What are the core services that a person with an active diabetes foot problem should expect from the multidisciplinary diabetic foot team? A Position Statement from the ZAP Amputation group of FDUK (Foot in Diabetes: UK)

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Key words

- Care
- Diabetes
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- Multidisciplinary team

The aim of the Zero All Preventable (ZAP) Amputation group is to reduce amputations by promoting prompt access to expert treatment. It has previously considered the delays which act as a barrier to people with diabetes accessing a specialist diabetes foot service. The present paper describes how a specialist diabetes foot service should provide expert care in response to the complex and aggressive natural history of tissue damage in the diabetes foot. The paper affirms that the specialist service should be delivered by the Multidisciplinary Diabetic Foot Team (MDFT) and describes the optimum organisation of such an MDFT, accepting that this may be influenced by local factors. Nevertheless, whatever the location, the skills of multiple disciplines are required in the care of the foot in diabetes. The paper describes the role of podiatrists, diabetologists, vascular specialists, orthopaedic, podiatric and plastic surgeons, microbiologists/infectious disease physicians, nurses, clinical/counselling psychologists, mental health liaison nurses, orthotists and plaster technicians as members of the multidisciplinary team. These roles need to be co-ordinated within the MDFT, which should provide oversight, as well as input into the care of people with diabetes and foot problems. Ideally, the MDFT should be standardised and fully commissioned.

Article points

1. Reduce amputations in people with diabetes by promoting prompt access to expert assessment and treatment
2. Specialist intervention should be co-ordinated by the multidisciplinary diabetes foot team
3. Podiatrists are the gatekeepers of foot care for people with diabetes, and this is reflected in their essential and unique role as interventionists and service co-ordinators.

The goal of the Zero All Preventable (ZAP) Amputation group is to reduce amputations by promoting prompt access to expert treatment. It has previously considered the delays that act as a barrier to the person with diabetes (PwD) accessing a specialist diabetes foot service (Morris et al, 2023). It is now important to consider how that specialist diabetes foot service should provide expert care and, particularly, how that care should be organised. The ZAP Amputation group considers that the specialist service should be delivered by the Multidisciplinary Diabetic Foot Team (MDFT) and it is important to consider the required personnel and structure of such an MDFT. It is accepted that geographical location and facilities will influence the organisation, but it is important to establish overall principles and practicalities of care with reference to the standard element of secondary care namely the district general hospital. However, it is also accepted that the contribution to diabetes foot care from primary and community care is also important (Paisey et al, 2018; Rayman et al, 2020). Nevertheless, this paper will concentrate on the organisation of the MDFT as it functions in

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secondary care, providing continuity of foot care in both outpatient and inpatient scenarios.

The foot in diabetes is complex, with an aggressive natural history and no single discipline can treat it alone. The recent publication of the International Working Group on the Diabetic Foot evidence-based guidelines has determined what expert care should comprise (Schaper et al, 2024). This paper concentrates on how that care should be delivered to prevent the deterioration of the foot in diabetes into such a condition that requires amputation. It concentrates on the management of the PwD who has active foot problems within the focus of a specialised service, the aim being to avoid preventable amputations. Co-ordinated multidisciplinary foot care is needed to treat repeated episodes of tissue damage to the lower limb, to which the PwD is subjected. In response to the complex and aggressive natural history of tissue damage in the background of neuropathy, ischaemia and infection, co-ordinated care by the MDFT should be practised to achieve successful management of the individual PwD. Furthermore, the MDFT should be overall accountable for the management of the entire journey of the PwD through these episodes.

It is important to realise that not only the diabetic foot is complex and vulnerable, but the PwD who presents to the MDFT with a foot problem may also be frail and medically unstable. A recent study of 71,000 individuals presenting with a diabetic foot ulcer (DFU) reported a high mortality of 14.4% by 52 weeks (Holman et al 2024). The main risk factors for mortality were related to age, comorbidities and ulcer severity. These factors demand that the management plan for people with a DFU needs to be broader than simply just foot ulcer healing. The MDFT thus has a vital role in making sure that it fulfils the complex care requirements of the PwD (Holman et al 2024). This has implications for the composition and leadership of the MDFT.

Although multidisciplinary teamwork has been accepted as the standard of care, there is evidence that when such teams do not work well, outcomes may not be good. When Mottolini (2022) analysed negligence claims mainly related to major diabetic lower-limb amputations for NHS Resolution, she stated that in specific cases that she examined: "Overall MDFTs were seen to give input not oversight and were not the primary team coordinating the care of the patient. While there were often multiple disciplines involved in the care of the patient, this did not automatically equate to integrated multidisciplinary care."

"MDFTs have different roles/responsibility and deliver different standards of care. There should be consensus as to what an MDFT entails — the involvement of clinicians, the remit of the service — their ability to admit and the overall decision-making capability."

The present document attempts to respond to these statements, which also have important implications for the membership, working patterns and leadership of the MDFT. Clinicians within an MDFT may comprise podiatrists, diabetologists, vascular specialists, orthopaedic, podiatric and plastic surgeons, microbiologists/infectious disease physicians, nurses, clinical/counselling psychologists, mental health liaison nurses, orthotists and plaster technicians. It is important that the contribution of the members of each discipline to the MDFT is agreed and the associated time commitment is agreed in their Job Plans.

