

Reflections from the Oxfordshire Multi-disciplinary Diabetic Foot Care Service

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Diabetic foot complications often progress rapidly and require multifaceted intervention to prevent limb loss. New integrated ways of working have been established. This article explores the reflections from key team members on this re-configuration.

The challenges

NICE guidance NG19 (“Diabetic Foot Problems: Prevention and Management”, 2015) recommends that there should be a Multi-disciplinary Foot Care Service (MFCS) in place to care for people with a limb or life-threatening diabetic foot problem and for those with diabetic foot problems that cannot be managed by the foot protection service. Each acute NHS hospital is expected to have a referral pathway for those who present with acute diabetic foot problems.

Oxford University Hospitals (OUH) NHS Foundation Trust is a large teaching organisation made up of four hospitals. Similar to many Trusts, split site working makes co-operation difficult, with orthopaedic surgery based at the Nuffield Orthopaedic Centre (NOC), vascular surgery at the John Radcliffe (JR), and diabetes/podiatry at the Churchill Hospital. Infectious diseases/microbiology, radiology and plastic surgery are generally available at all sites.

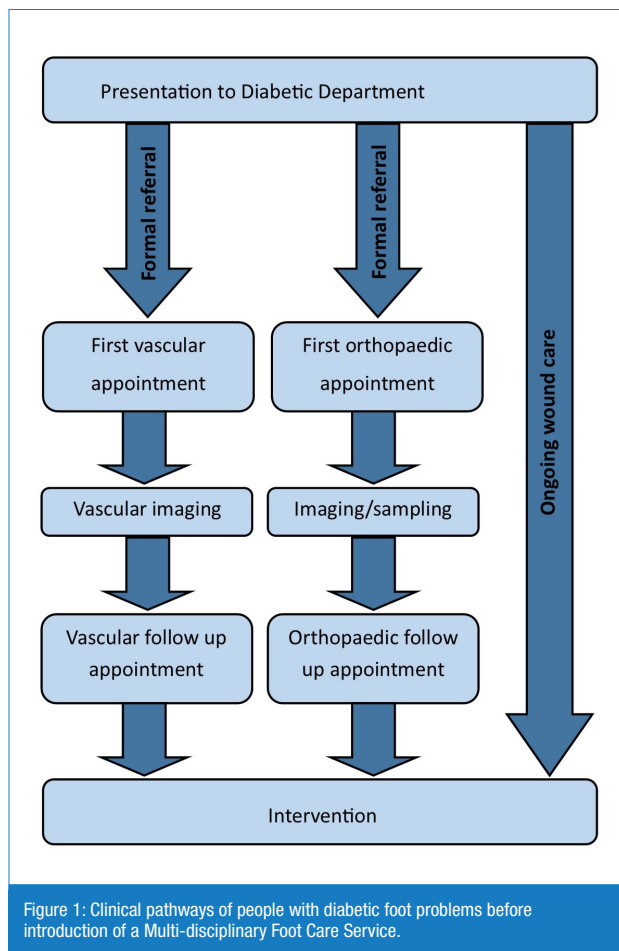


Figure 1: Clinical pathways of people with diabetic foot problems before introduction of a Multi-disciplinary Foot Care Service.



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Figure 2: OUH MFCS Team.

Prior to 2014 patients presented with acute diabetic foot problems to any of the different entry points. There was no formalised pathway and this fragmented care was further disrupted by the split site nature of the Trust (Figure 1).

To address this, an inpatient podiatry service was established to act as a triage point for all patients with an active diabetic foot problem admitted to OUH and to act as a gatekeeper and navigator of patients to the relevant specialities. This was partially successful but did not result in a true multi-disciplinary approach.

The solution

In 2017, NHS England called for bids for Diabetes Transformation Funding to improve access to multi-disciplinary foot care teams. We were granted two-year funding for a Multi-disciplinary Foot Care Service (MFCS) based around a weekly diabetic foot clinic in which patients would be seen by podiatry, diabetes, microbiology/infectious diseases, interventional radiology, vascular and orthopaedic surgery (Figure 2).

The weekly MFCS clinic runs for two hours, 49 times per year, delivering about 700 outpatient contacts per year. In addition, clinicians of all specialities are available every day to review emergency or deteriorating inpatient cases, either face-to-face or virtually (Figure 3). After the third year of the service, the successful financial (Table 1) and clinical (Figure 4) outcomes justified the provision of long-term funding. >>

