records, most commonly where deaths occurred outside the catchment area of University Hospitals of Leicester NHS Trust.

In nested multivariable linear regression analyses (Table 3) examining age at death as a continuous outcome, demographic and social factors alone explained a limited proportion of variance (Model 1 R^2 = 0.09). Single marital status was independently associated with significantly younger age at death, with individuals who were single dying approximately eight years earlier than married individuals. Male sex demonstrated a borderline association with younger age at death, while ethnicity, socioeconomic deprivation and divorce status were not independently associated in this initial model.

Addition of diabetes-related characteristics and health behaviours substantially improved model performance (Model 2 R^2 = 0.42). Poor glycaemic control, insulin therapy, higher body mass index, smoking status and T1DM were all independently associated with younger age at death. Each 1% increase in HbA_{1c} was associated with approximately 1.4 years younger age at death, while insulin therapy was associated with a reduction in age at death of nearly seven years. Length of diabetes showed a modest positive association with age at death.

In the fully adjusted model incorporating markers of disease severity (Model 3 R^2 = 0.50), several associations persisted. Single marital status, insulin therapy, higher HbA_{1c}, higher BMI, smoking and history of foot amputation remained associated with younger age at death. In contrast, prior lower-limb revascularisation was associated with older age at death. Overall, the final model explained approximately half of the observed variation in age at death. The magnitude of model fit improved progressively with sequential adjustment, with the adjusted R^2 increasing from 0.04 in the demographic model to 0.43 in the fully adjusted model, indicating that clinical and

Table 2. Statin use, SGLT2 inhibitor use and lipid profile according to recorded cause of death among deceased patients with diabetic foot ulcers and diabetes. Note: Medication and lipid profile data were unavailable for two patients

Cause of death group	n	Statin use, n (%)	SGLT2 inhibitor use, n (%)	LDL, median (IQR)	HDL, median (IQR)	Total cholesterol, median (IQR)
Overall	136	104 (78.8%)	22 (16.7%)	1.50 (1.10–2.10)	1.00 (0.80–1.30)	3.30 (2.77–4.20)
Cardiovascular	30	26 (89.7%)	4 (13.8%)	1.40 (1.10–1.80)	0.98 (0.81–1.20)	3.20 (2.80–4.15)
Respiratory	24	22 (91.7%)	7 (29.2%)	1.45 (1.20–1.82)	0.92 (0.80–1.19)	3.40 (2.98–4.00)
Malignancy	14	7 (53.8%)	2 (15.4%)	1.95 (1.51–3.12)	0.86 (0.73–1.20)	4.05 (3.02–4.72)
Sepsis/infection	21	14 (70.0%)	5 (25.0%)	1.50 (1.15–2.50)	1.06 (0.92–1.40)	3.40 (2.70–3.90)
Foot-related	6	5 (83.3%)	1 (16.7%)	1.25 (0.88–1.92)	0.93 (0.74–1.08)	3.25 (2.45–3.67)
Other/unknown	41	30 (75.0%)	3 (7.5%)	1.50 (1.10–2.20)	1.01 (0.80–1.30)	3.20 (2.70–4.20)

Table 3. Nested multivariable linear regression investigating factors associated with age at death. β coefficient (years difference), standard error (SE), p-value. Interpretation note: negative coefficients indicate younger age at death.

Variable	Model 1 β (SE)	P	Model 2 β (SE)	p	Model 3 β (SE)	p
Male sex	−4.53 (2.30)	0.051	−3.13 (2.02)	0.124	−2.75 (1.91)	0.153
Marital status						
Single vs married	−8.32 (2.98)	0.006	−7.98 (2.50)	0.002	−7.75 (2.36)	**0.001**
Divorced vs married	−1.00 (3.47)	0.774	−1.42 (2.93)	0.628	−1.02 (2.80)	0.715
Ethnicity						
South Asian vs White	−1.89 (2.93)	0.520	−5.37 (2.56)	0.038	−5.69 (2.43)	**0.021**
Black vs White	2.19 (6.66)	0.743	4.14 (5.70)	0.470	3.32 (5.39)	0.539
IMD decile						
Decile 2 vs 3	−1.33 (2.78)	0.634	−2.79 (2.32)	0.231	−1.86 (2.21)	0.401
Decile 1 vs 3	−0.62 (2.93)	0.832	−3.30 (2.46)	0.183	−2.01 (2.36)	0.397
Length of diabetes (years)	—	—	0.17 (0.09)	0.049	0.15 (0.08)	0.064
Type 1 diabetes (vs Type 2)	—	—	6.81 (3.09)	0.030	5.12 (2.93)	0.083
Insulin therapy	—	—	−6.98 (1.85)	<0.001	−6.25 (1.79)	**0.001**
HbA_{1c} (% per unit / per 11 mmol/mol)	—	—	−1.40 (0.55)	0.012	−1.30 (0.53)	**0.015**
BMI (kg/m²)	—	—	−0.33 (0.11)	0.004	−0.28 (0.10)	**0.008**
Smoking status						
Current vs never	—	—	−6.04 (2.63)	0.023	−7.27 (2.51)	**0.005**
Ex-smoker vs never	—	—	−7.80 (2.75)	0.005	−8.29 (2.60)	**0.002**
Amputation history	—	—	—	—	−5.01 (1.91)	**0.010**
Revascularisation	—	—	—	—	3.92 (1.82)	**0.033**
Renal replacement therapy	—	—	—	—	−4.83 (2.60)	0.065
Model R^2	0.09	—	0.42	—	0.50	—
Adjusted R^2	0.04	—	0.35	—	0.43	—
N	138	—	138	—	138	—

