Demystifying infection in the diabetic foot

FDUK

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Glossary

Crepitus: A sensation whereby gas can be felt and sometimes heard on palpation.

Commensal flora: Microorganisms that exist on the body without causing any harm.

Diabetic foot ulcer: An open wound on the foot of a person living with diabetes.

Diabetic foot infection: An infection in the foot of a person living with diabetes.

Hyperglycaemia: A blood glucose level of >7mmol/lit before a meal; >8.5mmol/lit after a meal.

Neuropathy: Damage to the nerves in a part of the body. For example, in diabetes, peripheral neuropathy may occur where nerves in the extremities may be damaged (damage to the nerves in hands, arms and feet).

Peripheral arterial disease: Restricted blood supply in the leg due to the narrowing of arteries. This can occur when fatty deposits accumulate in these arteries.

Pathogenic flora: Microorganisms that cause disease and harm the body.

Wound chronicity: A wound is considered to be chronic if it hasn't started to heal after 4 to 12 weeks, despite treatment. Wounds can become chronic due to diabetes or impairment of blood circulation or immune system.

Major abbreviations

DFI: diabetic foot infection

DFU: diabetic foot ulcer

MDFT: Multidisciplinary diabetic foot team

PwD/PwDs: Person or patient/people living with diabetes

Foreword

There are over 5 million people living with diabetes in the UK (Diabetes UK, 2023), with the global diabetes prevalence rising rapidly. The total number of people living with diabetes increased from 108 million in 1980 to 422 million in 2014 (World Health Organization, 2023). In 2021, approximately 537 million adults (aged 20-79 years) were living with diabetes, a number projected to rise to 783 million in 2045 (Sun et al, 2022). Diabetes can lead to several complications and increases a patient's infection risk by 1.5–4 times, with a higher risk of infection in the extremities (Edmonds et al, 2021; Holt et al, 2024). With diabetes, there is a lifetime risk of up to 34% of developing foot ulcers, at least half of which develop an infection (Edmonds et al, 2021).

In this backdrop, it is no surprise that up to the year 2012, the global rate of lower limb amputations was approximately one every 20 seconds (Edmonds et al, 2021). Healthcare professionals (HCPs) label a diabetic foot infection (DFI) an 'immediate threat' to a person with diabetes (International Working Group on the Diabetic Foot [IWGDF] Practical Guidelines, 2023).

Diabetes pathology increases patient susceptibility to both infections and a faster rate of infection spread, making timely identification and intervention a crucial step. This situation is exacerbated by the fact that symptoms of a newly developed or worsening infection in a PwD are more subtle and less systemic than a person without diabetes (IWGDF Practical Guidelines, 2023). Foot infection is one of the most common complications of diabetes, and represents a huge challenge in clinical practice. While it is well acknowledged that infection is a major issue, clear up-to-date guidance is needed for HCPs in the UK. The focus should be on prevention wherever possible, and identifying risk factors and red flags. A management approach is also needed that combines efficacy with awareness of antimicrobial stewardship. There is a perception among diabetic foot specialists that the majority of current infection-treatment guidelines do not address the subtleties of diabetic infections in people with diabetic foot ulcers (DFUs), which can lead to catastrophic patient outcomes faster than other wound aetiologies.

The objective of this consensus is to provide support to UK HCPs, especially those in primary care and support roles. Improved knowledge will help with prompt identification of DFIs and timely access to appropriate treatment.

The key points of this document will include clear, actionable guidance for best practice and a pathway for use in practice:

- Holistic patient assessment and identifying risk factors
- Red flags and prevention measures in suitable patients
- Early intervention in infection
- Treatment/product selection – encompassing the importance of cleansing, debridement and dressing selection where appropriate
- Pathway for management
- Antimicrobial stewardship.

This report aims to be a clinically useful document that lays out a practical course of action for HCPs at all levels – from unregistered care home workers to experienced diabetic foot practitioners. This consensus can help increase the confidence of frontline HCPs and workers in identifying a DFI, and confidently escalating the case to specialists as soon as possible.

Jacqui Fletcher, Chair

Diabetic foot infection (DFI): definition and risk factors

In people living with diabetes (PwD), there is a lifetime DFU risk of 19–34%, with a 65% ulcer recurrence rate within 5 years. At least 50% of all DFUs develop infection, which can spread quickly and can be devastating in a short period of time (**Figure 1a**; International Working Group on the Diabetic Foot/Infectious Disease Society of America [IWGDF/IDSA], 2023). **Figure 1b** shows some examples of DFUs and depicts the impact of the skin tone on how soon a DFU is diagnosed (for further discussion on the impact of skin tone on the presentation of DFUs, refer to Diabetes Africa, 2024).

DFUs develop as a consequence of a combination of factors; most commonly, peripheral neuropathy (causing a loss of sensation of pain), peripheral arterial disease (PAD), and some form of trauma (Armstrong et al, 2023). PwDs have increased susceptibility to infection and, due to compromised skin integrity, skin breaks can occur which can encourage growth of bacteria, causing an infection (McDermott et al, 2023). PwDs are predisposed to infections for a number of reasons including neuropathy, ischaemia and a compromised immune status (Edmonds et al, 2021; McDermott et al, 2023). Ulceration itself occurs typically due to mechanical forces, ill-fitting shoes (causing pressure and shear) or trauma (e.g. stepping on a sharp object, or damage to the skin when cutting nails). An ulcer may initially manifest as a callous – a response to pressure, which masks the skin damage beneath (Amemiya et al, 2020). The pathophysiology of diabetes affects both metabolic and immune function, increasing the risk for DFIs many-fold. A callous in a diabetic foot increases the risk of a DFU up to 11 times (National Library of Medicine [NLM], 2023a).

A DFI will commonly involve a Gram-positive *Staphylococcal* or *Streptococcal* species. DFI may also involve *Pseudomonas* and other Gram-negative organisms, as well as anaerobic organisms (NLM, 2023a). Chronic wounds, or those previously treated with antimicrobials, are more likely to be polymicrobial. In addition to this polymicrobial environment, long-term DFI treatment becomes even more complicated due to the presence of biofilms in many DFUs (biofilms are an aggregate of bacteria, tolerant to treatment and the host defence, which are invisible to the naked eye; Bjarnsholt et al, 2017). The lack of appropriate blood flow to the peripheries may lead to inadequate reach of antibiotic doses (NLM, 2023a). This increases the time to resolution of infection, the risk of therapeutic failure, and may also lead to development of antimicrobial resistance, including multidrug resistance.

