Striving to put feet first: An audit of inpatient care

Angela N Paisley, Paul Chadwick

Diabetic foot complications are the most common cause of non-traumatic lower-limb amputation in the UK, the majority of which are considered to be preventable. Diabetes UK (2009) published guidance on the management of diabetic foot disease in the secondary care setting and Foot in Diabetes UK developed a tool for auditing practice against the guidance's standards. Using this tool, the authors conducted a baseline audit of the standard of diabetic foot care received by inpatients at a large UK teaching hospital and report the results here.

Article points

1. Diabetic foot complications are the most common cause of non-traumatic lower limb amputation in the UK.
2. An audit of 14 episodes of diabetic foot disease was conducted using the Foot in Diabetes UK audit tool, assessing quality standards described in Diabetes UK's (2009) guidance *Putting Feet First.*
3. The results highlight a lack of appropriate management of inpatients with diabetic foot disease presenting acutely, particularly in the early stages of admission.
4. Early involvement of a specialist diabetic foot team following admission of people with active diabetic foot disease would improve the standard of care received by this group.

Key words:
- Audit
- Diabetic foot disease
- Inpatient care

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In June 2009, Diabetes UK, in partnership with NHS Diabetes, published *Putting Feet First,* guidance on the management and prevention of diabetic foot disease in hospital settings. The guidance provides a pathway of care that is divided into three time-sensitive phases and details the standard of care that should be met during each phase. A summary of the pathway of care can be found in *Box 1*. To the authors' knowledge, *Putting Feet First* has not yet been widely implemented.

An audit tool[†] based on the standards detailed in *Putting Feet First* was presented at the Foot in Diabetes UK (FDUK) Masterclass in 2009 (*The Diabetic Foot Journal*, 2009). The FDUK tool was designed to facilitate the recording of whether significant, limited or no evidence can be found to demonstrate that each care standard detailed in *Putting Feet First* has been met during a given episode of diabetic foot disease experienced by a person admitted to hospital.

Background

The Salford Royal NHS Foundation Trust Hospital, a large teaching hospital in north-west England, strives to achieve an integrated approach to the management of diabetic foot disease. This has led to year-on-year reductions in diabetes-related amputations since 2007 (*Figure 1*) against a background of increasing diabetes prevalence (NHS Information Centre, 2010). Furthermore, local clinical audit data demonstrate year-on-year reductions in median time to healing of diabetic foot ulcers since 2007 in the Salford area (*Figure 2*), achieving healing rates faster than those reported by many other UK centres (Margolis et al, 1999).

Despite improvements in the local management of diabetic foot disease, anecdotal reports suggested problems in the management of diabetic foot disease among people admitted acutely. The authors used the FDUK tool to conduct a baseline audit of the standard of diabetic foot care received by inpatients at the Salford Royal NHS Foundation Trust Hospital. The results are reported here.

Methods

The period audited was January–March 2010. Any person who presented to the Salford Royal NHS Foundation Trust Hospital with active diabetic foot disease, or active diabetic foot disease concurrent to other illness, during that period was included. Using the FDUK tool, the medical records of people meeting the inclusion criteria were the data source.

[†]The audit tool based on *Putting Feet First* (Diabetes UK, 2009) was presented by Martin Fox (Manchester) and Professor William Jeffcoate (Nottingham) and is available to FDUK members at footindiabetes.org (FDUK membership is free for healthcare professionals, visit footindiabetes.org/join).

Results

Participants

Thirteen people (five women, eight men) with 14 episodes of active diabetic foot disease were admitted during the audit period. Mean participant age was 65±15 years and diabetes duration ranged from 3–30 years.

Presentation was either (i) as an emergency to the casualty department or (ii) an emergency referral from a GP. There was a high disease burden in the group, with 12 patients receiving treatment for hypertension, five having chronic renal impairment, two dyslipidaemia, four with previously diagnosed peripheral vascular disease and eight with previously diagnosed peripheral neuropathy.

PHASE I: Immediate care

Data from this phase are summarised in *Figure 3a*. All patients were seen by general medical physicians at presentation.