Management of the diabetic foot to be provided by the MDFT

The main foot problems presenting to the diabetes foot clinic are tissue breakdown, deformity, infection and ischaemia. The PwD should expect expert assessment and multidisciplinary treatment of these foot in diabetes problems from appropriate members of the MDFT.

1. If an ulcer if present, it should be debrided by suitably qualified professionals, usually a podiatrist, as well as having appropriate offloading and adequate pressure redistribution.
2. If a Charcot foot is suspected — suitable offloading and immobilisation should be offered. If the PwD presents late, with a deformed Charcot foot, reconstruction should be available.
3. If the foot is infected — debridement and antibiotics should be rapidly provided and urgent operative surgical debridement should be available from a suitably experienced surgical member of the MDFT.

4. If the foot is ischaemic, prompt vascular assessment leading to timely revascularisation should be available.

People with diabetes should expect such multidisciplinary treatment in the following scenarios:

- the initial acute stage at the presentation of the diabetes foot problem,
- on admission to hospital with a severe foot problem,
- in the follow-up stage, as the PwD proceeds to complete healing.

The Multidisciplinary Diabetic Foot Team

In each of these scenarios, assessment and treatment cannot be provided by one single speciality caring for the foot in diabetes. Effective functioning of the MDFT requires the contribution of appropriate healthcare professionals from different disciplines working within a defined team structure. These comprise podiatrists, diabetologists, vascular specialists, orthopaedic, podiatric and plastic surgeons, microbiologists/ infectious disease physicians, nurses, clinical/ counselling psychologists, orthotists and plaster technicians as active members of the MDFT.

Recently, two surveys of multidisciplinary foot teams have been carried out (Robinson et al, 2022; Campbell et al, 2023). In a recent survey of orthopaedic foot and ankle surgeons, 117 Trusts admitted acute diabetic feet and 111 (95%) had an MDFT (Robinson et al, 2022). Podiatrists were present in 111 MDFTs. This consisted of non-operative podiatrists in 100 (90%) and podiatrists practising surgery in 11 (10%). A diabetologist was present in 106 Trusts, a vascular surgeon in 64 (58%), and an orthopaedic surgeon in 50 (45%). A diabetes nurse was present in 32 (29%), an orthotist in 28 (25%), a microbiologist in 18 (16%), a plaster technician in 20 (18%) and a tissue viability nurse in 9 (8%). Thus a podiatrist and diabetologist were effectively present in almost all of the MDFTs. In the second survey of 46 units which provided an MDFT, vascular surgeons attended in 63% and orthopaedic surgeons in 26% of the 23 units that met once weekly (Campbell et al, 2023).

In addition to these surveys, the English Diabetes Footcare Network (EDFN) sent a questionnaire relating to multidisciplinary footcare teams (MDFTs) to English Clinical Networks in 2019 and there were responses from 13 networks. There was a consensus from the English Clinical Networks that a benchmark for a standardised MDFT should have a podiatrist and diabetologist (Leigh et al, 2020).

Specific roles and responsibilities

Podiatrist

In the majority of MDFTs, podiatrists act as the gatekeepers of the service and lead the MDFT together with the diabetologist. There was a unanimous response to the EDFN questionnaire that podiatrists were at the centre of patient care, and this reflected their essential and unique role as interventionists, gatekeepers and service co-ordinators. The podiatrist's role must be understood in the context that the MDFT meets once a week in most circumstances. It is ideal if the podiatrist is present in the hospital for the rest of the week when the MDFT does not formally meet and is able to treat the newly presenting and follow-up PwD. The podiatrist provides expert debriding, wound care and offloading services. In addition, the podiatrist should be able to detect the presence of ischaemia and arrange for a vascular assessment, including a Duplex scan and a prompt vascular opinion. Also, podiatrists should have full referring rights for X-rays, CT and MRI. Also, on the days of the week that the MDFT does not meet, the podiatrist can receive the emergency foot PwD and should be confident of urgent assistance, if needed, from the other disciplines of the MDFT. Podiatrists should be able to decide if the PwD needs admission to the hospital.

Podiatrists have responsibilities not only in the initial assessment of the acute foot in diabetes but also if the PwD is admitted to hospital. A role has been established for the specialist podiatrist who cares entirely for inpatients with diabetic foot problems (Boulton et al, 2020; Baynham et al, 2022) but it is accepted that some hospitals do not have inpatient podiatry services. Also, podiatrists have a crucial role in the follow-up of the PwD after their initial assessment and treatment in the out-patients.

All of these roles argue for a full-time consultant podiatrist position in each district general hospital and there should be a formal career progression to

facilitate podiatrists attaining this position. The podiatrist should be recognised as an equal member of the MDFT and given support to develop the service. At present, it may be difficult to create consultant podiatrist positions in every hospital, but it should remain an aspiration. Furthermore, the ZAP Amputation group recommend that a podiatrist at senior level, preferably as a consultant podiatrist, be appointed in each hospital to act as joint clinical lead of the MDFT. In such a role, the podiatrist can provide continuous diabetes foot expertise, both on the days that the MDFT meet and also on the days of the week when the MDFT is not physically present so as to fulfill the timely needs of the PwD.