Defining a DFI

The IWGDF/IDSA guideline provides one of the most commonly used definitions of a DFI and is built on five classic signs listed below (IWDFG/IDSA, 2023). It states: *'Diagnose a soft tissue diabetes-related infection clinically, based on the presence of local or systemic signs and symptoms of inflammation'*. The signs of infection are then defined as:
'Infected: At least two of these items are present:

- *Local swelling or induration*
- *Erythema*
- *Local tenderness or pain*
- *Local increased warmth*
- *Purulent discharge*

And, no other cause of an inflammatory response of the skin (e.g. trauma, gout, acute Charcot neuro-arthropathy, fracture, thrombosis, or venous stasis).'

Thus, as per Lipsky et al (2016), the presence of infection is defined by purulence or presence of ≥2 classic findings of inflammation (erythma, warmth, swelling or induration, pain/tenderness). It is important to consider that two or more symptoms may not always be apparent. This can make identification of infection a challenge for many frontline HCPs. The IWGDF/IDSA guideline (2023) highlights this point with: *'In persons with diabetes-related foot complications, signs and symptoms of inflammation may, however, be masked by the presence of peripheral neuropathy, peripheral artery disease (PAD), or immune dysfunction'*.

Infected DFU with necrosis

Infected DFU to heel and ankle area with necrosis

Neuropathic DFU with spreading infection and wet necrosis

Figure 1a: First presentation of severe DFUs in people with diabetes (photographs provided by D. Wilson). *Abbreviations: DFU, diabetic foot ulcer.*

Not always red and swollen

An interdigital ulcer: The redness and swelling on this person with light skin tone is obvious. This allowed the ulcer to be detected.

An interdigital ulcer: Maceration and skin breakage has already happened in this person with dark skin tone (3A). A subtle discolouration can be observed (4B).

An interdigital ulcer: This advanced-staged ulcer may have been signalled earlier by toe discolouration (6B) on the background of dark skin tone (5C).

Figure 1b: The impact of skin colour on the presentation of DFUs and how soon they may be diagnosed. Illustration by Diabetes Africa (Diabetic Footcare in Dark Skin Tone Handbook; Diabetes Africa, 2024); photographs provided by L. Dhoonmoon.

Diabetic foot infection (DFI): definition and risk factors *(Continued)*

Table 1: Risk factors for DFIs (Rogers et al, 2011; Thiruvoipati et al, 2015; Berbudi et al, 2020; Wang et al, 2022; Akkus et al, 2022; Hsu et al, 2024).
Abbreviations: DFI, diabetic foot infection.

- Older patients (aged ≥65 years)
- Male gender
- Inadequate glycaemic control
- Peripheral neuropathy
- Peripheral arterial disease (PAD)
- Chronic hyperglycaemia (regularly high blood sugar levels over months or years; National Health Service [NHS], 2023)
- Callus/other skin breaks
- Bone/foot deformities (e.g. hammer toes, bunions and Charcot arthropathy)
- History of prior foot ulcers/infections/amputation
- Non-healing/chronic foot ulcers

MYTH

Gangrene is primarily associated with ischaemia, not DFI.

TRUTH

Infection can induce gangrene, even in a well-perfused diabetic foot. DFI can shut down the peripheral distal vessels, leading to tissue death. The most visible symptom can be the foot colour: a dusky-purple discolouration typically indicates DFI-induced gangrene.

Ischaemia or PAD may be present in 20-50% of people with diabetes (Kirby, 2023). The signs/symptoms of a DFI in an ischaemic foot are masked and signs of erythema and local increased warmth may be absent.

A DFI can present as cellulitis without an ulcer. The infected area is characterised by warmth, swelling and erythema.

Severe infection can also present as a bluish-purple discolouration resulting from an inadequate supply of oxygen to the soft tissues. This results from increased metabolic demands of infection and a decrease of blood flow to the skin, as a result of a septic vasculitis of the cutaneous circulation and can lead to wet necrosis/gangrene of tissues **[Figure 1a]**. Thus, infection can cause gangrene even in a foot with a good circulation. Furthermore, severe subcutaneous infection by Gram-negative and anaerobic bacteria produces gas, which can be detected by palpation as crepitus. In extreme cases, there is widespread destruction of tissues, with bullae/blister formation indicating a necrotising fasciitis.

Risk factors for DFIs

Due to the high prevalence of infection within DFUs, an understanding of the risk factors can help improve vigilance and prevention. Diabetes is a multi-system disorder, affecting metabolic, immune, vascular and nervous systems. The risk factors for DFI reflect this.

Table 1 summarises DFI risk factors (Rogers et al, 2011; Thiruvoipati et al, 2015; Berbudi et al, 2020; Wang et al, 2022; Akkus et al, 2022; Hsu et al, 2024).

Risk factors increasing the probability of developing infection include:

- The presence of PAD
- Wound chronicity (a wound becomes chronic if healing does not start after 4-12 weeks, despite treatment; NLM, 2022)
- Trauma as the cause of wound
- Diabetes-related immune dysfunction
- Concomitant renal failure
- Chronic persistent hyperglycaemia (IWGDF/IDSA, 2023).

There is a need for HCPs and PwD to be aware of the signs and symptoms of infection, and the need to seek urgent attention. There is also an unmet need for education on the more subtle DFI symptoms, which should alert HCPs to the need for urgent escalation. Confidence in identifying a DFI could be improved with clear, practical guidance.

How to identify a DFI?

Challenges in identifying DFIs in practice

Current wound infection guidelines require a clear presentation of infection symptoms to define an infection. Guidelines have great value in presenting the best available evidence to support the diagnosis and management of DFIs. However, most non-specialist HCPs are unlikely to have the time to study these in detail. The signs and symptoms of infection in a diabetic foot are frequently masked, or dampened down, by the presence of neuropathy, PAD/ischaemia and impaired immune response. This means that signs of infection can be missed, and not acted upon. It is important to look for other signs of infection as well as the classic signs **[Table 2, page 9]**.