In two (2/14; 14%) episodes accurate assessment of pedal pulses and sensation was performed. Appropriate investigation for foot infection was undertaken in eight (8/14; 57%) episodes, all of whom were determined to have signs of infection and prompt antibiotic therapy was commenced. In the remaining six cases not investigated for foot infection, four (4/14; 29%) had antibiotics initiated for reasons other than foot-related infection. Antibiotic therapy was notably delayed in two cases:

- A 86-year-old woman who presented with confusion following a fall. Although the woman's confusion was considered to be due to sepsis, the source was assumed to be a urinary tract infection. Not until the following day was cellulitis surrounding a foot ulcer noted.
- A 76-year-old woman who presented with increasing confusion on a background of dementia. Although active foot ulceration was listed in her medical record, the ulcer dressing was not removed until the following day and cellulitis noted.

There was no documentation to suggest that Charcot neuroarthropathy was considered in any episode, despite 57%

Box 1. Summaries of the *Putting Feet First* (Diabetes UK, 2009) phases of inpatient care.

PHASE I: IMMEDIATE CARE

↘ *Admission – 4 hours*

Both feet must be examined for pulses, sensation and infection; if there are signs of infection, appropriate investigations (blood work, local wound samples, X-rays) must be undertaken and antibiotics must be given promptly; if there is unexplained swelling or inflammation of the foot, acute Charcot neuroarthropathy must be considered; the advice of a specialist diabetes foot care team should be obtained as soon as possible; the need for urgent surgery should be assessed by an experienced surgeon; other aspects of diabetes care, including glycaemic control, should be attended to.

PHASE II: SECOND PHASE CARE

↘ *4 – 48 hours*

Review results of investigations and response to treatment and adjust appropriately; consult with the specialist diabetes foot care team; agree on management and transference of care; provide accurate information to the patient, their family and GP, including contact details for those responsible for specialist foot care.

PHASE III: CONTINUING SPECIALIST CARE

↘ *48 hours – ongoing care*

Continued review of emergency management; provide appropriate debridement and pressure relief; assess the need for vascular intervention; optimise diabetes care, including glycaemic control and cardiovascular risk reduction; provide accurate information to the patient, their family and GP, including contact details for those responsible for specialist foot care.

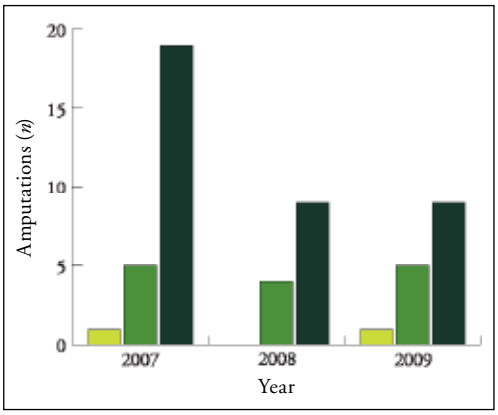

Figure 1. Diabetes-related amputations in the Salford catchment area for 2007–9. Above-knee amputation; below-knee/above ankle amputation; toe amputation.

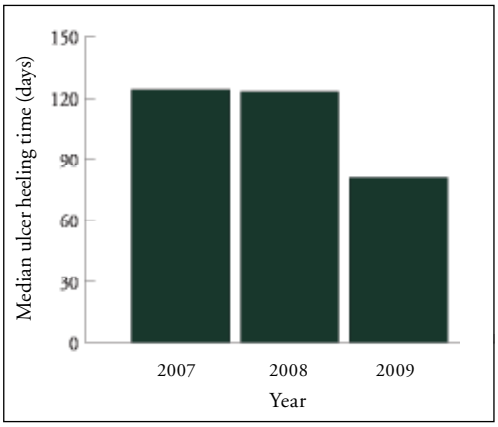

Figure 2. Median ulcer healing times for 2007, 2008 and 2009 (Salford Foot Ulcer Audit Team, 2010).

(8/14) of cases having a previous diagnosis of neuropathy in their medical records.

The specialist foot team was engaged for the assessment of two (2/14; 14%) episodes of ulceration during this phase. A diabetes specialist clinician was consulted in the optimisation of diabetes care in three (3/14; 21%) episodes during this phase.

