Setting up a diabetic foot clinic

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Diabetic foot disease is an increasing burden on health services both from both a financial and practical perspective, with no let up in sight. This requires healthcare professionals to meet this demand by changing practices and creating new more innovative models of care to reduce pressure on overwhelmed services. This paper presents a new non-doctor led model providing conservative and surgical management in a community setting, while maintaining links with acute services so that all the needs of the patient can be met.

Article points

1. Diabetic foot disease is an economic burden for the NHS with new imaginative thinking required to manage this deteriorating problem
2. A non-doctor led model for treating diabetic foot disease in a community setting maintaining a multidisciplinary approach
3. Collaborative working between multidisciplinary and interdisciplinary teams to help provide seamless pathways between acute and community care
4. Podiatric surgery as an important discipline in helping to manage diabetic foot disease from a conservative and surgical approach

Key words

- Community setting
- Diabetic foot disease
- Interdisciplinary clinic
- Podiatric surgery

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Diabetic foot disease is a logistical and economic burden for the National Health Service (NHS) with diabetes being the most common cause of non-traumatic limb amputation with a cumulative lifetime incidence of 15.6% (Ramsey et al, 1999). Mortality rates are high, exceeding 70% within 5 years of undergoing amputation (Armstrong et al, 2017) and outcomes often worse than some common malignant cancers (Espensen and Armstrong, 2017).

This is having a significant financial impact on the NHS due to outpatient costs, increased bed occupancy and prolonged stays in hospital with total costs estimated at around £1billion in England (Kerr, 2017) and is predicted to double between 2011 and 2036 (Hex et al, 2012).

Improving care while simultaneously ensuring it is cost effective is a tall order, but can be achieved using recognised effective treatment strategies, multidisciplinary working and close collaboration between community and acute services.

The authors propose a non-doctor led model for treating diabetic foot disease in a community setting maintaining a multidisciplinary approach (*Figure 1*).

Service development

In late 2015, Derbyshire Community Health Services NHS Foundation Trust set up a 12-month pilot diabetic interdisciplinary clinic at Whitworth Hospital in Matlock for two sessions per week incorporating a podiatrist and healthcare assistant overseen by a podiatric surgeon with each member having specific roles and responsibilities (*Table 1*). This would aim to simultaneously link in with the acute hospital and other community healthcare professionals and services with the primary aim of assessing, diagnosing and treating diabetic foot complications, namely foot ulceration, infection and Charcot neuroarthropathy.

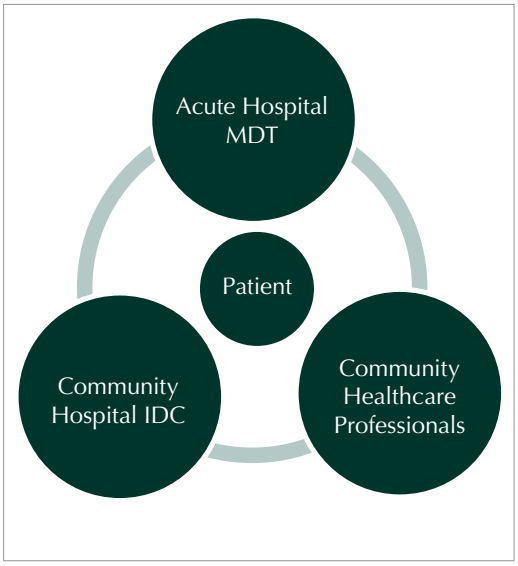

Figure 1. Relationship between multidisciplinary, Interdisciplinary clinic and community professionals.

Secondary aims would be to ensure cardiovascular risk was minimised, bearing in mind the high mortality rate attributed to diabetic foot ulceration (DFU) and its association with cardiovascular disease (Chammas et al, 2016). On this basis, glycaemic control, blood pressure, lipids, weight management and smoking were assessed by

Table 1. Staff roles.

Staff member	Role
Healthcare assistant	• Collecting patients from waiting room • Taking general observations • Blood taking • Dressing changes • Assist podiatrist where required
Podiatrist	• Taking medical and drug history • Ulcer examination, debridement and redressing • Vascular assessment • Neurological assessment • Cast application and removal • Taking swabs and tissue samples • Provision or orthoses • Inputting of audit data
Podiatric surgeon	• Interpretation of National Early Warning Score • X-ray, blood and microbiology interpretation • Prescription of medication • Provide diagnoses and formulate treatment plans • Arranging emergency and prophylactic foot surgery • Liaising with other medical professionals to optimise care • Onward referral where required • Collect, analyse and report audit • Assisting podiatrist where required

taking regular observations and blood work and referring back to the GP with subsequent onward referral for optimisation where necessary.