If symptoms of infection are not identified in a timely manner by PwD, their carers or HCPs, appropriate care and/or escalation of care may be delayed or not occur at all. This can have devastating consequences, raising the risk of limb loss.

The term 'Friday foot' has been used anecdotally by diabetic foot specialists to describe a scenario where a person with a DFI presents to a HCP late on a Friday afternoon. By Monday morning, spreading infection may have caused irreversible damage to the 'Friday foot', rendering it unsalvageable. All HCPs, whether it be a support worker in a care home, a community or practice nurse, a GP or an Emergency Department HCP, need to consider the suspicion of infection in any presenting DFU. It is vital that DFI is identified and managed aggressively.

Therefore, there is a need to have clear pathways in place to escalate DFIs both in and out of normal 'office' hours.

The expert panel discussed some of the challenges that may affect the accurate diagnosis and timely management of DFIs:

1. Currently, DFI diagnosis is based on what HCPs deem to be the 'classic' signs of infection. If these are absent, there is often an assumption of no infection. Furthermore, most non-specialist HCPs are probably not aware of current guidelines. The current DFI diagnosis methods depend on obvious clinical manifestations. However, 'at least two symptoms' may not be present or, at the start of a DFI, may be subtle and missed. Pain may be absent in a person with neuropathy. Symptoms of pain in someone who does have neuropathy should be seen as a significant 'red flag' requiring urgent escalation. The absence of fever does not mean a lack of infection. Additionally, redness and an increased skin temperature may be absent due to reduced blood flow to the feet. In a PwD, a minor increase in foot temperature or a slightly swollen foot/area of foot may be the only indication that a DFI is occurring. Furthermore, it is harder to identify skin colour changes in people with dark skin tones because the 'redness' may not be obvious (Wounds UK, 2021; Diabetes Africa, 2024). Similarly, localised dark skin tone caused by ischaemia further complicates this situation.
2. UK frontline HCPs are not adequately trained/experienced in identifying these subtle symptoms and differential diagnosis of DFIs.
3. Microbiology samples are not always taken. Wound swabs are often taken without prior debridement and cleansing **[Box 1]**. Tissue samples are not taken frequently.
4. HCPs may lack confidence in identifying and monitoring DFIs, and knowing when/how to refer on. This may result in delayed care and inappropriate antibiotic treatment, allowing the DFI to spread.
5. If the PwD is being overseen by different people (e.g. in a care home or in community nursing), this lack of consistency may make it harder to track worsening symptoms or any overall change. Photographs and shared patient records can improve continuity of care, and prompt HCPs to raise the alarm if the PwD is unwell or 'not themselves', or if the wound appearance changes due to an emerging DFI.
6. Other potential factors may delay the care process when a PwD with a suspected DFI presents to primary care in the NHS. If there is no clearly recognised diabetic foot

How to identify a DFI? *(Continued)*

PRACTICE POINT in DFIs

PwD with foot infection may not present with a raised body temperature. The NEWS 2 score is thus unreliable for use in PwD with infection (NHS, 2024; Royal College of Physicians, 2022).

MYTH

Redness in a diabetic foot will always indicate infection.

TRUTH

Redness, or erythema, does not always indicate infection. Nor does the absence of redness mean there is no infection. Consider the pathophysiology of infection, consider skin tone and think about other differential diagnoses for redness within the foot (e.g. acute gout, fracture, Charcot foot, sunburn, insect bite or ischaemia).

TOP TIPS in DFIs

Be suspicious of every diabetic wound. Consider the possibility of infection in every DFU. Evidence shows that around 50% will be infected.

TOP TIPS in DFIs

Diabetic foot infections can rapidly spread and become limb-threatening (i.e. within 48 hours). If you suspect a DFI, or if a PwD has a DFU and does not appear their usual self, act fast and escalate immediately.

pathway, a PwD may be given a 7-day course of antibiotics via their GP surgery, and only referred on if there is deterioration. The expert panel suggested that the algorithm used by the UK NHS 111 service may not be sensitive enough to identify a potential DFI requiring urgent escalation.

Whose responsibility is it to identify a DFI?

Every HCP involved in the care of someone with a DFU should be aware of the typical and more subtle DFI symptoms, and escalation pathways. It is also important to fill in the gaps in routine NHS pathways, including the 111 NHS assessment algorithm. This can ensure the identification of a PwD who is at risk of infection due to their diabetes. In such a PwD, it is important to rapidly diagnose a low-grade fever or a new onset pain in a neuropathic foot. Equally, it is of paramount importance to educate people with diabetes that they must inform their GP surgery receptionist, or (out of hours) the NHS 111 emergency call handler about their diabetes, a suspicion of an infected foot (DFI) and their urgent need for antibiotics according to local antibiotic guidelines.

It is also important to be aware that some people can present with a significant DFI and no fever. The absence of a raised temperature should not be seen as definitive for no infection. A fever/raised temperature of even 37.5°C in a person with a DFI should be escalated urgently to the specialist multidisciplinary diabetic foot team (MDFT), or, if not available, their local emergency care clinic (e.g. Emergency Department, Same-Day Emergency Care or Urgent Treatment Centre). Admission to hospital should always be considered if the PwD is systemically unwell (see PEDIS 4, **Table 6, page 17**). Therefore, the responsibility to consider a diagnosis of a DFI lies with all HCPs and care workers.

Diagnostic tools for DFIs

A comprehensive history, and physical examination, are the most important tools in diagnosing DFI. Infection should always be diagnosed clinically, and consideration should be given to subtle signs that may be present. See **Table 2**, which summarises the recommendations on what a frontline HCP or care worker should know and do to improve timely DFI identification and management. Clinical suspicion through a comprehensive history and physical exam are the most important tools in the diagnosis of DFI. Consideration can then be given to a complete laboratory evaluation, microbiological assessment, and imaging (Lauri et al, 2020).

The expert panel agreed that several diagnostic and classification tools are useful to support the management of DFUs and complicating DFIs. Furthermore, when presented with a potentially infected diabetic wound, it is important for HCPs to understand the tools specifically developed to classify and manage DFUs and complicating DFIs. These tools help create a consistent, common language for the thorough and timely communication that is essential in a MDFT.

