

# A 2-year prospective audit of patients admitted into an acute hospital from an outpatient podiatry clinic — trends and outcomes

Jayne Robbie, Daniel Tomkins, Louise Mitchell, Mujahid Saeed, Miruna D. David and Alok Tiwari

**Citation:** Robbie J, Tomkins D, Mitchell L et al (2020) A 2-year prospective audit of patients admitted into an acute hospital from an outpatient podiatry clinic – trends and outcomes. *The Diabetic Foot Journal* 23(4): 32–35

## Article points

1. Podiatrists should be experienced in recognising common and uncommon emergencies needing acute admissions in diabetic patients
2. Common causes for admission via diabetic foot specialist podiatrists include infection and ischaemia. Uncommon causes include hypoglycaemia and drug allergy.
3. Without podiatrists as ‘gatekeepers’ avoidable delays will lead to ‘dire’ results including major amputations.

## Key words

- Acute admissions
- Outpatient podiatry clinic
- Patient audit

## Authors

Jayne Robbie is Senior Podiatrist and Senior Lecturer at Birmingham City University; Daniel Tomkins is Senior Podiatrist; Louise Mitchell is Podiatry Lead; Mujahid Saeed is Consultant Diabetologist; Miruna D. David is Consultant Microbiologist; Alok Tiwari is Consultant Vascular Surgeon; all at University Hospitals Birmingham, Birmingham, UK

**The incidence of diabetic foot ulcers (DFUs) has been reported to be 4–10% globally, with a one-in-four risk of ulceration during an individual’s lifetime. The mortality rate of diabetes and diabetes-related complications is greater than the 5-year mortality rate of breast, colon and prostate cancer combined (Armstrong et al, 2007). DFUs are the foremost cause of hospital admissions in people with diabetes, with increasing incidence of wound infection on initial presentation over the past 5 years. This has also been associated with an up to 10-fold increase in cost and poor outcomes with increasing length of bed stays and recurrence, indeed, it has been reported that 55% of individuals with diabetes and lower-extremity amputation will require a further amputation in less than 3 years (Izumi et al, 2006). This poor prognosis for patients with foot ulceration results in psychological, physical and financial burdens for those patients affected. This 2-year prospective audit has shown the importance of multi-professional working and robust care pathways in ensuring that patients have access to the right medical interventions at the optimum time, demonstrating that early referral to specialist care and inpatient and outpatient multidisciplinary teams can reduce amputation rates and time to healing and multidisciplinary teams (inpatient and community-based/outpatient) can reduce amputation rates.**

**D** iabetic foot ulcers (DFUs) are complex chronic wounds, which have major long-term impacts on the morbidity, mortality and quality of the patient’s life. The incidence of DFUs have been reported to have a one-in-four risk during an individual’s lifetime, with 5–7% prevalence (Miller et al, 2014; Bader, 2008) and up to 44% mortality at 5 years in those who have undergone an amputation (Lipsky, 2004; Kerr, 2017). The National Diabetes Audit report on complications and mortality (Kerr, 2017) suggests that the numbers of minor amputations (to midfoot) have risen since 2010, and people with diabetes are around 23-times more likely to have a toe, foot or limb amputated than those without diabetes (Kerr, 2017). Foot problems in people with diabetes

also have a significant financial impact on the NHS, accruing costs at secondary, community and primary care levels, increasing outpatient costs, bed occupancy and prolonged stays in hospital.

It is estimated that £14bn is spent every year on treating diabetes and its complications, and that the cost of diabetes to the NHS is over £1.5m an hour or 10% of the NHS budget for England and Wales (Diabetes UK, 2019). Hospital Episode Statistics (HES) from 2014/15 showed that 89,055 diabetic admissions were for foot ulceration, representing 1 in 33 patients with diabetes (Health and Social Care Information Centre, 2015; Kerr et al, 2019). The mean length of stay for ulceration was estimated to be 16.58 days (compared with 7.46 days in those patients with diabetes admitted without foot

**Table 1. Reasons for admission.**

Reasons	n (%)
Infection; including cellulitis and osteomyelitis — requiring intravenous or oral antibiotics	49 (72)
Sepsis	3 (4)
Suspected drug allergy	1 (1.5)
Hypoglycaemia	2 (3)
Ischaemia; including necrosis and gangrene	11 (16)
Wound requiring surgical debridement	1 (1.5)
Other (foreign body)	1 (1.5)
<b>Total</b>	<b>68</b>