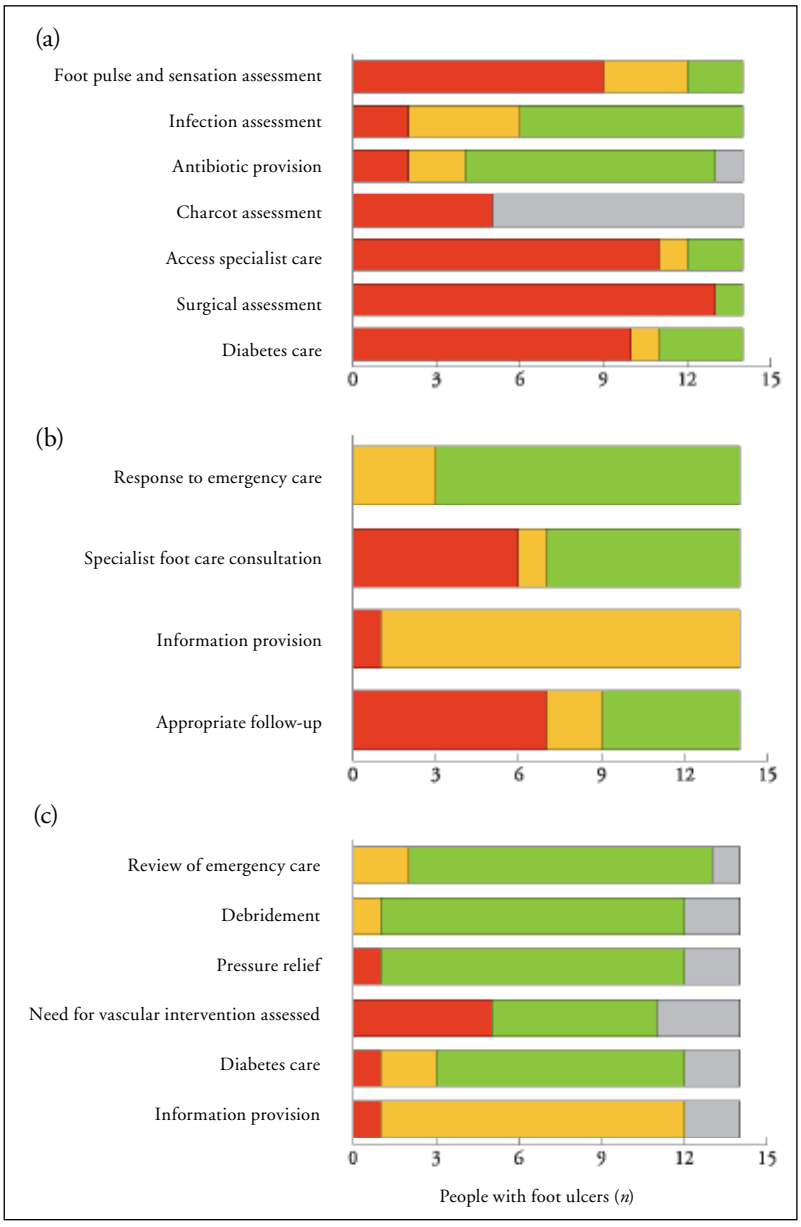

Figure 3. Significant (■), limited (■) and no (■) evidence of the **Putting Feet First** *(Diabetes UK, 2009) standards being met during (a) phase I (presentation–4 hours), (b) phase II (4–48 hours) and (c) phase III (48 hours–ongoing care) in the medical notes of inpatients with diabetic foot disease at the Salford Royal NHS Foundation Trust Hospital. ■, No data.*

PHASE II: Second phase care

Data from this phase are summarised in *Figure 3b*. Significant evidence of the review of results of investigations and response to treatment was found in 11 (11/14; 79%) episodes (evidenced by follow-up of microbiology results, ensuring appropriate antibiotic regimens, monitoring of inflammatory markers) with some evidence in the remaining three (3/14; 21%) episodes.

There was poor documentation of communication with the patient and their family in all episodes. By the end of this phase of care, seven (7/14; 50%) episodes had not received any input from the specialist foot team.

PHASE III: Continuing specialist care

Data from this phase are summarised in *Figure 3c*. During this phase the majority of episodes of ulceration were being appropriately managed with significant evidence of review of emergency management (12/14; 86%), appropriate debridement (13/14; 93%) and pressure relief (13/14; 93%). The need for vascular intervention was considered in more than half (8/14; 57%) of the episodes and a diabetes specialist clinician had been involved to optimise diabetes management in the majority (11/14; 79%) of cases. There was little evidence that information on the ulcer and its ongoing management was given to the patients or their families.