Table 2: Recommendations in identifying, escalating and managing a DFI.
Abbreviations: DFI, diabetic foot infection; DFU, diabetic foot ulcers; GP, General Practitioner; HCP, healthcare professional; MDFT, multidisciplinary diabetic foot team; PAD, peripheral arterial disease.

Be suspicious – think like a detective

Develop confidence in your 'gut feeling' or intuition. It is usually based on experience. Even a small suspicion of infection in a 'borderline' case should prompt action. Seek assistance if unsure.

Remember that, in addition to the standard signs of infection described in DFI guidelines, there may be subtle symptoms of DFIs.
If there is no wound yet:

- Is there a callous, under which there is actually a tissue breakdown?
- Does one foot feel slightly warmer than the other? Or is there a difference in temperature across the foot?
- Does the PwD feel unwell or has their behaviour/demeanour changed? If you have not met the patient before, ask their usual carer.
- Is their blood sugar level higher than usual?

If the person with diabetes has an open wound, remember that approximately half of all DFUs are infected. Therefore, in addition to the symptoms in DFI guidelines, the following may also be signs of infection and should be considered at each patient review or dressing change:

- A dull, 'beefy red' or pale wound base; in people with dark skin tones, this may appear as a hue of their normal skin tone
- Increased heat in the affected foot
- Is the quantity of wound exudate greater than you would expect from a wound of this size?
- Is the wound deteriorating despite adequate offloading and optimal wound management?
- Is there malodour associated with the wound?
- Lymphangitis (red lines tracking away from the wound towards or up the leg)
- New, increased or altered pain
- Periwound oedema
- Bleeding or friable (easily damaged) granulation tissue
- Increased or altered/purulent exudate
- Induration
- Wound breakdown/enlargement
- Erythema (redness) distant from wound edge (indicating possible deep abscess)
- Crepitus, warmth, induration or discolouration spreading into periwound area
- Malaise or other non-specific deterioration in the PwD's general condition. Shivers, shakes, rigors or flu-like symptoms
- Pocketing-granulation tissue does not grow in a uniform manner across the entire wound (pockets can harbour bacteria)
- In people with dark skin tones, a change in skin colour may present differently. It is essential to consider this fact when assessing change in wound colour. Refer to the Wounds UK Best Practice Statement to understand potential bias in wound colour assessment and how to overcome it (Wounds UK, 2021)

To keep track of the information listed above, take pictures of the foot or wound. HCPs should ideally record wound dimensions (surface and depth). These records can then be referred to on the next patient visit. If a PwD has any of these symptoms, the case should be escalated to the specialist MDFT.
Does the PwD have ischaemia or infection or both? Remember that approximately half of all DFUs become infected (Boulton et al, 2018; Goyal et al, 2020). See the Buerger's Test [Table 3, page 12] to assess the PwD for arterial insufficiency.

How to identify a DFI? *(Continued)*

Table 2: Recommendations in identifying, escalating and managing a DFI.
Abbreviations: DFI, diabetic foot infection; DFU, diabetic foot ulcers; GP, General Practitioner; HCP, healthcare professional; MDFT, multidisciplinary diabetic foot team; PAD, peripheral arterial disease. ***(Continued)***

Be suspicious – think like a detective
If the PwD does not appear well, always consider the possibility of infection. A person with diabetes may have compromised immunity and stalled wound recovery. Therefore, it is important to think about the PwD's history and risk factors **[Table 1]** that can delay wound healing and increase the risk of wound infection. If you can see bone in a foot ulcer, this will increase the possibility of osteomyelitis (bone infection) and risk of amputation. Escalate urgently to the MDFT. Is the PwD already taking antibiotics? Are they working? Are the dose and duration appropriate? Are local antimicrobial guidelines for the management of DFIs being followed? Think how this might affect the results of their swab and their DFI. When unsure, seek specialist assistance. Consider the window of delay that the PwD may have faced in reaching you (e.g. same-day GP appointments are harder to get in some UK areas). Consider the weekend-window: how may it have delayed the patient reaching you and how long might it take you to get a patient referral reviewed if the PwD came to you on Friday evening? Ensure that you are aware of appropriate escalation pathways in your area for these and other similar situations.

Box 1. Considerations when taking a swab

A. Things to consider before taking a swab:

a. Swabs should not be routinely taken on all wounds because this can increase burden on microbiology services.
b. Swabs should be taken if there are clinical signs or suspicion of infection.
c. All wounds will contain bacteria. Wound preparation is essential prior to taking a swab, to remove normal flora from the wound surface.
d. Ideally the wound should be debrided and cleansed. At the very least, the wound should be thoroughly cleansed with a sterile saline solution and sterile gauze. Failure to do this could result in the over-prescription of antibiotics.
e. Consider the full clinical picture: if a swab does not provide any cultures or sensitivities, but the wound shows visible signs of infection, the PwD should receive antibiotics as per local guideline. Remember to always 'treat the patient' and not just the lab report.
f. In people with diabetes with a suspected infection, where possible, urgently refer the PwD to a specialist clinic where a deep tissue sample can be taken.

B. How to take a wound swab appropriately?

Before taking a wound swab, clean and debride the wound properly and then take a swab from the wound base. If you are not trained to perform this procedure, escalate to a HCP who can.

C. When not to perform a swab:

If there is no suspicion of infection. If you have no training in wound debridement and/or swabbing techniques, immediately seek help to start antibiotics and refer to specialists.

D. What to do when DFI assessments are equivocal or uninterpretable:

a. For general HCPs: refer to specialist clinic urgently for review.
b. For specialists: *'Assess inflammatory serum biomarkers such as C-reactive protein, erythrocyte sedimentation rate, or procalcitonin in a person with diabetes and a possible infected foot ulcer for whom the clinical examination is diagnostically equivocal or uninterpretable'* (Best Practice Statement from IWDFG/IDSA, 2023).