Prescription of medicines is an important role of podiatrists who in the UK qualify with Prescription Only Medicines (POMs) entitlements, granting them access to a limited number of antibiotics. Foot clinics should have systems in place to enable the use of this. Furthermore, hospital formularies should support podiatrists in prescribing appropriate antibiotics, including complex agents such as linezolid. This process should be standardised across the NHS to ensure consistent and equitable prescribing practices, enabling podiatrists to manage infections effectively within their scope of practice. It is also helpful if the podiatrist is an independent prescriber, and there have been suggestions that podiatrists should take on a more active medical role in the management of the PwD and foot problems, especially the ischaemic PwD, and this may involve prescribing ACE inhibitors and statins to maximise cardiovascular and renal function. However, this may place too much responsibility on podiatrists, especially in looking after the complex and medically unstable PwD. Traditionally, in UK foot clinics, podiatrists have worked closely with diabetologists in the care of the PwD with foot problems, each discipline supporting the other and this should be encouraged and responsibilities shared. However, it must be noted that in some locations, the podiatrist works very closely with the vascular surgeon and in others, with the orthopaedic surgeon depending on local interest, enthusiasm and arrangements.

Also, podiatrists are the prime candidates to perform basic mental health screening. They see the PwD most frequently and would be able to detect changes in a person's attitude/personality/behaviour. It would also be possible, with the assistance of the psychologist and mental health professional, to screen and assess for anxiety, depression, diabetes distress and possible delirium(Capability Framework For Integrated Diabetic Lower Limb Care: A user's guide. 2019). Podiatrists would need to have knowledge of mental health referral pathways and be confident in holding appropriate conversations about wellbeing with the PwD.

Diabetologist

Diabetologists have become increasingly busy in servicing the array of diabetes clinics, and they may have difficulty in finding time to care for individuals with diabetes and foot problems. Nevertheless, foot services are part of the "Super Six" areas of specialist diabetes care (Nicholson et al, 2016) Thus, it is appropriate that the diabetic foot service continues under the umbrella of diabetes. Most multidisciplinary diabetes foot services are commissioned through secondary care diabetes services, funding for the service being paid to diabetes, and governance of the service is through the diabetes managerial system.

Traditionally, diabetologists have been part of the core diabetic foot team. They have expertise in managing impaired metabolic control, diabetic complications, comorbidities (impaired renal function and nutritional status, anaemia, cardiovascular disease), acute and chronic ulcers, infections (soft tissue and bone) and antibiotic therapy. Also, diabetologists can work very closely with vascular surgeons, initially diagnosing peripheral arterial disease and recognising the indications for revascularisation. Furthermore, diabetologists have knowledge of offloading principles and can interact and co-operate with orthopaedic surgeons and other team members (Anichini et al, 2020).

According to a recent survey of 111 Trusts with an MDFT, a diabetologist was present in 106 Trusts (95%) (Robinson et al, 2022). This is appropriate as the MDFT receives vulnerable, complex, medically unstable and often ill PwDs and it is right for diabetologists to share major responsibility for these PwDs together with the podiatrist. Thus, the role of the diabetologist in the MDFT is to assist the podiatrist in the diagnosis and treatment of diabetes foot syndromes,

including neuropathic and ischaemic feet and to achieve good diabetic control and optimum medical care. Also, a key role is to diagnose and manage infection, prescribing antibiotics in conjunction with microbiologist or infection disease specialist and other members of the MDFT. It is noteworthy that Mottolini remarked in NHS Resolution, 2022, that the responsibility for outpatient antibiotic prescription was, in some cases, placed inappropriately upon the General Practitioner.

The diabetologist also has important inpatient responsibilities. It is often discussed as to under which discipline the PwD needing hospital treatment for an infected diabetic foot should be admitted. In general, it is thought that such PwDs are best cared for on diabetic/medical wards, although they should be seen regularly by the surgical members of the MDFT. Thus, non-ischaemic people with diabetes and severe infection are often admitted directly under the diabetologist or initially under the general medical take and then transferred to the care of the diabetologist. In this situation, the combined roles of the diabetologist and the podiatrist looking after inpatients are important but nevertheless, such patients should also be seen by the surgical members of MDFT at least once weekly. Vascular surgery usually admits severely ischaemic feet for urgent investigation and revascularisation, but the PwD and mild or moderately ischaemic feet and moderate infection may be admitted under the diabetologist to receive intravenous antibiotics.

