

Peer review and follow-up to enhance diabetic foot services throughout the patient journey

Richard Paisey, Angela Abbott and Rachel Levenson

Citation: Paisey R, Abbott A, Levenson R (2019) Peer review and follow-up to enhance diabetic foot services throughout the patient journey. *The Diabetic Foot Journal* 22(4): 42–7

Key words

- Amputation incidence
- Diabetic foot ulceration
- Integrated diabetes care
- Peer review
- Service provision

Multidisciplinary peer reviews were performed to audit the efficacy of diabetic foot care services in the South West region of England. The resulting peer review recommendations were implemented in practice and have led to a reduction in the incidence of major amputation associated with diabetic foot ulceration. Inequalities and gaps identified in diabetic foot ulcer treatment have led to the reconfiguration of some services and the consideration of future changes to others. Service improvements require cogent commissioning, responsive, locally-sensitive provision of care and adequate funding from clinical commissioning groups. The provision of integrated care by a strong multidisciplinary foot team will result in prompt recognition and treatment of diabetic foot disease and enhance outcomes.

Major amputation incidence is justifiably a key performance indicator for foot services because of its widely-reported impact on quality and length of life (Jupiter et al, 2016). Timely access to care has been identified as a major factor in improving healing rates and reducing amputation risk (National Institute for Health and Care Excellence [NICE], 2004, 2012, 2017; Jeffcoate et al, 2014). Diabetes UK has been promoting the benefits of robust diabetic foot services for more than a decade, but there are still widespread gaps in service provision and inequalities between providers.

Cardiovascular disease, stroke and cancer services are subject to audit, peer review, national data reporting and annual performance review. As a result services and outcomes have improved (Birkhead et al, 2004; Royal College of Physicians, 2006; Williams and Drinkwater, 2009). Diabetic foot disease has only recently been subjected to this level of scrutiny, despite being characterised by: a preventable precursor stage; manageable early risk factors (Jeffcoate and Young, 2016; Paisey et al, 2016, 2018); the potential to avoid initial significant tissue loss (Paisey et al, 2019); and possible

avoidance of end-stage critical limb damage that requires urgent intervention (British Orthopaedic Association et al, 2016). The fact that diabetic foot disease problems cost 1% of the NHS budget per annum and improving care reduces this burden (Kerr et al, 2019; Paisey et al, 2019) should act as a stimulus for care providers to prioritise the issue. However, the prevention and prompt treatment of diabetic foot ulcers (DFUs) remains challenging because of the multifactorial nature of the problem and the demands of sustained, integrated care. The key performance indicator for the success of a diabetic foot service is the incidence of major amputation; rates above the NHS England national average highlight potential failures in overall service provision (Holman et al, 2012). This, however, does not identify specific gaps in services.

Diabetic foot care peer review

NHS England South West (SW) sought to investigate the variable but mostly high major diabetes-related amputation rates in the SW region using peer review. The process identified wide variation in the timely provision of care, including patient education, quality of general practice

Authors

Richard Paisey is Honorary Consultant, Torbay and South Devon NHS Foundation Trust and South West Strategic Cardiovascular Network, UK; Angela Abbott is Podiatry Lead, Torbay and South Devon NHS Foundation, UK; Rachel Levenson is Quality Improvement Lead, South West Strategic Cardiovascular Network, NHS England, UK

Table 1. Service provisions associated with improvement in diabetes-related major amputation.

Care provision	Actions required by healthcare professionals
Patient education at annual review	Confirmation by general practice lead and patients at interview
Regular community healthcare professional of education	Confirmation by general practice and podiatry leads and evidence of the education programme
Adequate community podiatry numbers and skills mix, with rotation into the MDFT	Comparison of the service with Society for Podiatry guidelines and confirmation by podiatrists
Jobs planned by the MDFT on a weekly basis	Evidence from clinic records and MDFT members
Sufficient administrative support	Interview with administration and clerical staff, podiatry and MDFT leads
Pathways and communication of the plan of care to the patient	Confirmation by patients at interview, documentation in notes, and examples of summary sheet of patient care pathway
Identification of diabetic inpatients and if they have received foot checks	Evidence of Information technology used to identify patients and protocol for foot assessment
Access to an orthotist, as an integral member of the MDFT	Review of MDFT clinic
Urgent vascular opinion available to foot clinic staff	Review of MDFT clinic
Ulcer database and root cause analysis of all amputations	Review of results of data base and analyses.