PRACTICE POINT in DFIs

Wound swabs taken without debridement and/or cleansing are likely to be unreliable. They will pick up surface bacterial flora, which may be commensal and not pathogenic.
Although the NICE guideline recommends that the PwD should be referred in 24 hours and should be seen in 48 hours (NICE NG19, 2019), not immediately starting the antibiotic can lose precious time. Therefore, the PwD should receive antibiotics immediately while the referral/escalation is in progress.

Resource and expertise availability determine the diagnostic and classification tool used by HCPs (McDermtt et al, 2023). Many of these tools do not require extensive training or equipment, and can be used very quickly by a non-specialist primary care HCP. They can provide practical information in the differential diagnosis of DFI versus ischaemia – a condition often mistaken as a DFI and vice versa.

Table 3 provides a summary of the classification tools, which includes their requirement to recognise any complicating infection of diabetic ulcers. For details, please refer to the publications cited for each.

Most HCPs will not have the ability to perform advanced tests, such as those listed in WIfI, to identify and escalate DFI and/or critical ischaemia cases. Simpler, easier actions can be used to identify ongoing ischaemia. These actions include palpation of foot pulses, listening to arterial waveform signals with a handheld Doppler or the use of Buerger's test to assess for ischaemia. There is a need to improve the knowledge and confidence of HCPs at all levels to support differential diagnosis and identification of DFI.

Differential diagnosis of DFIs in routine primary care

Table 4 lists the different foot conditions that may present in routine care settings and it is important for HCPs to consider these when making a differential diagnosis. More than one of these conditions may be present at a given time in a person with diabetes.

How and when to ask for help: the pathway for DFI referrals in primary care

There is a need to involve community HCPs in foot care teams, and this care should not solely be podiatrists' responsibility. There is also an unmet need to recognise community and primary care nurses as part of these teams and support them with training to improve confidence and decision-making. Such training may involve ACT NOW, which is an assessment tool for HCPs and PwD, designed to help recognise early warning signs, including infection that might lead to amputation [Figure 2, page 13; iDEAL, 2018].

The PwD should be seen at least once by a diabetic foot specialist, to confirm the diagnosis and management plan. This can then be shared with all HCPs involved in the

PRACTICE POINT in DFIs

Remember that new pain/sharp pain in a neuropathic diabetic foot is a significant red flag, and may be infection-related. Similarly, a sudden increase in pain intensity in an ischaemic diabetic foot may indicate infection, but could also represent critical limb-threatening ischaemia. Both of these conditions should be escalated urgently.

How to identify a DFI? *(Continued)*

Table 3: Diagnosis and classification tools for DFUs and complicating DFIs, and their applicability in daily practice (Lavery et al, 1996; GPnotebook, 2018; Williams et al, 2022; McDermott et al, 2023; NHS England, 2024).
Abbreviations: DFI, diabetic foot infection; HCP, healthcare professional.

DFI diagnosis/ classification tools	Used for	Details
WIfI (Wound, Ischemia and foot Infection)	Assessing wound, infection and ischaemia	• Helps HCPs see a DFI-affected foot holistically • A comprehensive tool to communicate/escalate assessment results with vascular surgeons/specialists • Predicts risk of amputation • May be too complicated or unrealistic to use in some settings due to the need to check a large number of clinical parameters **Alternative tools for HCPs less confident in using WIfI are listed below.**
PEDIS (Perfusion, Extent/ size, Depth/tissue loss, Infection and Sensation)	Categorising the severity of DFUs, including infection. PEDIS grades (1-4) are also used as a means of classifying infection (IWGDF/ IDSA system).	• More straightforward than WIfI to apply in routine clinical practice • Helps assess change in foot over time, with separate assessment of severe infection and ischaemia
SINBAD (Site, Ischemia, Neuropathy, Bacterial infection, Area and Depth)	Used as a predictive tool for major adverse foot events	• Can be used in clinical settings where limited data are available • Has shown applicability in predicting wound healing times in the diabetic population of the UK • Used as a prognostic tool within the UK National Diabetes Foot care Audit (NDFA)
University of Texas (UoT)	Assesses wound depth and the presence of ischaemia and infection in DF	• Can be easily applied in a clinical setting without the need for diagnostic equipment or risk calculators • Directs the HCP to consider the DF wound holistically and allocate severity for escalation of care • Can predict amputation risk
Buerger's test	To assess arterial sufficiency within the leg	A simple test for lower limb ischaemia, observing colour changes of the foot during elevating and lowering the leg. A positive result suggests arterial occlusion and is indicated by pallor on elevation, best seen on the sole, with a reactionary hyperaemic red flush over the dorsum of the foot on lowering. In a normally perfused leg, there is no such colour change during this manoeuvre.

Having diabetes can put the foot at risk of developing serious foot problems. Presentation of a red, hot, swollen foot (with or without pain) should always be treated as a diabetic foot emergency, and referred on for urgent specialist assessment. Sometimes, it can be difficult for a HCP to differentiate between presenting symptoms (Goyal et al, 2020; Lauri et al, 2020; IWGDF/IDSA, 2023).

PwD's ongoing care. Figure 3 (see page 18) shows an overall, simplified diagnostic and treament pathway. In addition, the IWGDF/IDSA guideline (2023) is an excellent reference point for specialist DFI care and provides a set of universal rules for diagnosis and management of DFIs and osteomyelitis for HCPs who can prescribe or order tests (Figure 4; IWGDF/IDSA, 2023).

Importance of patient engagement in early DFI identification

PwDs should be encouraged to routinely observe their feet and DFU, if present. They should be educated on who, and how, to contact if any change, or deterioration occurs with their foot or health. In particular, flu-like symptoms, vomiting and/or feeling feverish can alert them to an infection (see Figure 4; page 19). Care and services for these patients must also consider additional patient-level complexities and patient psychology. Anecdotal evidence highlights instances where some PwDs felt guilty about the burden of their illness. It made them reluctant to 'take the time of a HCP', or made them feel as if they were 'being a burden on the NHS'. It is important for HCPs to find the right balance between the PwD taking shared responsibility and feeling burdened with self-care. If a problem occurs, this burden can make people feel guilty and ashamed when approaching a HCP.