In a recent survey, 117 Trusts admitted acute diabetic feet (Robinson et al, 2022). A total of 90 Trusts (77%) stated that the admission involved medicine/diabetes with 53 (45%) of these admissions being exclusively under medicine/diabetes, and 37 (32%) as joint admissions. Of the joint admissions, 16 (14%) were combined with vascular and 12 (10%) with orthopaedic surgery. Admission was solely under vascular surgery in 12 Trusts (10%) and orthopaedic surgery in 7 (6%). Diabetes foot abscesses were drained by orthopaedic surgeons in 61 Trusts (52%) and vascular surgeons in 47 (40%). Robinson states "the majority are admitted under the sole, or combined care, of a diabetologist. We believe that this is appropriate".

Thus, the two most frequently attending disciplines in the MDFT are the podiatrist and the diabetologist with a few exceptions when the surgical members of the MDFT take the lead. Ideally, a diabetologist with special responsibility for the foot in persons with diabetes should be job planned to work as a member of the MDFT either as a rotating post or preferably as an individual with permanent interest and responsibility for the PwD and foot problems.

Vascular specialists

The term 'vascular specialists' includes vascular surgeons, interventional radiologists, vascular specialist nurses and vascular clinical scientists. It is important that diabetic ischaemic PwD and chronic limb-threatening ischaemia receive prompt assessment and, when indicated, revascularisation (Fitridge et al, 2024). Vascular services are organised into a regional hub and spoke models in the UK, with hubs performing arterial surgery. There have been challenges in balancing the increasing drive for centralisation of vascular services to improve surgical outcomes versus the desire to provide specialist diabetic foot care away from the arterial hub. Vascular surgeons have a very important role in the operative debridement of the infected ischaemic foot and, in some centres, also take responsibility for the debridement of the infected non-ischaemic foot (Campbell et al, 2023). Operations for acute foot sepsis were done by vascular surgeons in 98% of localities and by orthopaedic surgeons in 22% (in some localities by both) (Campbell et al, 2023).

The PwD with an ischaemic foot may initially present to the MDFT or vascular outpatients either at a hub or spoke hospital. The 2021 Provision of Services for People with Vascular Disease states that "a vascular specialist should be present at multidisciplinary foot care clinics across the vascular network", represented by either a vascular surgeon or vascular nurse specialist. The benefit of a physical presence in the multidisciplinary foot care clinic is the mutual education between team members that this allows. To ensure that ischaemia is adequately recognised and treated where vascular surgeons are less present, services must therefore provide:

- adequate education (and equipment) for assessment of perfusion
- clear pathways of escalation for vascular surgery review or further imaging
- direct access to senior vascular surgeons for cases of severe/acute limb ischaemia or sepsis.

Thus, it is vital that podiatrists and diabetologists have

direct access to vascular surgery decision-makers to be able to discuss urgent or complex cases.

Interventional radiologists are important members of the MDFT linking in with other members of the MDFT in Multidisciplinary Angiography Conferences and performing endovascular revascularisation either alone or in hybrid procedures with vascular surgeons(Reekers, 2016). Endovascular revascularisation, including that of the foot arteries should be available in hub and spoke hospitals. Infrapopliteal arterial bypass is carried out by vascular surgeons in the hubs. Ultra distal surgical arterial bypass to the plantar arteries and deep venous arterialisation (DVA) are best carried out in specialist vascular centres.

Time to revascularisation has been shown to be influenced by presentation to an arterial hub or spoke hospital. Generally, longer delays to revascularisation in the PwD first seen in the spoke hospitals have been associated with worse outcomes of increased morbidity and mortality (Li et al 2022). In the Best Practice Clinical Care Pathway for Arterial Disease of the Vascular Society, the Peripheral Arterial Disease Quality Improvement Framework (PAD-QIF) stated that the PwD and chronic limb threatening ischaemia admitted to hospital should be revascularised in 5 days (Boyle et al, 2022). This remains aspirational to most centres. For those seen in outpatients, the Best Practice Clinical Care Pathway indicates that revascularisation should take place within 14 days.

The vascular specialist nurse plays an important role in the co-ordination and organisation of care of inpatients and outpatients with chronic limb threatening disease both in the spoke and hub hospitals, liaising very closely with other members of the MDFT. Also, an important member of the MDFT is the vascular clinical scientist working in the vascular laboratory. Early testing of the ischaemic PwD is important to speed access to appropriate care. The vascular laboratory performs Duplex evaluation of the lower-limb circulation. Observations from the vascular laboratory can help formulate the WIFI (Wound Infection foot Ischaemia) score, which the Global Vascular Guidelines (Conte et al, 2019) adopted as the preferred wound classification system, particularly to support the identification and management of chronic limb-threatening ischaemia. WIFI should be adopted in foot ulcer management, including in the diabetic foot (Fox et al, 2022; Fitridge et al, 2024).

Orthopaedic surgeon (Foot and ankle)

Orthopaedic surgeons have an important role in the care of the foot in diabetes, especially in the surgical management of the infected foot and the correction of Charcot foot and forefoot deformity. Diabetic foot infections can be limb-threatening and are ideally managed by the MDFT although the foot and ankle orthopaedic surgeon is expected to take the lead in the surgical component of its management (Wee 2023). Such infection needs rapid diagnosis, identification of pathogens, targeted intravenous antibiotics and urgent radical surgery which should be provided by surgical members of the MDFT in each district general hospital (Bateman et al, 2015). As well as debriding the infected non-ischaemic foot, orthopaedic surgeons may debride mildly ischaemic infected feet in spoke hospitals Alternatively, podiatric surgeons and plastic surgeons may surgically debride infected diabetic feet, both non-ischaemic and mildly ischaemic feet. Severely ischaemic infected feet needing debridement should preferably be surgically debrided by vascular surgeons in the hub hospitals.