MDFT = multidisciplinary diabetic foot team

annual reviews, access to community podiatry and multidisciplinary foot protection services (Paisey et al, 2018). Less obvious but equally important barriers to good care include a lack of robust administrative support and clarity and accessibility of diabetic foot pathways.

The process

Over 100 patients living with DFU were interviewed (four in each provider centre) to evaluate barriers to prompt assessment and treatment. Each provider centre was visited by a team made up of a lead podiatrist, vascular surgeon, diabetologist and orthopaedic surgeon, none of whom worked in the location reviewed. Visits were completed within 1 working day.

In every review, the team sought to engage community and hospital service providers, clinical commissioning group (CCG) leads, GP leads, providers and local hospital trust board representatives. Notably, in contrast to stroke, cancer and cardiovascular services, diabetic foot care was poorly understood and inadequately represented at CCG and hospital board level. Lack of representation at executive level may partly result from the complex nature of the disease and the absolute requirement for multidisciplinary care and cross-pathway provision, including general practice and community services. The standards of care found to be linked with satisfactory diabetic foot care from the peer reviews are given in *Table 1*.

Data analysis

Public Health England (PHE)'s diabetes complications reports that include amputation rates do not separate different providers within a CCG. The authors sought to shed more light on the details of care provision in each provider within the CCGs with some success, as their amputation rates and challenges varied widely.

The PHE statistics also rely on 3-year outcomes to enhance reliability of findings. The authors have reported 1-year changes where significant improvements to service have occurred to assess effects quickly to make sure that the changes have started to help. The mechanism for obtaining these statistics is that the CCG data analysts can interpret Secondary Uses Service data to separate provider areas in the CCG and generate 1-year statistics.

Positive changes

Where providers were able to implement the 10 key services, there was a direct correlation with a reduction in amputation rates, see *Table 2* and *Figure 1*. Notable changes included:

- Improved uptake of diabetic foot screening
- Foot Risk Awareness and Management Education (FRAME) tool use (NHS Scotland et al, 2017) in GP practices to improve standards of diabetic foot checks
- Development of streamlined referral pathways
- Link podiatrists working closely with groups of general practices

Article points

1. Multidisciplinary peer review has been validated as an effective audit process for the efficacy of diabetic foot care.
2. Implementation of peer review recommendations was associated with a reduction in major amputation incidence.
3. Digital technology and linking podiatrists with General Practices can improve outcomes.
4. Diabetic foot ulceration is often associated with frailty, resulting in increased demand for services.
5. Centralisation of vascular services can reduce prompt access to treatment in non-arterial centres and has been shown to result in a deterioration in outcomes.

Table 2. Service provision before and after the peer review visit and impact on amputation incidence.*†

Number of key services provided in 2013	Major amputations/ 1000/year 2009–12	Number of key services provided in 2015	Major amputations/ 1000/year 2012–15	Number of key services provided in 2017	Major amputations/ 1000/year 2014–17
8	1.0	8	0.5	8	0.8
7	1.0	8	0.9	7	0.8
7	1.2	7	0.9	7	0.9
6	0.8	9	0.4	8	0.5
6	1.1	6	1.0	6	1.1
5	1.4	9	0.7	8	0.7
5	1.2	8	0.5	10	0.5
5	1.2	6	1.5	6	1.3
5	1.1	5	1.0	10	0.6
4	1.1	9	0.6	9	0.7
3	2.0	7	1.3	10	0.6
3	1.3	2	1.4	4	1.3
2	1.5	9	0.9	9	0.5
2	2.0	3	1.7	5	1.3
	0.9		0.8		0.7

*Data in each row represent one provider of foot care services based on a district general hospital and foot protection service.

†Data from Devon Clinical Commissioning Group (CCG). Analysis from Health Episode Statistics, Secondary Uses Service (SUS) (NHS New Devon CCG, 2019).