**Table 2. Interventions during hospital admission.**

Interventions	n %
Minor amputations (to midfoot)	16 (27.6)
Major amputations (below knee/ above knee)	1 (1.7)
Vascular interventions (including, angioplasty/bypass)	13 (22)
Debridement and washout	14 (24)
Infection therapy including intravenous antibiotics	44 (76)
Charcot's; requiring surgical revision	1 (1.7)
Other (2x hypoglycaemia/1x pneumonia /1x urinary tract infection /1x allergic reaction)	5 (8.6)
<b>Total</b>	<b>58</b>

ulceration), thereby representing an 8.04 day increase in length of bed stay, with a significant cost to the NHS (Kerr et al, 2019). The estimated cost of these extended hospital admissions is suggested to be in the region of £145.45mn (Kerr et al, 2019). The projected increase in people living with diabetes by 2030 will see these costs increase significantly, when the number of people affected by diabetes is expected to reach 5.5mn in the UK (Diabetes UK, 2019).

A diabetic foot infection is defined as a soft tissue or bone infection, occurring below the malleoli, and is the most common complication of diabetes requiring admission to hospital; additionally, it is the most common cause of non-traumatic lower-limb amputation (NICE, 2002), with DFUs preceding more than 80% of amputations in people with diabetes (NICE, 2002). Many patients present to the podiatry clinic, who then act as 'gatekeepers' (Blanchette et al, 2020), and there is very little literature on patients presenting to the podiatry

clinics and then being assessed by this speciality to determine the need for hospital inpatient admission.

The podiatry service at University Hospitals Birmingham (UHB) is a small team (3.3WTE substantive staff members with the additional three Trust sites being staffed by a local podiatry department on a service-level agreement). The highly skilled clinical podiatrists provide treatment for both outpatients and inpatients within the Trust, 5 days a week and are supported by weekly multidisciplinary team ward rounds and Diabetic Foot Clinics.

The skill mix and specialist interests of the clinical staff underpin the holistic management of the diabetes-related foot problems referred to UHB.

## Methods

A pragmatic prospective audit was conducted from August 1, 2017 to August 31, 2019 at UHB NHS Foundation Trust, to include all patients referred directly for inpatient admission into the acute

hospital (via the Acute Medical Unit and Accident and Emergency Department) from a secondary care outpatient podiatry-led clinic. These were patients who were deemed by the podiatrist to need urgent admission to hospital. All patients were recorded for admission date and date of discharge (length of bed stay), with outcome data for the primary reason for admission along with hospital treatment and the ongoing outcome. Clinical data, including date and cause of death, was extracted from hospital electronic notes.

### Results

During the study period, 58 patients (68 acute admissions; 48 males) were referred from clinic to acute medical or surgical teams. Of these, eight patients were admitted twice and two patients had three admissions. The mean age of the patients was 53 years (range 40–90 years), with most patients aged between 50–69 years old (70.6%). Most patients were white British (36 males, 9 females), whilst the remainder were either of Indian, Pakistani, African or Caribbean origin. Fifty-two (89.7%) patients lived with type 2 diabetes and 10 patients were dialysis-dependent.

The most common reasons for referral and admission are summarised in *Table 1*. 32 patients (47%) were admitted at a podiatry appointment after a routine redressing/walk-in, 11 (16%) were seen as urgent/emergency walk-ins, 8 (11.8%) following attendance at the multidisciplinary diabetic foot clinic requested by podiatry, 10 (14.7%) following referral from primary care (general practitioner (GP)/district nurse/practice nurse/community podiatry) and seven (10.3%) from other hospital speciality referrals (such as vascular surgery or renal medicine).

The intervention of these patients after admission is summarised in *Table 2*. The mean length of stay was 15.8 days (1–90 days), with females staying for a mean of 22.7 days (1–90 days) and males 13.8 days (1–50 days). Eleven (19%) patients died during the audit period, including two during their actual hospital admission. Causes of death included cardiovascular (five patients), cancer (two patients), cardio-renal syndrome (one patient) and pneumonia (one patient) – the cause of death was not known in two patients. Of the patients who died, 88.9% died within 1 year of this admission to hospital.

### Discussion

This prospective audit has shown the importance of robust care pathways in ensuring that patients have access to the right medical interventions at the optimum time. Many hospitals now have access to a multidisciplinary Diabetes Foot Clinic at least once a week, similar to our practice. With patients presenting directly to daily podiatry-led clinics at all other times, this exposure and autonomous practice enables podiatrists to act as ‘gatekeepers’ and determine which patients need admitting, from those that can be managed on an outpatient basis (Diabetes UK, 2019). Early referral to specialist care pathways can both reduce healing times and the need for lower limb amputations by reducing ulcer duration (Kerr et al, 2019), while the National Diabetes Foot Audit (NDFA) has unsurprisingly found that delays in foot assessment are linked with both an increased ulcer severity and duration. The individual clinical skill and judgement regarding the need for hospital admission is difficult to quantify, and is often the result of good clinical knowledge and experience from working within specialist clinics and the multidisciplinary team, with particular reference to the red flag markers:

- The acutely red/hot/swollen foot
- Spreading cellulitis or tracking
- Allied with systemic symptoms indicative of sepsis
- Critical limb ischaemia
- Purulent gangrene, or
- Increasing rest pain with absent pulses.