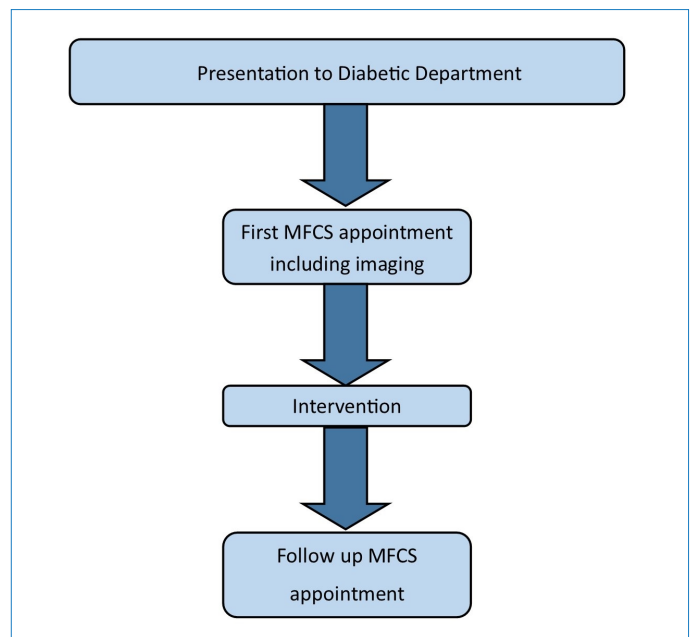


Figure 3: Clinical pathways of people with diabetic foot problems after introduction of a Multi-disciplinary Foot Care Service.

Reflections

After nearly five years of the MFCS, representatives of some of the specialities have reflected upon what they have learnt from involvement in the service to date.

• Orthopaedic Surgeon

Diabetic foot ulcer patients with underlying osteomyelitis are complex and hence their needs are complex too. Access to specialist opinion has been invaluable as well as the education that comes with it. Our close links with our plastic surgery colleagues has improved our understanding of angiosomes of the foot, where and how to make incisions and more importantly how to close those wounds avoiding excess bone resection that could be detrimental to function and future accommodation within shoes.

In addition, our links with our infectious disease colleagues has advanced our knowledge on the role of appropriate and careful biopsies, avoiding contamination and then prescribing guided antibiotic use ('start smart and then focus'). Local antibiotic use has also been a recent addition to our armamentarium for our diabetic foot patients who may have issues with systemic delivery, absorption and compliance. This acquired knowledge from access to our wonderful colleagues has spilled over to our non-diabetic patients benefiting the wider patient cohort.

Our orthopaedic trainees attend the MFCS clinics and they go on to spread this knowledge by osmosis to our ward nursing staff and to GPs with more comprehensive clinic letters.

Technology has also helped our split site model tremendously when opinions from members of the MFCS cannot always be provided by bedside review. The ability to access electronic patient records (EPR) with diagnostic imaging and especially photography of feet and wounds has made virtual reviews a success, which was especially valuable during the COVID pandemic.

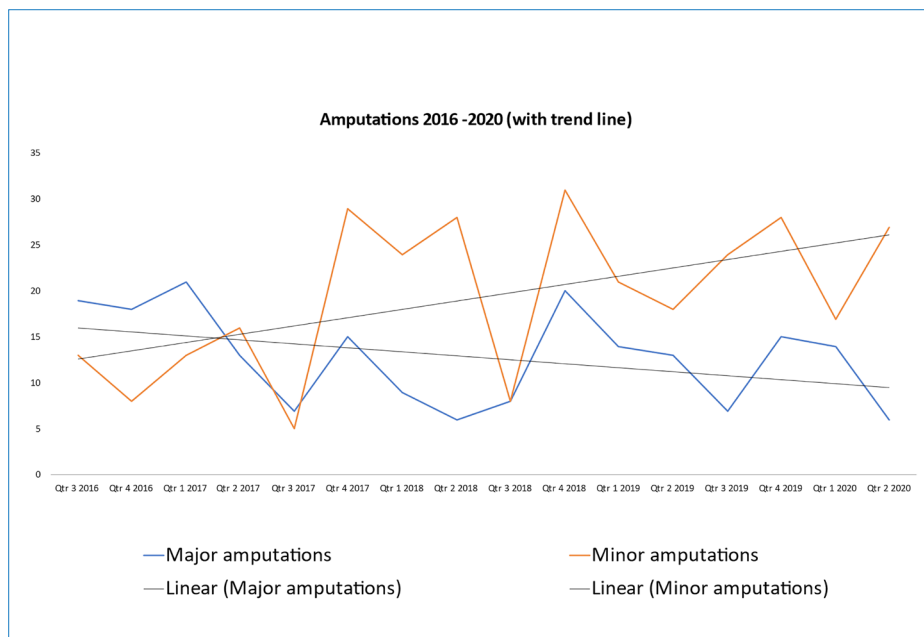


Figure 4: Impact of the introduction of a Multi-disciplinary Foot Care Service on major and minor lower limb amputation rates.

One thing we still need to improve and not solved yet is the management of the potentially acute Charcot foot. When a diabetic patient presents with a swollen, warm, erythematous and sometimes painful foot to community podiatry or hospital podiatry, these services are very good at referring to orthopaedics for assessment within 24 hours as the guidelines suggest. Unfortunately, when these patients present to busy A&E departments, treatment centres or GP practices they are often treated as cellulitis or sprains. Hence the majority of Charcot feet only present for orthopaedic review when they are into the fragmentation phase with joint involvement and deformity. By this stage, the opportunity for early intervention has been missed. There is work to be done in raising awareness of this uncommon condition and educating these services. The consequences of delayed management of Charcot arthropathy are profound with complications of deformity, subsequent ulceration, deep infection and amputation.