- Appointment of inpatient podiatrists
- Job planning and audit of multidisciplinary diabetic foot teams (MDFTs)
- Establishment of virtual MDFTs for rural areas
- Prospective root cause analysis (RCA) of major amputations
- Use of digital technology to document accurate vascular assessment, including toe pressures
- Identification of inpatients with diabetes and recording of their foot status
- Sharing records and ulcer photographs.

Amputation root cause analysis

The causative factors that led to both major and minor amputations were notable in services where RCAs were routinely undertaken. The hospital- and podiatry-based investigation of factors leading to amputation in over 30 cases in one CCG led to a misleading conclusion. There was an assumption that inadequate annual review and failure of prompt referral to podiatry could be blamed for half of the amputations. A full pathway and system approach, as developed in the Diabetes UK RCA guide (Diabetes UK, 2016), led to a much better understanding of

the situation. Thorough review of general practice records demonstrated just how hard most practices had endeavoured to engage with their patients and how they had followed existing referral pathways. Pathways that delay timely referral because of restrictions on patient self-referral continue to be a problem. Untrained staff are expected to triage foot ulcer referrals in many areas, especially where there is a single point of referral for all allied healthcare professional services.

Identifying inequalities and gaps in provision and reconfiguring services

Large CCGs covering several hospitals can provide greater flexibility in commissioning; however, audit of diabetic foot services must be refined to explore any differences in outcomes within CCG maps (Figure 2 and Figure 3). This is particularly important in order to share good practice. It must be recognised that different provider areas within large CCGs (or sustainability and transformation partnerships) may need to provide services configured according to population and geographical characteristics within the CCG.

Podiatry service

A strong community podiatry team, rotation into the MDFT and daily hospital ulcer clinics in addition to the MDFT itself are the foundation of excellence in treatment of diabetic foot disease. Inpatient podiatry provision is also essential. In one area, the development of a virtual MDFT linked with community podiatrists has more than halved the major and minor amputation rates in the 2 years since its inception (White et al, 2019). The process relies on ulcer photographs attached to emailed referral forms. Over half of patients referred can be treated without seeing the MDFT face-to-face. The shortage of podiatrists since the withdrawal of training bursaries is a serious concern. Apprenticeship training schemes for allied healthcare professionals may be of future benefit.

Vascular service

Poor outcomes for aneurysm surgery in the UK necessitated a reorganisation of vascular services in England. A hub-and-spoke (arterial and non-arterial centre) model was proposed and a gradual transformation of service delivery commenced in 2012 as part of specialist commissioning. One consequence of the centralisation of major vascular interventions to a regional arterial centre was the inevitable reduction in vascular surgical presence in the MDFT and reduction of vascular inpatient beds in the non-arterial centres. This has the potential to delay diagnosis and treatment in spoke hospitals and increase pressure for DFU investigations and treatment in hubs. Data have shown that in three areas the move to an arterial hub-and-spoke model has been associated with increased diabetes-related amputations (Public Health England, 2019). A possible mitigating factor may be the continued clinical preference for endovascular intervention in persons with DFUs complicated by peripheral vascular disease. Angioplasty can often still be undertaken in non-arterial centres if vascular service review is available when required. Combining this with orthopaedic intervention for non-ischaeemic diabetic foot problems in the non-arterial centre would seem a logical way forward.

Orthopaedic service

Peer reviews of diabetic foot services throughout the SW and Wessex regions have highlighted an inequality in orthopaedic expertise in the MDFT.

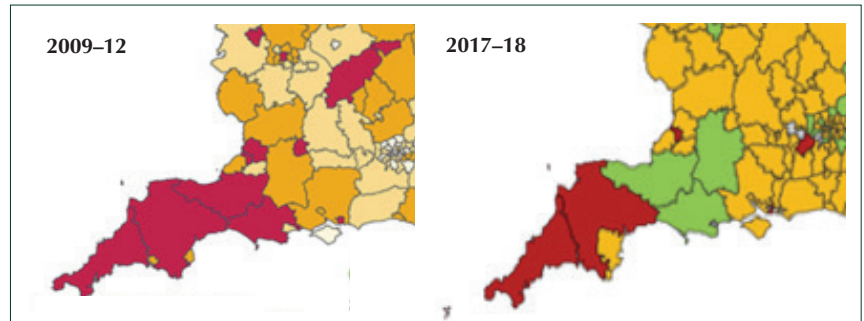


Figure 1. Rates of major amputation before (left) and after (right) peer review. Data from Public Health England, 2019. Key to figure colours: red >2 standard deviations above England average; yellow one standard deviation above England average; green equal to or lower than the England average.