Instances were also highlighted of PwDs saying, 'I deserve this…' or 'I delayed coming to you because I was feeling guilty that I did not do enough…'. This feeling of unfounded inadequacy in a PwD's mind may be a hindrance in improving their engagement with long-term DFI prevention and treatment plans. Therefore, it is important to counsel the PwD and improve engagement by speaking about the complexities and stigma associated with a long-term condition like diabetes. HCPs should discuss with PwDs that diabetes increases their risk of foot complications including foot infection. These complications may lead to devastating consequences, but early intervention can save limbs. Special support should be provided if PwDs cannot perform routine surveillance of their feet. For example, this inability to do routine monitoring may be due to a disability that stops a PwD from bending to look at their feet, or dementia that can make them forgetful, or poor eyesight associated with diabetic retinopathy.

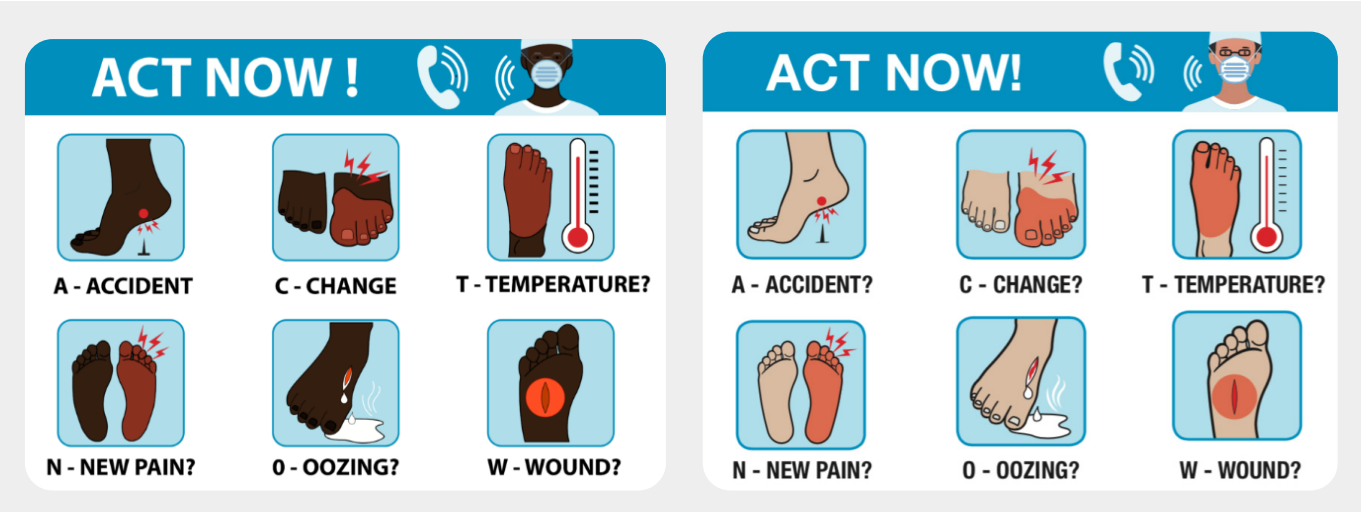

Figure 2: The ACT NOW acronym provides a visual summary of warning signs of amputation including infection. The left panel represents a dark skin tone and the right a light skin tone (iDEAL, 2018).

How to identify a DFI? *(Continued)*

Table 4: Differential diagnosis of DFI from other conditions that can affect a person with diabetes (Gohil et al, 2017; *protein; DFI, diabetic foot infection; HCP, healthcare professional; MRI, magnetic resonance imaging; WCC, white blood cell count.*

Soft tissue infection of foot (a wound with infection) in a person with diabetes	Ischaemia	Cellulitis (acute bacterial infection of the skin)	Osteomyelitis
May include a combination of the following symptoms: • Hot, red/dark, inflamed/swollen foot area(s) • Obvious wound/disrupted skin • Purulent secretions (pus) • Redness, warmth, swelling or induration, and pain or tenderness • Sharp, new pain • Malodour • PwD does not appear well (on its own, this symptom may not necessarily be attributed to a DFI. The PwD might just have a cold or other unrelated illness. Consider this symptom in combination with other DFI symptoms listed in this document) • Fever • Raised CRP or WCC • Flu-like symptoms • Change in behaviour or demeanour • Blood glucose not within normal range • Redness/beefy red colour of skin around the affected area (remember the differences in people with dark skin tones) • Infection-induced gangrene	• In severe ischaemia, the foot may appear pink/red. The pink painful red 'sunset foot' with taut shiny skin is typical of severe ischaemia. The severely ischaemic foot can progress to develop localised areas of necrosis. Toes may become cyanosed/blue and will progress to necrosis/gangrene unless perfusion of the foot is improved • Poor arterial flow to the foot that can be assessed via the Buerger's test: patient's leg may appear colourless upon lifting or the leg colour may appear different even without lifting – it may have a dusky forefoot that completely blanches if the limb is lifted. This indicates critical limb ischaemia and must be urgently referred to a vascular surgeon • Ischaemia may appear as 'shades of duskiness' in people with dark skin tones (Edwin et al, 2021)	• The infected area is characterised by pain, warmth, swelling, and erythema. Blisters and bullae may form. Fever, malaise, nausea and rigors may accompany or precede the skin changes • Cellulitis most commonly affects the lower limbs, but other areas, such as the upper limbs, face, ears, and trunk, can also be affected • May be confused with acute sunburn, Lyme disease and localised allergic reaction (e.g. to a dressing) • May blister	• Harder to diagnose with observation as it can be present without showing local or systemic infection and inflammation signs (especially true for chronic osteomyelitis) • Can co-exist with soft tissue infection • A wound with a width >2cm^2 or a deep ulcer with >3mm depth may be associated with presence of osteomyelitis • A positive 'probe to bone' test can increase likelihood of osteomyelitis, as can the observation of bone/bone fragments within the wound • 'Sausage toe' – red, swollen toe • The presence of hypergranulation tissue may correlate to underlying osteomyelitis • Radiological evidence of osteomyelitis (x-ray, MRI), recognising that early changes may not be picked up on x-ray) • Osteomyelitis can exist without the presence of a wound ('hematogenous' osteomyelitis) – as opposed to 'contiguous' osteomyelitis where the bone becomes infected through a wound

There was a consensus on the following additional points:
- If a HCP sees a suspect change in a diabetic foot, with or without an obvious wound and especially when the PwD has experienced a DFI before, there should be a high clinical suspicion of infection
- Immunosuppressants/chemotherapy increase the susceptibility to infection. Review medication regularly for any immunosuppressant drugs
- If a PwD develops a redness/change in skin hue or cellulitis distant from the wound (e.g. a PwD has an infected toe and then develops a redness in the arch of the foot), it can indicate an underlying abscess and must be investigated urgently
- All PwD with a foot ulcer must be seen at least once by a specialist multidisciplinary diabetic foot clinic
- Consider any other conditions that may affect PwD's memory or ability to provide history (e.g. diabetes-associated cognition function loss, psychiatric disorders or poor mental health)
- A combination of infection and ischaemia can rapidly become limb-threatening and requires urgent escalation.