Discussion

These results highlight a lack of appropriate management of people who present acutely with diabetic foot disease, or other illness with concurrent diabetic foot disease, at the authors' institution. It was particularly evident that care during the first 4 hours following presentation was poor. This probably reflects the failure of the admitting physician (frequently an emergency physician or non-specialist junior physician) to recognise the need to assess the feet of people with diabetes who present with acute illness of unknown cause, and the need to seek specialist intervention when diabetic foot disease is present at admission.

Positively, the majority of cases were assessed for signs of infection and antibiotics commenced if necessary. However, the notable exceptions suggest that examination of the foot as a possible source of infection during early admission of people with diabetes is not routine.

During phases I and II the majority of patients were not reviewed by the specialist foot team. This likely reflects the lack of provision for an on-call specialist foot team. Patients are transferred from accident and emergency to the emergency assessment unit where they may stay for up to 24 hours, occasionally longer, and are then admitted to the medical wards. Referral for specialist foot care is usually not sought until the patient is admitted to a medical ward, resulting in delays to specialist care – delays of several days if the admission is late on a Friday afternoon.

The results also reflect that the involvement of the specialist foot team during phase II increased the likelihood of the patient receiving appropriate wound care and vascular or surgical intervention if necessary – the kind of multidisciplinary management shown to reduce diabetes-related amputation rates (Sanders et al, 2010). Although no significant adverse outcomes occurred during the 14 episodes of ulceration reported here, delay in specialist referral has been associated with increases in both time to healing and the risk of amputation (Macfarlane and Jeffcoate, 1997).

Optimisation of glycaemic control is important during episodes of acute illness among inpatients with diabetes (Fowler and Rayman, 2010). Despite this, the audit revealed delays in referrals to the diabetes team.

In all episodes reported here, evidence that the patient or their family had been provided with diabetic foot-related information was poor. This was apparent during all three phases. It is likely that this reflects both (i) poor documentation by the healthcare professional of their providing information to patients and (ii) an actual failure to communicate with patients.

Addressing shortfalls in care

One way to ensure that the phase I standards of *Putting Feet First* are met would be to educate physicians who treat patients at presentation about the impact of foot ulceration among people with diabetes. This may include the provision of a checklist of investigations that should be undertaken to exclude a foot problem in any person with diabetes presenting with fever or unexplained ill-health, as well as a list of investigations, subsequent management directions and necessary referrals for patients who present with active foot disease, even if it is coincidental to their presenting complaint.

Prompt access to a suitably skilled multidisciplinary diabetic foot team is widely agreed to be the gold standard in the management of active diabetic foot disease (International Working Group on the Diabetic Foot, 2007). Thus, immediate access to a specialist foot team via an on-call system, although expensive in the short term, is likely to improve patient outcomes and – given the costs associated with extended inpatient stays and lower-limb amputation – reduce long-term costs.

The shortfalls in care that these results highlight have been reported to the commissioning and strategy group for diabetes in Salford. In an effort to improve the standard of care for inpatients with diabetic foot disease, a sub-group has been established and tasked with implementing a change package. The package includes:

- The introduction of a "red flag" warning system where a diabetic foot component will be added to the Waterlow Scale, which is carried out by nursing staff on all patients within 6 hours of admission. If the patient has diabetes, the nurse will be directed to remove the patient's shoes, socks and any dressings and bandages and check for (i) an ulcer or break in the skin, (ii) swelling, discoloration or heat and (iii) fracture. Any of these require a referral to the specialist diabetic foot team. This will be supplemented by a list of red flag diabetic foot actions for the medical team, which comprises pedal vascular and peripheral

Page points

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neurological checks, consideration of infection and antibiotic initiation according to local protocol, referral to specialist foot team, consideration of urgent vascular consultation, consideration of Charcot neuroathropathy and provision of a foot ulcer information leaflet.

- Making the *Putting Feet First* patient information card locally relevant and distributing it to people in the Salford preventative foot care programme who will be encouraged to present the card if admitted to hospital.

Re-auditing is planned for 6 months following the implementation of the change package.

Conclusion

The authors suggest that all health economies audit their practice against the standards detailed in *Putting Feet First*. Taking steps to identify current shortfalls in practice should be followed by efforts to implement cost-effective changes that will improve patient outcomes. ■

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