Orthopaedic availability ranges from no foot and ankle surgeon along with limited access to plaster of Paris casting, to MDFT leadership by podiatric surgeons with dedicated operating theatre sessions. In some centres, enthusiastic orthopaedic surgeons offer a prompt and innovative intervention for recurrent ulceration and osteomyelitis.

Orthotic service

The majority of secondary care orthotics services for all conditions are commissioned piecemeal from independent providers. This commissioning may exclude any link with the MDFT. Delays in the provision of bespoke footwear or devices ranged from weeks to 6 months. With adequate space and the presence of an orthotist in the MDFT, biomechanics can be fully investigated and the findings brought to bear on choice of orthosis. Counselling is a crucial part of this service, to avoid the futility of an expensive shoe being disposed of unworn by patients, and needs to be integrated in this service.

Diabetes service

There are many vacancies in the endocrinology and diabetes workforce and few diabetologists are keen to take the lead in a MDFT. The average HbA_{1c} in DFU patients is 70–80 mmol/mol (8.6–9.5%) or higher (Paisey et al, 2016), contributing to the development of ulceration, impaired healing and predicated future complications of diabetes. It may be that in future an experienced diabetes specialist nurse could provide some diabetes care in the MDFT, in particular, engaging with the

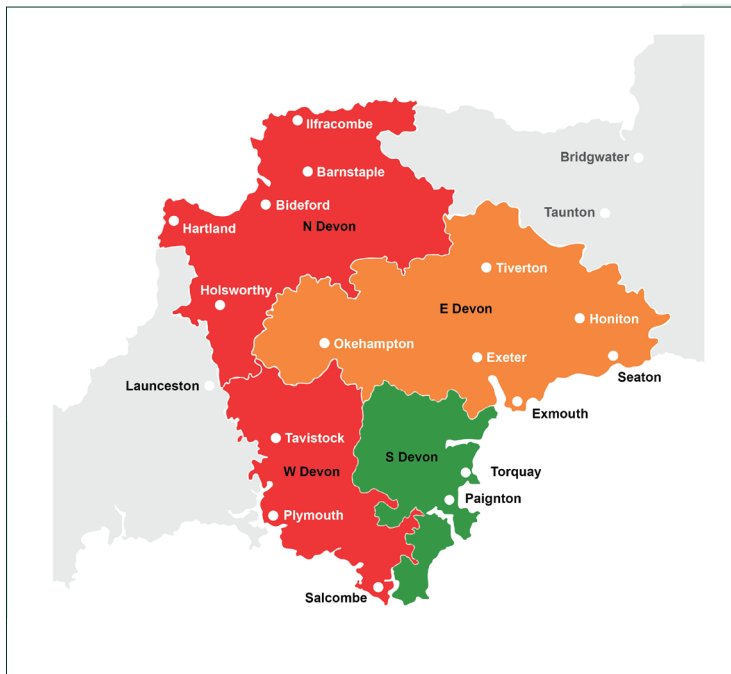


Figure 2. Areas in the Devon Clinical Commissioning Group with higher-than-national-average amputation rates (red) prior to peer review.



Figure 3. Areas in the Devon Clinical commissioning Group with higher-than-national-average amputation rates (red) after peer review.

patient to improve glycaemic control. Where diabetes specialist nurses are prescribers, they will be able to offer appropriate therapeutic interventions. The availability of a diabetologists to consult to the MDFT is highly desirable.

Acute services (hot red foot)

Just as integrated diabetes foot care is underrepresented at CCG and trust board level, the acute diabetic foot patient is often neglected at presentation to acute services. Failure of thorough examination and basic investigations can result in many hours or days of delay before intensive therapy is begun. Good medical, nursing and podiatry practice should ensure prompt treatment and referral.