Overall, the orthopaedic surgeon can play an important role in the MDFT. Robinson quotes: "Orthopaedic surgeons are already draining abscesses in 52% of Trusts. which is more than any other speciality. There is a perception that there is a lack of interest from orthopaedic surgeons in the treatment of the diabetic foot. We believe that the figure of 52% reflects the willingness of orthopaedic surgeons to provide acute care for PwD and diabetic foot disease" (Robinson et al, 2022).

Charcot foot reconstruction has been a major advance in the treatment of the deformed diabetic Charcot foot (Kavarthapu et al, 2023). Such procedures are carried out with MDFT support. Internal and external fixation techniques cam be used. The indications for Charcot surgery include deformities which cannot be accommodated in an orthosis, non-healing wounds, recurrent wounds, pain, and gross instability. Regardless of the specific method, surgical treatment generally utilizes realignment arthrodesis incorporating soft tissue releases, osteotomies and partial ostectomies as needed (Wukich et al, 2024).

The perioperative care of the Charcot PwD should be managed by the MDFT due to the co-morbidities associated with the Charcot foot. PwD often have coronary artery disease, poor glycaemic control, diabetic nephropathy and neuropathy (motor, sensory and autonomic). Attendance at a pre-surgery educational class is also of great help in order to establish appropriate expectations. and facilitate postoperative rehabilitation. Charcot reconstruction should be available in hospitals where the orthopaedic surgeon has experience in reconstruction techniques and is supported by an MDFT.

Podiatric surgeon

An important role of podiatric surgeons is to surgically debride acutely infected diabetic feet. They also correct forefoot deformities and carry out arthroplasties or minor amputations in the presence of recurrent infected toe ulcers. Major amputations may also be carried out. In some cases, Charcot midfoot and hindfoot deformities are corrected.

In certain centres, podiatric surgeons work closely with diabetologists and also with vascular surgeons or orthopaedic surgeons in diabetes and vascular multidisciplinary teams (Maher et al, 2019). In a recent survey, 11 Trusts had podiatrists practising surgery contributing to the care of the foot in diabetes, including six Trusts with one, three with two, and two Trusts had more than two podiatrists practising surgery. In seven of these 11 Trusts, the podiatrists practising surgery worked in conjunction with the orthopaedic foot and ankle team. They were independent in the other four Trusts. (Robinson et al, 2022). There should be greater integration of podiatric surgery with diabetes foot services.

Plastic surgeon

Plastic surgeons can play a critical role in salvage of the diabetic limb as robust soft tissue coverage is essential. Full or partial thickness skin grafts, dermal substitutes and microsurgical free tissue transfers are increasingly used to achieve wound healing and preserve as much of the residual limb as possible and avoid major amputations wherever appropriate

A meta-analysis of a systematic review of flap reconstruction for diabetic foot ulcers in 2023 reported a flap success rate of 90.1% and limb loss rate of 88.6% at 12 months (Reed et al, 2024). Other systematic reviews have reported similar outcomes (Fitzgerald O'Connor et al, 2011; Bhat et al, 2023; Tan et al, 2023). There is now evidence to suggest that limb salvage by reconstructive microsurgery is associated with better life expectancy. In a retrospective comparative study, there was a 5-year survival rate of 86.8% compared to 41.4% (Oh et al, 2013). In a propensity score matching study based on national data in Taiwan, limb preservation with free flap reconstruction was associated with significantly better survival at 1 (80% v 67.6%), 3 (49.7% v 35.5%) and 5 years (30.1% v 19.9%) compared to amputation in patients with end stage renal disease (Ou et al, 2022). A qualitative study has also found that free tissue transfer for diabetic disease can be positively life-changing (Goodall et al, 2024).

There is increasing interest from plastic surgeons to be members of the MDFT to carry out soft tissue reconstruction of the diabetic foot and this should be encouraged.

Microbiologist/infectious disease physician

Infection is the greatest destroyer of the diabetic foot leading to major amputations. People with diabetes undergo repeated crises from the rapid onset of foot infection and need a special form of easily accessible care. The critical factor in saving limbs in this context is to give antibiotic treatment early to prevent tissue destruction. One of the greatest challenges for any healthcare professional who has contact with the PwD is to recognise infection early. Such a "first contact professional" will not necessarily be a member of the MDFT but, on recognition of infection, should arrange empirical antibiotic treatment, take cultures, such as an ulcer swab or tissue specimen, and refer to the MDFT.