Goyal et al, 2020; Lauri et al, 2020; Edwin et al, 2021; Wounds UK, 2021; NHS, 2023; NICE, 2024). *Abbreviations: CRP, C-reactive*

Charcot arthropathy	Deep vein thrombosis	Acute gout flare-up	Fractures without Charcot	Sunburn or melanomas
In the initial stages, presents as a 'red, hot and swollen foot'. In the later stages, can present with new foot deformity. Can be 'silent' but some symptoms may be present: • Red, hot, swollen foot with or without pain • New foot deformity/ change in foot shape • May or may not be a history of trauma (ankle sprain or fall or any accident) • X-rays may appear 'normal' in early stages but MRI will show early signs of bone marrow oedema	• Unilateral leg pain • Swelling of foot, ankle or leg • Calf swollen • A Duplex scan will reveal thrombosis in the deep veins of the calf	• Painful (can be excruciating) most commonly seen in big toe (metatarsal/ phalangeal) joint with redness/darker hues (in people with dark skin tone), heat and swelling • Can present with symptoms similar to acute Charcot or cellulitis • May be presence of gouty tophi	Can present as red, hot swollen foot with or without pain Consider: • History of trauma (ankle sprain or fall or any accident) • History of foot overuse (e.g. heavy sports)	Both of these can be confused with cellulitis and/or DFUs • Rule out sunburn • Consider possibility of atypical malignant melanomas. Although rare, they can be easy to confuse with foot ulcers resulting in antibiotic abuse and dangers associated with missing the melanoma treatment. Malignant melanomas may bleed easily, may have raised hypergranulation tissue, and may be pigmented

Immediate steps in DFI management

The HCP who has diagnosed infection should refer to the multidisiplinary diabetic foot clinic.

However, immediate steps by the HCP comprise taking a microbiological specimen from the ulcer (either a swab [Box 1] or, preferably, a deep tissue sample) both after ulcer/wound debridement and prescribing antibiotics straightaway. Metabolic control and offloading should be addressed. Tables 5 and 6 summarise recommendations for immediate steps in DFI management.

Importance of wound debridement before swab

Ideally, all wounds should be debrided and throughly cleansed. Wound debridement is crucial before taking swabs for assessing the type and extent of infection (Mayers et al, 2024). This will give a more accurate picture of any pathogenic organisms cultured from a deep swab or tissue sample. It will also help change the wound environment, and help disrupt any factors that may delay healing (Patry et al, 2017; Schumer et al, 2020; Nakagami et al, 2020; Thomas et al, 2021; Tettelbach et al, 2022). However, recent data indicate that wounds are not debrided frequently enough in approximately 60% of cases (Tettelbach et al, 2022).

If sharp debridement is not possible, thorough wound cleansing (with sterile saline and gauze) can be performed. This will remove any surface bacteria and can disrupt any biofilm. A swab taken after thorough cleansing is better than no swab at all. If available, HCPs should follow the debridement protocols determined locally. Not all local areas in the UK may have written protocols for debridement.

In the UK, most registered nurses are not trained in wound debridement, especially in an infected foot. This is usually undertaken by podiatrists, or specialist nurses who have undergone training in debridement. In the UK, this job would usually be performed by a specialist clinic. Debridement before swabbing will improve the identification of DFI pathogenic organisms. However, if debridement cannot be undertaken, thorough wound cleansing should be undertaken, using sterile gauze and saline. If no debridement is done and a swab is taken from the surface of the wound only, the results will indicate only the microbes from the surface of the wound and will not reflect the picture at the wound depth where the microbes are actively attacking live tissues (Mayers et al, 2024). It is recommended that the swab request includes review for infection by aerobic, anaerobic, and fungal pathogens (NLM, 2023b). HCPs should refer any infected wound (or suspected infection) to the specialist podiatrist or diabetic foot clinic for debridement and in-depth assessment. Advice on how to achieve the best results can be given by the local microbiologist or infection prevention and control team.

There should be no delay in the PwD receiving appropriate antibiotic treatment while waiting for swab results. Waiting for swab results before starting antibiotics can lose critical time and lead to worse outcomes. Start treatment empirically until the swab results are received, following your local diabetic foot antimicrobial guidelines.

In the UK, there is an unmet need to provide education and training to registered HCPs to extend competencies around specialist wound management, including debridement. Multidisciplinary diabetic foot clinics should facilitate shared learning and identify training needs, where appropriate. The benchmarking tool 'Capability Framework For Integrated Diabetic Lower Limb Care: A User's Guide' lists these skills for all HCPs in a MDFT (Diabetes on the net, 2019).