Our results show that the majority of patients admitted have severe soft tissue infection, requiring intravenous antimicrobials. This is especially important to recognise, as many of these were already receiving oral antimicrobials. However, there were also a large number of patients who eventually required minor amputations and vascular interventions, with many of these patients (47%) not seeming to appreciate that they were unwell, because they attended for routine podiatry appointments as scheduled.

There is very little data regarding the positive effect of podiatrists on major or minor amputation risk in patients with diabetes (NICE, 2002), so additional research is suggested, with a systematic review determining the impact of podiatry in the multidisciplinary foot team (MDFT) being

indicated (Blanchette et al, 2020), and further assertions being made that there is little research to support the impact that amputation has on a person's quality of life (Levy et al, 2017). The expertise and skills of podiatrists in the MDFT have been shown to improve patient outcomes and limb salvage (Sanders et al, 2010; Buckley et al, 2013).

Audit data will continue to be collected contemporaneously, in order to inform a service redesign, specifically around improving the early access to podiatry services (both in secondary and primary care), and timely provision of appropriate antimicrobials, which will support the assertion that early referral to specialist care improves patient outcomes, reduces length of bed stay and reduces healing time. Although this audit involved a relatively small cohort of patients, it has demonstrated that patients with diabetic foot problems have multiple comorbidities that need to be addressed for optimum outcomes, as not all complications are foot-related and occur across all age groups. As frontline care providers, podiatrists should be able to identify and escalate patients who need urgent hospital admissions, rather than waiting for the next medical appointment, as 'delays lead to dire results'. ■

- Armstrong DF, Wrobel J, Robbins JM (2007) Guest editorial: are diabetes-related wounds and amputations worse than cancer? *Int Wound J* 4(4): 286–7
- Bader MS (2008) Diabetic foot infection. *Am Fam Physician* 78(1): 71–9
- Blanchette V, Brousseau-Foley M, Cloutier L (2020) Effect of contact with podiatry in a team approach context on diabetic foot ulcer and lower extremity amputation: systematic review and meta-analysis. *J Foot Ankle Res* 13(1): 15
- Buckley CM, Perry IJ, Bradley CP et al (2013) Does contact with a podiatrist prevent the occurrence of a lower extremity amputation in people with diabetes? A systematic review and meta-analysis. *BMJ Open* 3(5): e002331
- Diabetes UK (2019) *Number of People With Diabetes Reaches 4.7 Million*. Available at: <https://bit.ly/37Qj9yT> (accessed 29.10.2020)
- Health and Social Care Information Centre (2015) *National Diabetes Audit 2012-2013. Report 2: Complications and Mortality*. HSCIC. Available at: <https://bit.ly/2HPh1Na> (accessed 29.10.2020)
- Izumi Y, Satterfield K, Lee S, Harkless L (2006) Risk of reamputation in diabetic patients stratified by limb and level of amputation: 10-year observation. *Diabetes Care* 29(3): 566–70
- Kerr M (2017) Diabetic foot care in England; an economic study. Insight Health Economics
- Kerr M, Barron E, Chadwick P (2019) The cost of diabetic foot ulcers and amputations to the National Health Service in England. *Diabetes Med* 36(8): 995–1002
- Levy N, Gillibrand W, Kola-Palmer S (2017) Minor amputation and quality of life: Is it time to give the patient a voice? *The Diabetic Foot Journal* 20(4): 228–34
- Lipsky BA (2004) Medical treatment of diabetic foot infections. *Clin Infect Dis* 39(Suppl 2): S104–14
- Miller JD, Carter E, Shih J et al (2014) The 3-minute diabetic foot exam. *J Family Practice* 63(11): 646–56
- National Institute for Health and Clinical Excellence. Principles for Best Practice in Clinical Audit. 2002. Available online at: <https://www.nice.org.uk/media/796/23/BestPracticeClinicalAudit.pdf>
- Sanders LJ, Robbins JM, Edmonds ME (2010) History of the team approach to amputation prevention: pioneers and milestones. *J Vasc Surg* 52(3 Suppl): 3S–16S