Within 1 hour of arrival to hospital

Both feet must be off-loaded immediately on arrival, including the removal of all footwear and dressings, with a bed cradle and relief of heel pressure implemented. Full blood count, renal function, blood glucose and C-reactive protein tests should be performed. The results should be reported within 1 hour for critical patients. Possible ischaemia should be assessed and the presence of infection determined. If patients present in shock, practitioners should follow the national guidelines for the management of septicæmia.

Within 4 hours of arrival to hospital

Glycaemic control should be managed according to capillary blood glucose monitoring within 4 hours. Where infection is diagnosed, intravenous antibiotics need to be commenced within 4 hours of arrival in hospital. Unless contraindicated, prophylactic subcutaneous heparin should be administered within this period.

National initiatives to be considered

Quality and Outcomes Framework

The new Quality and Outcomes Framework guidelines recognise the need to modify insulin and oral hypoglycaemic agents according to frailty and the consequent risk of serious hypoglycaemia (NHS Digital, 2018). This can be of particular importance for patients treated by the MDFT, as insulin resistance may decline sharply following successful treatment of osteomyelitis or the amputation of ischaemic toes. Good glycaemic control (<58mmol/mol; <7.5%) achieved by therapies with a low risk of hypoglycaemia benefits wellbeing and reduces the risk of long-term complications; however, less tight control (70–75mmol/mol; 8.6–9.0%) is safer for frail patients on insulin with limited life expectancy, unless the risk of hypoglycaemia can be minimised.

An important corollary of this concerns Quality and Outcomes Framework exemption from practice annual review. Whatever the reason for non-attendance, the outcomes are poor for patients with diabetes (Kontopantelis et al, 2016). Older, multimorbid and more deprived patients are more likely to be exempted from the scheme. More research is needed to confirm the clinical impression that these groups are at proportionately greater risk of DFU.

National Diabetic Foot Audit (NDFA)

NDFA data show that timely referral to diabetic foot services on first presentation of a DFU and timely access to associated services is linked to improved healing times, as measured by ulcer-free survival at 12 weeks (NHS Digital, 2019). There is a strong case for mandatory participation in the NDFA for all community and secondary care diabetic foot care providers.

Prevention and service planning are key

Tertiary prevention of diabetes encompasses damage limitation and rehabilitation once a DFU has developed. There are multiple factors in the progression from a vulnerable foot to the development of DFU and amputation. Effective team working across disciplines is crucial to the provision of effective diabetic foot care. There is real hope that — with inclusive multidisciplinary working, RCA and NDFA — DFUs can be prevented and, where they occur, treated with alacrity to avoid amputation. This will require cogent commissioning, responsive, locally-sensitive provision of care and adequate funding from CCGs. Rigorous assessment of commissioned services is of the essence. Future-proofing services with appropriate skill mixing, capacity and succession planning are all essential.

Conclusion

In the 5 years since the SW peer reviews were completed there have been excellent examples of successful incorporation of digital technology to support better access to care. Governance and leadership by lead vascular surgeons, diabetologists, podiatrists and general practice staff is necessary. These practitioners, orthotists and orthopaedic surgeons are essential members of the MDFT. ■