In a study of 668 patients with diabetic foot ulcer infection treated in a single hospital, there was a 0.6% increased risk of major amputation or death for each day that referral to the medical centre was delayed (Lin et al, 2021). The MDFT should assess the severity of the infection and decide whether topical, oral or intravenous antibiotics are indicated and whether debridement is required. The MDFT should also decide whether outpatient podiatric debridement (also taking a tissue biopsy) or inpatient surgical debridement is necessary.

At this point, the microbiologist usually becomes involved and will be available to give initial advice on the results of cultures and definitive antibiotic

treatment. This should continue throughout the episode of infection either by direct conversation or by taking part directly in the MDFT. The polymicrobial nature of diabetic foot infections needs to be recognised, as both Gram-positive and Gram-negative aerobes, as well as anaerobes, cause these infections. The microbiologist has knowledge of bacteria in the hospital and community and local sensitivities and resistance of antibiotics to these bacteria and is the key to targeting causative organisms. Local diabetic foot antibiotic guidelines should be developed for empirical antibiotic treatment based on local data. The MDFT, in conjunction with the microbiologist, has the responsibility for prescribing antibiotics throughout episodes of infective ulceration whether treated in the inpatient or outpatient settings. This may be carried out by the diabetologist, podiatrist, surgeon or nurse, but expert advice from the microbiologist is important, who can also advise on the duration of antibiotic therapies. It is important that the PwD and an infected ulcer should have close initial follow-up by the MDFT.

If intravenous antibiotic therapy is advised as an outpatient, the microbiologist together with the antimicrobial pharmacist may be able facilitate the intervention of a specialist Outpatient Parenteral Antimicrobial Therapy (OPAT) service.

In the USA, hospital referral regions with high geographic density of infectious disease physicians were associated with a reduced risk of major amputation after controlling for demographics, comorbidities and ulcer severity (Brennan et al, 2017). This relationship between the geographic density of infectious disease physicians and major amputation was not influenced by ulcer severity and was maintained when adjusting for socioeconomic factors and modelling amputation-free survival.

Nurse

The nurse has various important functions in the MDFT including roles as:

- Tissue viability nurse
- Wound care nurse
- Specialist diabetes foot nurse
- Specialist OPAT (Outpatient Parenteral Antimicrobial Therapy) nurse
- Specialist diabetes nurse
- Specialist vascular nurse
- Mental health liaison nurse.

The tissue viability nurse (TVN) advises on expert care for complex wounds particularly for inpatients and also in the community. There may be some overlap in hospitals in the management of lower-limb and foot wounds between the role of the TVN and that of the inpatient podiatrist. However, in some hospitals, there is a mutual sharing of care of the inpatient workload between tissue viability and podiatry, with podiatry caring for wounds at or below the ankle and tissue viability above the ankle.

Some specialist foot nurses take responsibility for lower limb casting, in particular the application of the total contact cast for the treatment of neuropathic ulcers and the Charcot foot (Berrington et al, 2016). Other specialist nurses have a responsibility for assessing PwD on arrival to the clinic, particularly observing vital functions, including blood pressure, to detect any unwell PwD. They also take blood specimens in the clinic, give parenteral antibiotics, mainly emergency doses of intravenous antibiotics and also collaborate with the OPAT team. Other specialist nurses check diabetes control and management of risk factors. The specialist vascular nurse diagnoses and treats vascular PwD in conjunction with the vascular surgeon as part of the MDFT and this role is particularly important in the hub hospitals-see under Vascular Specialists. The role of the mental health liaison nurse is discussed below.

Orthotist

The provision of footwear, effective pressure redistribution, immobilisation, accommodation of anatomical deformities and application of corrective forces is an important function of the MDFT. This is best co-ordinated by the orthotist who works as a member of the MDFT (Pankhurst et al, 2019). Provision of footwear is either supplied by a hospital-employed orthotist who liaises with various commercial firms or by a commercially contracted orthotist. It is important that close links are maintained between the orthotist and manufacturers and that orthoses are supplied by the manufacturer who has an interest and experience in diabetes.

Clinical/counselling psychologist

The role of the clinical/counselling psychologist within the MDFT is to provide assessment and treatment to medically and psychologically complex

PwDs and psychological training, case consultation, patient distress screening and joint working with multidisciplinary teams. The clinical/counselling psychologist can detect psychological issues quickly, particularly when impacting on self-management and/or footcare treatment. The psychologist helps the PwD make informed decisions about their treatment and supports adherence and engagement in treatment. The psychologist also considers psychological factors which might impact the working of teams and the foot care system as a whole.

The importance of psychological support in diabetes per se has recently been highlighted. The Diabetes UK 'Too Often Missing Report' (2019) states that "75% of individuals (with diabetes) who felt they needed access to psychological support were unable to access it" (Flury et al, 2019). One recommendation in this report was to integrate diabetes and mental health pathways and "Recommendations for local implementation by the Diabetes and Mental Health Expert Working Group in England have been published as a Position Statement" (Sachar et al, 2023). The London Commissioning Guidelines recommend access to specialist psychology provision as part of the diabetes pathway (London's diabetes care pathway: Commissioning recommendations for psychological support, 2014). Guidelines stress the importance of recognising and managing psychological need in people with diabetes including adolescents (Gregory et al, 2022) and Type 1 diabetes (Type 1 diabetes in adults: diagnosis and management (NICE, 2022). With reference to the multidisciplinary foot care service, NICE NG19 (NICE, 2019) states that it should have access to psychological services. If no psychologist is embedded within the MDFT, then it needs to be able to access psychological support elsewhere as a minimum.