A clinic had already been set up in Derbyshire enabling inward referral from a range of medical professionals across the high peak area, as well as acute services in Stockport. The new clinic would extend the service further into Derbyshire using the same model.

Using podiatric surgery services already set up in Derbyshire would enable access to theatre facilities for managing foot disease, access to inpatient and outpatient facilities in the community hospital, access to community nursing and use of podiatric independent prescribing rights to meet established antimicrobial guidelines. The podiatric surgery department already had in place an on-call 24-hour service allowing healthcare professionals and patients to access the service in a timely manner and meet NICE guidance (NICE, 2016).

Prior to the commencement of the proposed interdisciplinary clinic (IDC), a meeting was sought and undertaken with the lead diabetologist and vascular surgeon at the local acute hospital who ran a twice-weekly multidisciplinary team (MDT) diabetic foot clinic informing them of the authors' intentions and to seek their endorsement, as well as to create initial vital links to ensure unhindered access to specialist services, including microbiology, vascular surgery, radiology and orthotics. The project was met with approval and provided a potential pathway for the seamless flow of patients between acute and community care.

It was also apparent that as the clinic was initially set up as a 12-month pilot project, it would be paramount to audit each patient so that commissioners and managers could be provided with data to justify its existence and demonstrate how the clinic can deliver a high-quality service at an overall cost saving to the NHS trust. It was decided that PASCOM-10 (Podiatric and Surgical Clinical Outcome Measurement) would be used. This is an anonymised, web-based national auditing system commonly used in podiatric surgery to capture various data, including diagnoses, treatments and outcomes and supported by the College of Podiatry. There is also a high-risk foot domain enabling the authors' service to monitor where referrals were coming from, medical and podiatric diagnoses, type and frequency of imaging and diagnostic investigations, treatments undertaken, healing rates and patient-reported outcome measures.

The first clinic took place in November 2015 and was initially underutilised. The authors relied on inward referral from podiatrists already working within the community hospital who were aware of our existence and required help in managing DFU they were struggling to heal or where a second opinion was required.

Figure 2. Charcot neuroarthropathy complicated by osteomyelitis requiring MDT support.

Throughout January and February 2016, presentations to podiatric colleagues were undertaken at their respective team meetings across Derbyshire to promote the service and offer access to the IDC to assess, diagnose and manage diabetic foot disease. The authors promoted fast unhindered access to podiatric surgery with waiting times between 1–2 weeks or earlier where required to conduct incision and drainage procedures and expertise in the use of packing locally administered antibiotics at the site of infection, as well as less urgent prophylactic surgery, were used to help prevent re-ulceration.

The authors also marketed their expertise in casting, which is a recognised technique in treating neuropathic foot ulceration and should be offered as part of a treatment strategy (NICE, 2016). In addition, we also promoted the clinic to podiatry colleagues as an alternative to using busy GP practices for prescription of antibiotics for timely management using our Independent Prescribing rights and following established local antibiotic guidelines, as well as our cannulation and intravenous (IV) training to assist in IV antibiotic administration. Finally, onsite diagnostic investigations, such as blood taking and imaging including X-ray were other positive benefits the service could provide with onward referral for ultrasound, MRI and CT, which the authors' community hospital could not conduct.

Further contact was also made to diabetology resulting in inward referrals to the IDC in patients that were systemically well. This provided referrals requesting primarily either casting or for surgical solutions both for urgent and prophylactic purposes.

Throughout 2016, referrals increased from acute and community care to the extent where the clinic was saturated to full capacity requiring restructuring of appointment times to accommodate demand. In addition, a step-down clinic was set up to manage those patients whose acute problems were resolving and where ulcerations were improving that would not always need to be seen by the podiatric surgeon but would be available within the building should any complications arise. To further reduce saturated clinics patients were referred back to the community podiatrist once wounds were healed or where foot disease was stabilised.

To help promote best practice weekly intra-disciplinary meetings were held between the podiatric surgeon, consultant podiatric surgeon and the diabetic specialist podiatrists to discuss diagnosis and management of complex cases, including X-ray review and treatment strategy. It was also noted that closer collaboration with the acute hospital MDT clinic would be beneficial to provide stronger ties. Thus, the lead diabetologist was approached who agreed the addition of a biweekly attendance of a podiatric surgeon within the MDT. As a consequence, many patients have so far benefited by means of undergoing fast-tracked referral and treatment to the IDC to expedite healing of ulceration through casting and urgent or prophylactic corrective foot surgery.