disease-severity factors accounted for a substantial proportion of the variability in age at death.

A multivariable logistic regression model (Table 4) was constructed using the same set of covariates as the fully adjusted linear regression analysis, with premature mortality defined as death before the age of 70 years in accordance with World Health Organization criteria. These associations are illustrated in Figure 2. This analysis provided a complementary assessment using a clinically interpretable binary outcome and allowed evaluation of whether factors associated with younger age at death were also associated with premature mortality.

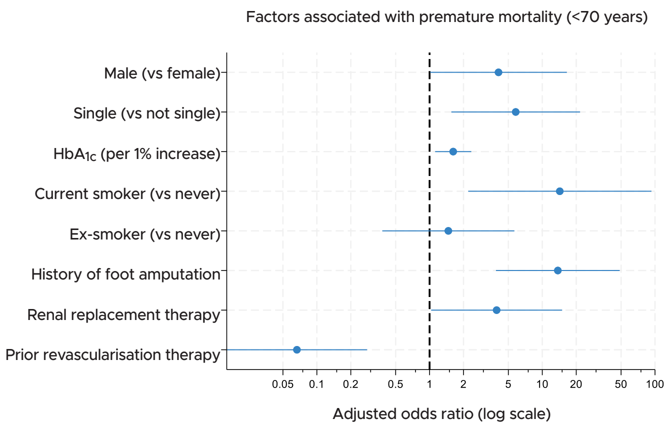
Overall, factors associated with younger age at death in the linear regression analyses were broadly consistent with those associated with premature mortality in the multivariable logistic regression model. Key markers of disease severity and behavioural risk – including smoking, poor glycaemic control, history of amputation, renal replacement therapy and absence of prior revascularisation – demonstrated consistent direction and clinical relevance across both modelling approaches.

Some variables showed attenuation or loss of statistical significance in the logistic regression, reflecting differences between modelling age at death as a continuous outcome and applying a binary definition of premature mortality. In particular, variables demonstrating more modest gradients in age at death, such as ethnicity and duration of diabetes, were more apparent in the linear model but less influential when using a fixed mortality threshold. No variables demonstrated conflicting directions of association between the two models.

Table 4. Fully adjusted multivariable logistic regression, examining factors associated with premature mortality (death before age 70 years)

Variable	Adjusted OR	95% CI	p-value
Male sex	4.09	1.01 – 16.52	**0.048**
Marital status			
Single vs married	5.81	1.56 – 21.64	**0.009**
Divorced vs married	4.84	0.42 – 55.36	0.205
Ethnicity			
South Asian vs White	1.68	0.20 – 14.31	0.635
Black vs White	1.42	0.22 – 9.10	0.714
IMD decile			
Decile 2 vs 3	0.66	0.15 – 2.86	0.577
Decile 1 vs 3	0.86	0.16 – 4.48	0.856
Type 1 diabetes (vs Type 2)	0.24	0.06 – 1.04	0.057
Insulin therapy	3.98	0.94 – 16.88	0.061
HbA_{1c} (per 1% increase / 11 mmol/mol)	1.62	1.12 – 2.34	**0.010**
BMI (kg/m²)	1.05	0.98 – 1.11	0.152
Duration of diabetes (years)	0.97	0.91 – 1.02	0.208
Smoking status			
Current vs never	14.30	2.20 – 92.95	**0.005**
Ex-smoker vs never	1.47	0.38 – 5.66	0.578
History of amputation	13.74	3.88 – 48.63	**<0.001**
Renal replacement therapy	3.94	1.03 – 15.01	**0.045**
Prior revascularisation	0.07	0.02 – 0.28	**<0.001**