Mental health liaison nurse

As an alternative or in addition to the clinical/counselling psychologist, the mental health liaison nurse has an increasingly important role in detecting and treating psychological distress and mental illness, which are more common in the PwD than in the general population. Also, there is an important role in teaching the other disciplines of the MDFT to initially detect such mental health problems (Sachar et al 2023).

Plaster technicians and orthopaedic practitioners

In some MDFTs, plaster technicians and orthopaedic practitioners play an important role in the offloading of the diabetic foot by applying below-knee total contact casts.

How should the MDFT function overall?

Although the PwD needs to be cared for by the various members of the MDFT at specific times, overall holistic care needs to be co-ordinated. There needs to be "oversight not just input" (Mottolini, 2022). The podiatrist/diabetologist combination working within the focus of the MDFT is probably best placed to provide this. However, it is important to know that the MDFT has overall responsibility for taking the PwD through an episode of diabetic foot care and is responsible for the eventual outcome of that PwD. In order to discharge this responsibility, it is important that the commitment of all specialist members of the MDFT is officially recognised and this should be reflected in their respective job plans. Thus, all specialists should be commissioned as members of the MDFT, which ideally should be standardised and mandated (Leigh et al, 2020).

It is also important to consider how the MDFT works in relation to community and primary care and whether the MDFT should provide a step-down or a step-up service. Recent data from the National Diabetes Foot Care Audit of England and Wales have indicated that there is a statistically significant link between clinical outcome and the time that elapses from the first presentation of a new ulcer episode to its first assessment by a member of a specialist team (NHS Digital, 2022).

The longer the time that passes before the first expert assessment, the worse the clinical outcome at 12 weeks. A step-up service will mean the PwD will first be seen in community clinics, with the option of referral to the MDFT if there is no response to treatment. This will inevitably involve delays if the PwD goes first to a community clinic and then needs to go on to be assessed by the MDFT afterwards. "Time is Tissue" and the initial assessment and treatment are crucially important. However, NICE Guideline NG19 (NICE, 2019) states that referral of ulcers may be made to the Foot Protection Service, which is usually based in the community, and

it has been suggested that this service may initially undertake the treatment of uncomplicated ulcers.

In contrast to the step-up service, a step-down service involves a hospital-based MDFT receiving all patients promptly and providing expert assessment within 14 days of presentation or sooner according to the urgency of the foot problem. Thus, it may be preferable for the PwD to see the MDFT first to get a thorough examination, including vascular assessment with ideally, toe pressures and a WIfI assessment.

The solution may be that referrals of the PwD with foot problems should go through a central triage point within the MDFT, and a decision should be made as to whether the PwD should be seen first by the MDFT or the Foot Protection Service. Podiatrists in community foot protection teams can play a major role in foot care and be important members of an overall multidisciplinary foot service.

The 2018 NDFA 'Success Factors' Survey asked 10 NHS services, with the highest proportion of patients with severe foot ulcers that were alive and ulcer free at 12 weeks, to pinpoint factors that were responsible for their relative success (NHS Digital, 2019). All 10 services reported direct access to an MDFT and good community podiatry and MDFT integration. At least 80% of services reported fuss-free referrals accepted from any healthcare professional or patient, an option for next working day appointments and prompt access to a vascular service (Morris et al, 2023).

Multidisciplinary diabetes foot clinic

The multidisciplinary diabetes foot clinic should be the local physical focus of care. It should be situated in an identifiable outpatient space, which is accessible to the PwD and reduced mobility. It should be set up so that it can take on the role of a 'command centre' for diabetes foot problems. The specific pattern of clinics conducted by each MDFT will be determined by local situations and availabilities. In a recent survey, MDFT clinics were held on more than one occasion per week in 7 Trusts (6%) and in 78 Trusts (70%) the clinic was weekly, 15 (14%) fortnightly, and in 11 (10%) monthly (Robinson et al, 2022). However, in a separate review, diabetic foot clinics were held mostly once weekly in 50%, twice weekly in 13% and three times weekly in 17%, daily in 9% and twice daily in 2%; and less frequently — monthly or fortnightly — in 2% (Campbell et al, 2023). Thus, in most situations, the MDFT clinics were held once weekly.

Whatever the frequency of MDFT clinics, it is important to make appropriate care arrangements when the MDFT is not available. Ideally, a podiatry-led diabetes foot clinic should see and treat the acute presentations for the rest of the week, and according to the podiatrist's initial assessment, the PwD may be reviewed when the MDFT next meets. However, if further specialist care is needed on the day of the initial visit, the appropriate discipline may be called upon. Alternatively, the PwD may need to be admitted to the hospital.