The pathway has also been reciprocated in the opposite direction, for example, in a complex case of Charcot neuroarthropathy who went on to develop osteomyelitis (*Figure 2*). An appointment within the acute MDT clinic was sought for a second opinion and an appropriate treatment strategy put in place with the patient proceeding to a successful outcome. Other patients have also benefited where advice has been sought from the diabetologist, which has helped maintain treatment in the community and reduce pressure on acute services. This pathway also provides a route of admission to acute care and important back up for our IDC for those patients who may become systemically ill.

Since the commencement of the clinic, multiple audit reports have been submitted at the request of managers to enable them to quantify the outcome and success of the service especially in terms of

healing rates and avoidable admissions. This anonymised data is reported using PASCOM-10, which processes the data collection and is then analysed to quantify the figures by translating healing rates and avoidable admissions into cost savings.

Discussion

The results show patient activity and outcomes of the authors' diabetic interdisciplinary clinic over a 20-month period involving 164 new patient episodes, 45 of which proceeded to community day case surgery (*Table 2*). Referral into the clinic came from a range of sources (*Table 3*), but predominantly, community podiatrists followed by diabetology within the acute hospital for a range of diagnoses and treatments (*Tables 4* and *5*). GP referrals, however, were poor, but the authors believe this was due to referrals being either direct to acute care or channelled to podiatry teams who have then subsequently referred on to the MDT or IDC where the podiatrist has deemed it appropriate. It is, therefore, recognised that more work needs to be done to inform GPs of the authors' service to enable a more direct pathway and reduce time delays.

The authors' results have demonstrated that 58% of patients with DFU healed, 26% are still ongoing, 10% were referred on for vascular assessment and 6% lost to follow up with mean healing times of 9.04 weeks (*Table 6*), which compare relatively favourably with other studies which have shown healing in 65–77% of ulcers, 11–12% still ongoing, 5–24% proceeding to amputation and 3–6% lost to follow up (Milne et al, 2013). Out of eight patients (6%) classed as lost to follow-up, two died, four requested treatment closer to home with an unknown outcome for the remaining two patients. The National Diabetes Foot Audit 2014–2016 (NHS Digital, 2017) results, meanwhile, demonstrate that 44.8% of patients are ulcer free at 12 weeks, 44.9% have persistent ulceration, 2.3% deceased and 8% were unknown or lost to follow-up involving over 13,000 episodes of ulceration. Milne et al (2013) demonstrated excellent results with 89% healing of 682 DFUs in 261 patients over a 4-year period in their high-risk foot clinic with a median healing time of 49 days, but noted that healing times increased to 59 days that were affected by peripheral arterial disease (PAD) and 83 and 115 days that had concurrent soft tissue infection and osteomyelitis, respectively. They also noted that their MDT sister clinic had nearly double the rate of healing times as a consequence of more complex and long-established ulceration.

Table 2. Audit results (20-month period) — activity data.

New patient episodes	Follow-ups	NP/FU ratio	Episodes proceeding to day case surgery
164	1213	1/7.4	45

Table 3. Audit results (20-month period) — referral source.

Referral source	Count	%
Podiatrist	113	69
Diabetic Consultant	29	18
Diabetes Specialist Nurse / Other nurse	9	5.5
New episode commences from old referral	9	5.5
GP	4	2

Table 4. Audit results (20-month period) — podiatric diagnosis.

Diagnosis (patients may present with more than one diagnosis)	Count
Foot ulcer	128
Cellulitis of toe	12
Cellulitis of lower limb	7
Charcot neuroarthropathy	9
Osteomyelitis	31
Other (incl fracture, hammer toe, preulcerative lesion, gout, in growing nail)	34

Table 5. Audit results (20-month period) — treatment.

Treatment undertaken	Count
Ulcer Debridement — sharp	854
Wound redressed	1003
Slipper casting	48
Total contact casting	336
Cam walker/removable boot	5
Other treatments	539

Table 6. Audit results (20-month period) — diabetic foot ulcer outcome.

Total patients with ulceration	Healed ulcers	Onward referral to vascular	Mean average healing time	Lost to follow up	Ongoing ulcer
128	74 (58%)	13 (10%)	9.04 weeks	8 (6%)	33 (26%)

Table 7. Audit results (20-month period) — avoidable acute admissions.