Figure 2. Forest plot illustrating odds ratios (ORs) and 95% confidence intervals (CIs)



Discussion

This retrospective cohort study examined factors associated with earlier age at death and premature mortality among patients with diabetic foot ulcers managed within a multidisciplinary foot clinic. Using complementary analytical approaches, we identified a consistent set of social, behavioural, metabolic and disease-severity factors associated with both younger age at death and death before the age of 70 years. Together, these findings reinforce the concept that diabetic foot ulceration represents a marker of advanced systemic disease, in which mortality risk is shaped by more than ulcer characteristics alone.

Cardiovascular disease was the leading cause of death in this cohort, followed by respiratory illness. This pattern is consistent with previously published studies examining causes of mortality among patients with diabetic foot ulcers.[3-5] The high burden of cardiovascular co-morbidity observed in our cohort, with approximately half of patients having a documented history of congestive cardiac failure, acute coronary syndrome, or both, likely contributes to this finding. These observations reinforce the importance of comprehensive cardiovascular risk assessment and optimisation in patients with diabetic foot disease. In particular, aggressive management of modifiable cardiovascular risk factors, including the use of lipid-lowering therapies such as statins where appropriate, can play an important role in reducing cardiovascular mortality and improving overall survival in this high-risk population.[6-8] We observed limited use of SGLT2 inhibitors in this cohort, which may reflect cautious prescribing in patients with active diabetic foot disease.

Across both linear and logistic regression analyses, single marital status was consistently associated with younger age at death and premature mortality. Previous studies have shown that non-married individuals, particularly men, are at increased risk of diabetic foot infection.[9] Single marital status may reflect reduced social support, poorer engagement with healthcare services, and challenges in self-care. Although marital status is not modifiable, identifying socially vulnerable patients may allow targeted follow-up and enhanced community support to reduce adverse outcomes.

The association between higher body mass index and younger age at death observed in the linear regression was attenuated in the logistic model, likely due to loss of information following age dichotomisation and the absence of a clear threshold effect. Higher BMI increases plantar pressures and may hinder effective foot care, while also reflecting reduced physical activity. Prior work has shown that lower step counts in patients with neuropathy are associated with increased amputation risk, supporting BMI as a marker of functional vulnerability rather than a direct determinant of premature mortality.[10]

Notably, socioeconomic deprivation and ethnicity were not independently associated with premature mortality after full adjustment. This suggests much of the observed risk may be mediated through modifiable clinical and behavioural factors. Equally, the lower mean age of death observed among patients with T1DM in adjusted analyses was no longer independently associated with earlier mortality after multivariate adjustment, indicating that observed difference is largely explained by other covariates rather than diabetes type itself.

Smoking status was independently associated with premature mortality in this cohort, with both current and former smokers demonstrating higher odds of early death after adjustment. Although the association was more pronounced among current smokers, the wide confidence intervals reflect limited subgroup sizes and warrant cautious interpretation. Nonetheless, these findings suggest that the adverse impact of smoking on mortality risk in patients with diabetic foot ulcers may persist beyond smoking cessation.

Smoking has extensive adverse effects on diabetic foot ulcer outcomes. It exacerbates diabetic neuropathy, accelerates peripheral vascular disease, and induces microvascular dysfunction, leading to tissue hypoxia and impaired wound healing.[11] A key underlying mechanism is increased intracellular generation of reactive oxygen species, which promotes oxidative stress and disrupts normal cellular repair processes.[12] Recent studies have also demonstrated reduced systolic toe pressure, measured using automated photoplethysmography, among active smokers. As systolic toe pressure is a key marker of microvascular perfusion in the foot, this finding provides further mechanistic support for the adverse impact of smoking on diabetic foot ulcer outcomes.[13]

The active identification of smoking status should be an essential component of the diabetic foot clinic proforma. This should include brief advice, the provision of nicotine replacement therapy and follow-up in subsequent encounters, as outlined by the Ottawa Model for Smoking Cessation and the UK National Institute for Health and Care Excellence Guideline NG209.

Revascularisation remains the treatment of choice for symptomatic peripheral arterial disease, aiming to restore perfusion to affected limbs in patients with critical limb-threatening ischaemia or intermittent claudication. Any form of lower-limb revascularisation was associated with lower odds of premature mortality across all models, suggesting a protective association. Approximately 35% of patients received revascularisation, which may reflect a relatively proactive revascularisation strategy within our centre.