Ideally, inpatients, including the ischaemic PwD or Charcot PwD who has undergone vascular or Charcot reconstruction respectively with complex postoperative wounds, should be followed up in the MDFT clinic. Also, if an urgent diabetic foot referral is made 'out of hours', then the PwD should be seen in the Accident and Emergency (A&E) Department and, if necessary, be admitted to the hospital. If admission is not indicated, then the PwD should receive initial treatment and then be referred for an urgent MDFT appointment.

Inpatient multidisciplinary diabetes foot care

It is important that the expertise of the MDFT is extended to inpatients as well as outpatients, and the MDFT should supervise the care of the PwD admitted to the hospital with an acute foot problem right from the start of the admission. The role of the inpatient podiatrist is exclusively dedicated to the co-ordination of the care of diabetes inpatients with foot problems in conjunction with the diabetologist providing medical care (Boulton et al, 2020) However, acutely infected diabetic feet may need surgical debridement, and this is the responsibility of the surgical members of the MDFT, with overall care supported by an MDFT ward round. In a recent review, 64 out of the 111 Trusts which had an MDFT, also carried out a ward round (Robinson et al, 2022). Podiatrists and diabetologists attended 100% of these rounds, vascular surgeons were present in 48%, and orthopaedic surgeons were present in 40% (Robinson et al, 2022). Other specialities attending the MDFT ward round were diabetes nurses in 22%, microbiologists in 22%, orthotists in 9% and tissue viability nurses in 5%. Thus, the central foundation of specialist diabetes foot care, the MDFT should undertake a multidisciplinary hospital

ward round as well as provide outpatient treatment (Baynham et al 2022).

Advantages of specialists working together in the MDFT

The individual roles of each specialist are important, and speciality care gives longer event-free survival for patients with diabetic foot ulcers (Liu et al, 2023). However, these roles are enhanced by specialists working together, who communicate effectively, practise shared decision making and are united in a common goal of limb salvage within the MDFT (Musuuza et al, 2020; Sutherland et al, 2022).

Conclusion

This paper has described the role of the various disciplines which provide a core service in the care of the foot in diabetes. These disciplines need to work together within the framework of the MDFT to provide integrated multidisciplinary care. Thus, the central foundation of specialist diabetes foot care is the MDFT, which should undertake foot care in the diabetic foot clinic and also on the hospital wards. The MDFT should be accountable for the co-ordination of specialist treatment and the oversight of care of the PwD with foot problems. Ideally, it should be standardised and fully commissioned. ■

Key points

Effective functioning of the MDFT requires the important contribution of healthcare professionals from different disciplines working within a defined team structure

1. A podiatrist working at a senior level, preferably as a consultant podiatrist, is pivotal to the efficient working of the MDFT. A podiatrist should be appointed in each hospital to act as joint clinical lead of the MDFT in conjunction with the diabetologist.
2. In each hospital, a diabetologist should perform the important role of jointly leading the MDFT, both in the diabetes foot clinic and in the hospital ward, in conjunction with the podiatrist and other disciplines.
3. Vascular specialists are crucial for optimum care of the diabetic ischaemic foot both in the operative surgical debridement of the acutely infected ischaemic foot and also in achieving revascularisation. Endovascular revascularisation, including that of the foot arteries, should be available in the hub and spoke hospitals. Distal surgical bypass should be available in the hub centres. Ultra distal surgical bypass and DVA (Deep Venous Arterialisation) should be available in specialist vascular centres.
4. Orthopaedic surgeons are important members of the MDFT in each hospital in performing acute surgical debridement of the infected non-ischaemic foot. They should also carry out the correction of forefoot deformities and also midfoot and hindfoot Charcot foot deformities.
5. Podiatric surgeons should be more closely linked into the MDFT to perform important roles of surgical debridement of the infected non-ischaemic diabetic foot and correction of forefoot and Charcot midfoot and hindfoot deformities.
6. Plastic surgeons play a critical role, as important members of the MDFT, in the salvage of the diabetic limb, providing robust soft tissue coverage with full or partial-thickness grafts and microsurgical free tissue transfer.
7. The microbiologist/ infection disease physician should provide vital expert diagnostic and treatment advice to support the successful management of diabetes foot infections.
8. Nurses have various important functions within the MDFT, including roles as tissue viability nurse, wound care nurse, specialist diabetes foot nurse, specialist Outpatient Parenteral Antimicrobial Therapy (OPAT) nurse, specialist diabetes nurse, specialist vascular nurse or mental health liaison nurse.
9. Orthotists should be part of the MDFT, providing expertise in the assessment of deformity, pressure redistribution, accommodation of deformity and the provision of orthoses for the foot in diabetes.
10. The clinical/counselling psychologist should be a member of the MDFT to provide assessment and treatment of medically and psychologically complex people with diabetes and also psychological training, case consultation and patient distress screening to multidisciplinary teams.
11. As an alternative or in addition to the Clinical/Counselling Psychologist, the Mental Health Liaison Nurse has an increasingly important role in detecting and treating psychological distress and mental illness as part of the MDFT.
12. Plaster technicians and orthopaedic practitioners play an important role in the offloading of the diabetic foot by applying and managing total contact casts

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