- Birkhead JS, Walker L, Pearson M, Weston C et al; National Audit of Myocardial Infarction Project Steering Group, 2004. Improving care for patients with acute coronary syndromes: Initial results from the National Audit of Myocardial Infarction Project (MINAP). *Heart* 90(9): 1004–9
- British Orthopaedic Association, British Orthopaedic Foot and Ankle Society, Vascular Society, Diabetes UK, Association of British Clinical Diabetologists, Foot in Diabetes UK; British Association of Prosthetists and Orthotists, British Orthopaedic Association, British Orthopaedic Foot and Ankle Society (2016) *Joint Specialty Recommendations: Operational Delivery of the Multi-disciplinary Care Pathway for Diabetic Foot Problems*. Available at: <https://bit.ly/2kSsGiO> (accessed 02.10.2019)
- Diabetes UK (2016) *How To... Use Root Cause Analysis To Reduce Diabetes Related Amputations*. Available at: <https://bit.ly/2kGf4rb> (accessed 02.10.2019)
- Holman N, Young RJ, Jeffcoate WJ (2012) Variation in the recorded incidence of amputation of the lower limb in England. *Diabetologia* 55(7): 1919–25
- Jeffcoate W, Holman N, Rayman G et al (2014) New national diabetes footcare audit of England and Wales. *Diabet Med* 31(9): 1022–3
- Jeffcoate W, Young B (2016) National Diabetic Foot Audit of England and Wales yields its first dividends. *Diabet Med* 33(11): 1464–5
- Kerr M, Barron E, Chadwick P et al (2019) The cost of diabetic foot ulcers and amputations to the National Health Service in England. *Diabet Med* 36(8): 995–1002
- Kontopantelis E, Springate DA, Ashcroft DM et al (2016) Associations between exemption and survival outcomes in the UK's primary care pay-for-performance programme: a retrospective cohort study. *BMJ Qual Saf* 25: 657–70
- NHS New Devon Clinical Commissioning Group (2019) *Health Episode Statistics. Secondary Uses Service (SUS)*. Available at: www.newdevonccg.nhs.uk (accessed 02.10.2019)
- NHS Digital (2018) *Quality and Outcomes Framework. Achievement, prevalence and exceptions data – 2017–18*. Available at: <https://bit.ly/2ySX9kF> (accessed 02.10.2019)
- NHS Digital (2019) *National Diabetes Foot Care Audit, 2014–2018*. Available at: <https://bit.ly/2Vh40g8> (accessed 02.10.2019)
- NICE (2004) *NICE Clinical Guidance CG10. Type 2 Diabetes Foot Problems: Prevention and Management of Foot Problems*. Available at: www.nice.org.uk/guidance/cg100 (accessed 02.10.2019)
- NICE (2015) *NICE Guideline 19. Diabetic Foot Problems: Prevention and Management*. Available at: www.nice.org.uk/guidance/ng19 (accessed 02.10.2019)
- NICE (2019) *NICE Pathways. Foot Care for People with Diabetes Overview*. Available at: <https://pathways.nice.org.uk/pathways/foot-care-for-people-with-diabetes> (accessed 18 September 2019)
- Paisey RB, Abbott A, Levenson R et al (2018) South-West Cardiovascular Strategic Clinical Network peer diabetic foot service review team, 2018. Diabetes-related major lower limb amputation incidence is strongly related to diabetic foot service provision and improves with enhancement of services: peer review of the South-West of England. *Diabet Med* 35(1): 53–62
- Paisey RB, Abbott A, Paisey CF, Walker D (2019) Diabetic foot ulcer incidence and survival with improved diabetic foot services: an 18-year study. *Diabet Med* [pub ahead of print] <https://doi.org/10.1111/dme.14045>
- Paisey RB, Darby T, George AM et al (2016) Prediction of protective sensory loss, neuropathy and foot ulceration in type 2 diabetes. *BMJ Open Diabetes Research and Care* 4: e000163
- Public Health England (2019) *Public Health Profiles*. Available at: <https://bit.ly/2xLcnch> (accessed 02.10.2019).
- Royal College of Physicians (2006) *Stroke Peer Review Scheme*. RCP, London. Available at: www.rcplondon.ac.uk/projects/outputs/stroke-peer-review-scheme (accessed 02.10.2019)
- White MV, Hucker M, Brown R et al (2019) Service improvement Oral Presentation A24 (P398), Introducing a virtual diabetic foot clinic in rural England. Diabetes UK Professional Conference, March 2019, Liverpool
- Williams MV, Drinkwater KJ (2009) Radiotherapy in England in 2007: modelled demand and audited activity. *Clin Oncol (R Coll Radiol)* 21(8): 575–90

Acknowledgements: Figures 2 and 3 have been calculated from Secondary Uses Service returns for payment in England and separated into providers within Devon CCG. The authors thank Shane Coe, Rosamund Paisey and Melvin Cowie for their contributions. The authors also acknowledge the patients, specialised clinical nurses and diabetic foot care teams in the Wessex and South West regions.