To date, randomised trials have not demonstrated a clear survival benefit of angioplasty or other revascularisation strategies in patients with peripheral arterial disease or chronic limb-threatening ischaemia. Large contemporary studies, including BEST-CLI, have shown improvements in limb-related outcomes without a corresponding reduction in all-cause mortality.[14] The protective association between revascularisation and premature mortality observed in our cohort may therefore reflect indirect benefits, such as limb salvage, reduced infectious complications and selection of patients with greater physiological reserve, rather than a direct effect on survival.

Markers of disease severity demonstrated some of the strongest associations with mortality. History of lower limb amputation was associated with substantially younger age at death and markedly higher odds of premature mortality. This aligns with existing evidence that amputation not only represents limb loss but is also a surrogate marker for severe vascular disease, infection and systemic frailty.

Renal replacement therapy is associated with an increased risk of developing diabetic foot ulcers and subsequent lower limb amputation.[15,16] Contributing factors include reduced cutaneous microcirculation during dialysis,[17] lower-limb oedema leading to inappropriate footwear, reduced mobility, and difficulties accessing podiatry services. Once ulceration occurs, impaired wound healing and high infection burden further increase the likelihood of amputation in this population. Targeted interventions – such as routine foot checks within dialysis units, use of pressure-relieving surfaces, rapid referral pathways for newly identified ulcers and improved access to preventive podiatry care – may help to reduce ulcer progression and limb loss among patients receiving dialysis.[15]

This study has several strengths. It reflects real-world clinical practice within a multidisciplinary foot service and uses two complementary analytical approaches to examine mortality from different perspectives. Analysing age at death as a continuous outcome allowed detection of gradients of risk that might be obscured by binary endpoints alone, while confirmatory logistic regression strengthened confidence in the robustness of observed associations.

However, several limitations should be acknowledged. The retrospective design limits causal inference, and the cohort included only patients who had died, precluding survival analysis because reliable time-to-event data were not available. The study was also based on a single-year cohort of patients known to the diabetic foot clinic who died in 2024. While this would be expected to capture patients from ethnic minority groups who developed diabetic foot ulceration and died younger, it would not include individuals who died earlier in the course of their diabetes before developing foot ulceration or before referral to specialist foot care. As such, the cohort may not fully reflect ethnic differences in premature mortality, and multi-year data would provide a more robust assessment. The single-centre nature of the study may limit generalisability, and the modest sample size resulted in wide confidence intervals for some estimates, so findings should be interpreted cautiously, particularly within small subgroups. Biochemical markers reflecting terminal physiology were not included in the primary models to minimise reverse causation, although this may have excluded potentially informative variables. In addition, peripheral arterial disease was recorded descriptively but not included as a standalone regression variable because its ascertainment was heterogeneous across the clinical record. Revascularisation was therefore used as a more clearly documented vascular variable, although this may have introduced selection bias and should not be interpreted as a proxy for peripheral arterial disease.

Despite these limitations, the findings have important clinical implications. Patients with diabetic foot ulcers who are socially isolated, actively smoking, poorly controlled metabolically, or who have advanced renal disease or prior amputation, represent a subgroup at particularly high risk of premature mortality. Early identification of these patients may allow targeted interventions, including intensified multidisciplinary follow-up, cardiovascular risk factor review, smoking cessation support, optimisation of glycaemic management, and proactive vascular and renal involvement. Importantly, the association between revascularisation and improved survival highlights the potential benefit of timely access to specialist vascular care.

Key messages

- Cardiovascular disease was the leading cause of death in patients with diabetic foot ulcers.
- High-risk patients may benefit from intensified multidisciplinary management and comprehensive cardiovascular risk reduction steps extending beyond foot care alone.

Conflict of interest None.
Funding None.
Author contributions LSF collected and analysed the data, performed the statistical analysis, and drafted the manuscript. ST, HM, RB and RJ contributed to clinical review and critical revision of the manuscript. IGL and MFK supervised the study, contributed to study design and interpretation of the findings, and critically revised the manuscript.
Ethics/governance approval This study was conducted as a retrospective service evaluation of routinely collected clinical data from patients managed within the Leicester Diabetes Centre Multidisciplinary Foot Clinic. No interventions were performed, and all patient data were anonymised prior to analysis. In accordance with UK Health Research Authority guidance, formal Research Ethics Committee (NHS REC) approval was not required.

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