Number of admissions avoided to acute care	Reasons for avoided admission
86*	**48** episodes of day case surgery in 43 patients
	31 patients were treated for osteomyelitis requiring either IV or oral antibiotics
	7 patients were treated for cellulitis extending from the foot into the leg

**Potential avoidable admissions as some patients may have been managed in community depending on various circumstances.*

Table 8. Audit results (20-month period) — patient reported outcome data.

Friends & Family test*	Outcome
Extremely likely	55
Likely	4
Neither likely or unlikely	0
Unlikely	0
Extremely unlikely	0
Don't know	0

**Likelihood of the patient recommending the service to friends and family.*

Similarly, the authors' patients were complex with 10% requiring referral for vascular assessment due to peripheral arterial disease and 8% and 14% of DFU complicated by soft tissue infection and osteomyelitis, respectively (*Table 4*). In light of the complex recalcitrant ulcerations the authors treated, the percentage of healed ulcers and healing times were believed to be favourable, although it is difficult to make like-for-like comparisons with other studies. These results are a likely consequence of total contact casting, which have been shown to reduce plantar foot pressures (Begg et al, 2016) and early surgical intervention to help resolve infection and correct deformity.

With regard the economic impact, the authors accept there is a cost implication in setting up an IDC using this model where a nurse, podiatrist and podiatric surgeon are required for two sessions each week and the associated material costs, however, the authors have demonstrated the possible prevention of 86 acute hospital admissions (*Table 7*). These account for 48 cases of urgent and prophylactic surgery and 38 patients with osteomyelitis and cellulitis extending beyond the foot that may have required temporary acute admission, although it is acknowledged that some of these cases may have been managed successfully in the community without intervention by the authors.

This reduction of acute admissions subsequently reduces pressure on acute services with freeing up of hospital beds and reduced hospital-acquired complications, such as venous thromboembolism, bed sores, hospital-acquired infections and medication errors (Department of Health, 2010). Other additional economic and logistical benefits include freeing up of acute hospital theatre space and reduction in pressures on imaging and busy casting departments.

A price, however, cannot be attached to the human benefits of healing ulceration and helping to reduce ulceration recurrence through surgical intervention enabling patients to get on with their lives, rather than spend their days attending appointments and lying on hospital wards. Patients were also generally very satisfied with the service and care they received with the Friends & Family Patient Reported Outcome Measure demonstrating that 59 patients were 'extremely likely' or 'likely' to recommend the service and no cases of dissatisfaction (*Table 8*). However, the authors cannot account for the satisfaction levels of patients lost to follow-up.

The authors are also acutely aware that healing DFUs can be short-lived and the very nature of diabetes ensures that recurrence is common. It has been demonstrated that 40% recur at 1 year, 66% at 3 years, 75% at 5 years, and between 80% and 100% within a decade (Armstrong et al, 2017). To help mitigate this high recurrence rate, the authors ensure, where appropriate, that patients are able to step down to total contact insoles and orthotist input following conservative or surgical treatment.

Analysis of data sometimes provides more questions than answers, but also helps the service to grow and become more robust in the future. For example, it would have been useful to know the duration of ulceration at first appointment to help understand the recalcitrant nature of some of these ulcers and to help contextualise the healing times, but this is often difficult to ascertain due to the very

nature of neuropathic foot ulceration. Providing robust data on the effectiveness of such a clinic will also help to determine if it is cost effective. In future, the authors aim to collect data in line with the NDFA to enable comparisons to be made.

The authors also aim to continue to strengthen links with the acute hospital ensuring robust pathways particularly for those patients requiring urgent medical attention. Similarly, enhancing links with community practitioners by rolling out casting training to community podiatrists and using local knowledge including tissue viability, diabetes community nursing and other healthcare staff enhancing the team approach.

Further work is required to pull together and publish the data on the surgical intervention undertaken as a consequence of the service along with clinical and patient reported outcomes, which may help to promote earlier intervention to address deformity and reduce healing times further.

Finally, it is not imperative that the lead clinician responsible for introducing such a service is a podiatric surgeon, but a podiatrist with the appropriate skills and competence who could build the links and pathways for further medical management and surgical intervention where required.

Commissioners and service providers should ensure early access to specialist diabetic foot services due to the growing socioeconomic burden of diabetic foot complications. The authors have provided a model for the assessment, diagnosis, and treatment of diabetic foot complications in a community setting using a non-doctor-led service with relatively favourable outcomes, while maintaining strong links with the acute sector and access to the specialist skills and services when required. Through the use of treatments including casting, appropriate dose and duration of antibiotic therapy and surgical intervention, the authors have improved healing times with reduced acute admissions, ultimately benefiting patients and the NHS alike. ■

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