• Infectious Diseases

The bed side teaching in MFCS clinic has led the whole team to learn the spectrum of activity of antibiotics, adverse reactions, allergy and monitoring, as well as to embrace the principles of the antibiotic management of diabetic foot infections. They have been empowered to make sensible decisions in settings outside the clinic. This weekly collaboration has led to all members of the team readily and promptly seeking additional microbiological advice for more complex cases.

• Vascular Surgeon

The MFCS provides a platform for managing emergency interventions and is equipped to perform urgent investigations, wound debridement, and initiate immediate antibiotic therapy. The rapid access to vascular, podiatric, and orthopaedic opinions streamlines the patient pathway and facilitates emergency admission under the correct specialist when required. We have found that this approach translates to improved resource usage, a reduction in overall amputation rates, particularly with regard to severity of amputation (Figure 4) and a positive impact on mortality and quality of life for patients with severe diabetic foot disease.

A core strength of this MDT approach has been shared knowledge and synchronised intervention. Tailoring vascular intervention to provide optimal perfusion for the foot and ankle reconstruction and timing the delivery of antimicrobial agents to target

	No of patients admitted due to foot disease	Average length of stay (days)	Total bed days	Cost
July 2016 – June 2017	476	11.5	5457	£2,051,832
July 2018 – June 2019	194	6.4	1250	£470,000
Change	280 fewer admissions	5.1 days shorter stay	4207 fewer bed days	£1,581,832 saved

Table 1: Impact of introduction of a Multi-disciplinary Foot Care Service on hospital inpatient admissions.

soft tissue and bone infection pre- and post- intervention are common logistical discussions in our clinic. This joined-up approach provides the best solution for these high-risk patients.

From a vascular point-of-view, we have many new effective intervention options for patients with ischaemia due to occluded distal vessels. Some of the technical advances that we regularly perform include transpedal retrograde angioplasty, arterial flossing with antero- and retrograde intervention, drug-coated balloon and stenting, distal venous arterialisation, angiosome-directed revascularisation, and distal bypass surgery.

The next step in our service is to standardise the assessment of the severity of diabetic foot disease and degree of ischaemia across our network. This will incorporate the use of objective measures of distal malperfusion, such as toe pressure assessment, and the use of the Wifi (Wound, Ischaemia, foot infection) scoring and GLASS (Global Anatomic Grading System) to help guide intervention approach and prioritisation.

• **Interventional Radiologist (IR)**

The MFCS has resulted in greater engagement from several professional groups and dramatically speeded up the response times in dealing with difficult and complex patients with varied needs. IR assesses the underlying anatomical problems such as blocked or narrowed arteries, and then undertakes endovascular interventions such as angioplasty, stenting and distal venous arterialisations. Having regular contact with the patient also gives the IR the ability to continually monitor how these interventions can improve the patient's outcomes.

• **Lead Podiatrist**

The MFCS gives a platform for learning and advancing clinical skills and knowledge in a natural and supportive environment. Being able to take the first steps in advancing practice whilst your colleagues from other specialities are there for advice and support is immensely valuable to our team of Podiatrists. There is a shared responsibility across the professions. This collegiate approach has broken down traditional professional boundaries. It

allows for learning and clinical development to occur. It provides an opportunity for innovative discussions to happen, and most importantly, it has allowed sometimes challenging cross professional discussions to occur whilst focussing care on the patient.

It has also facilitated a more flexible clinical service. As trust has increased, it has allowed us to move away from a traditional model of follow-up and continuing care. We use the right people, with the right skills at the right time.

Finally, it has highlighted the strengths of what the podiatry profession can bring to the patient group and the wider team. As a small profession the scope of practice and skills of podiatrists is often not fully understood by other professions. In this clinic set-up, each clinician has developed a full appreciation of

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their colleagues' skill set. It has highlighted the continuity that podiatry can bring to the patient pathway. We will see them throughout their entire clinical journey, from presentation and assessment, throughout their inpatient stay and into long-term preventative care. This consistency allows us to be strong advocates for the patient group.

• **Diabetologist**

The funding and development of a MFCS is challenging, particularly as the management of diabetic foot disease crosses multiple speciality boundaries. There were three key lessons:

Data is king: the ongoing funding of the service was dependent on the provision of evidence of both financial and clinical benefit. The ability to collect, analyse and present data in a convincing manner supported the efficient performance (and

improvement) of the service as well as its ongoing commissioning.

Opportunities favour the prepared: recognising an unmet clinical need, we had already built the outline of a business case with the commissioners for a MFCS even before the initial funding call. This allowed a prompt (and successful) funding application to the Diabetes Transformation Fund.

Focus on populations not just the individual: clinical governance of the clinical pathway, even for patients not presenting directly to the MFCS has been important to improve care, although this is still a work in progress.

Conclusions

The establishment of a Multi-disciplinary Diabetic Foot Care Service (MFCS) in response to the NICE guidance has led to improvements in patient care, such as reduced amputation rates and shorter inpatient stays. Financial savings have demonstrated the sustainability of this model of care. More importantly, team working in this collaborative approach has led to education and empowerment which has seeped into other areas of the Foot and Ankle service.

Declaration of Interest

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