Considerations when prescribing antibiotics for a PwD with newly identified DFI

When choosing appropriate antimicrobial treatment, consider the following:

- Follow local antibiotic prescribing guidelines because they reflect the antimicrobial resistance (AMR) principles in your area

Table 5: Recommendations in escalating and managing a DFI.
Abbreviations: DFI, diabetic foot infection; DFU, diabetic foot ulcers; GP, General Practitioner; HCP, healthcare professional; MDFT, multidisciplinary diabetic foot team; PAD, peripheral arterial disease

If suspicious, act fast
If you have any suspicions that a DFI may be occurring, refer to the MDFT. Microbiology samples should be taken if infection is suspected **[see Box 1]**. This can be actioned by any appropriately trained HCP with access to facilities for taking and processing wound swabs/tissue samples. Where available, a specialist podiatrist, working in the MDFT, may be more experienced in understanding whether the wound is a non-infected diabetic wound or potentially infected and deteriorating. Regarding immediate antibiotic therapy, if you are not a prescriber, reach out to your local prescriber immediately (e.g. GP, 111 helpline or MDFT). If you are a prescriber, using your local guidelines for antimicrobial prescribing, start antibiotics as soon as you suspect a DFI. Remember that antibiotics should be given empirically until microbiology cultures and sensitivities are available. Seek specialist advice if there is any uncertainty. As per local guidelines, start with the appropriate dose recommended for the infection stage (mild, moderate, severe) following your assessment. Severe infections (as per PEDIS classification in Table 6 below) will require urgent hospitalisation. Ensure that the dose is appropriate for the level of infection and the person with diabetes. In some cases, topical antibiotics may be applied to the ulcer.
Review thoroughly and routinely
Once the PwD is receiving antibiotic treatment, review the wound and follow your local guidelines, ensuring to consider holistic factors that can stall or deteriorate diabetic wounds. Your review should involve the infected wound along with results of microbiology sampling, blood tests, glycaemic control, vascular status, offloading effectiveness and patient engagement. Escalate to the the MDFT with this information if you are unsure or suspect deterioration. If the infection is not improving despite antibiotics, escalate to specialist care.

Table 6: PEDIS (IWGDF/IDSA System) infection grading

Clinical manifestations	Infection severity	PEDIS grade
Wound lacking purulence or any manifestations of inflammation	Uninfected	1
Presence of ≥2 manifestations of inflammation (purulence, or erythema, tenderness, warmth, or induration), but any cellulitis/erythema extends ≤2cm around the ulcer, and infection is limited to the skin or superficial subcutaneous tissues; no other local complications or systemic illness	Mild	2
Infection (as above) in a PwD who is systemically well and metabolically stable but who has ≥1 of the following characteristics: cellulitis extending >2cm, lymphangitic streaking, spread beneath the superficial fascia, deep-tissue abscess, gangrene, and involvement of muscle, tendon, joint or bone	Moderate	3
Infection in a PwD with systemic toxicity or metabolic instability (e.g. fever, chills, tachycardia, hypotension, confusion, vomiting, leukocytosis, acidosis, severe hyperglycemia, or azotemia)	Severe	4

Immediate steps in DFI management *(Continued)*

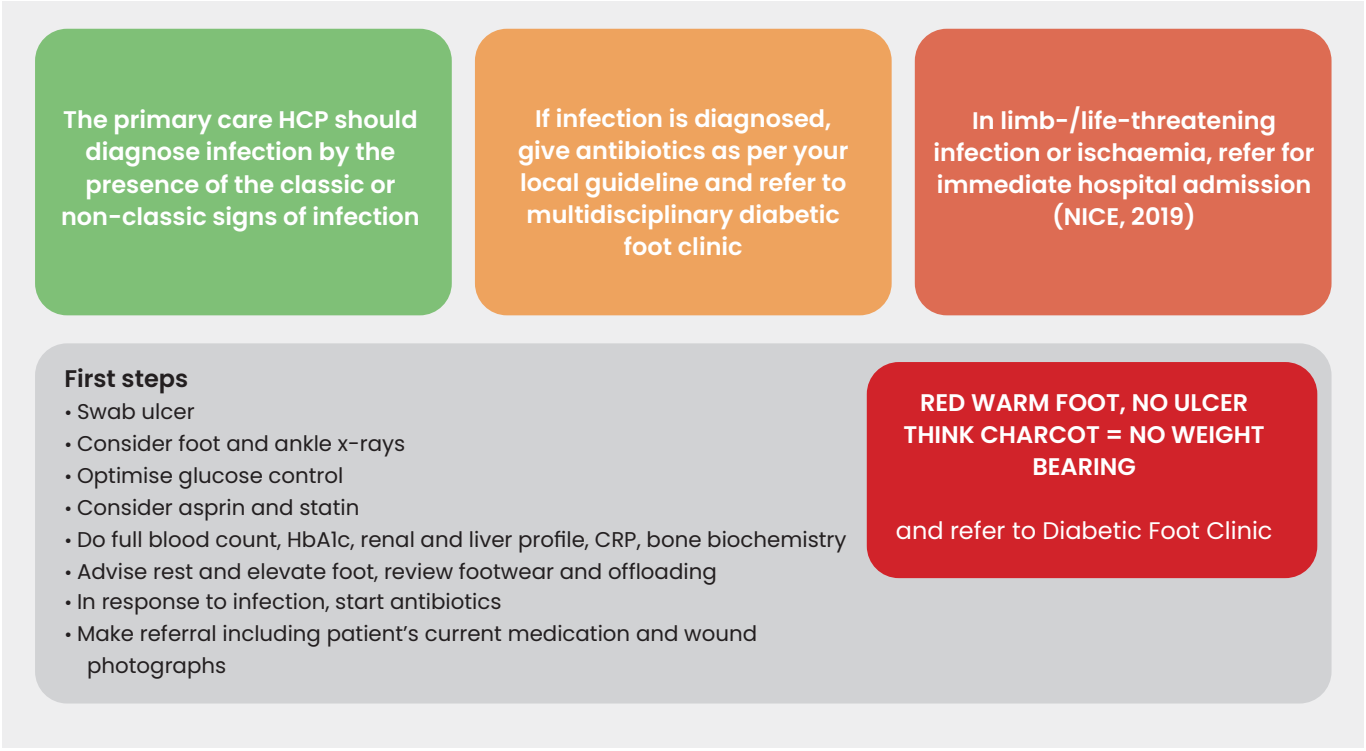

Figure 3: A summary of steps that HCPs at all levels must take when presented with a suspected DFI. Refer to the local multidisciplinary diabetic foot clinic. Local antimicrobial policies should be followed when prescribing antibiotics.
Abbreviations: CRP, C-reactive protein; ED, emergency department; HbA1c, haemoglobin A1c.

- Assess the stage and severity of wound (using the NICE NG19 and the IWDFG/IDSA guidelines) and follow local guidelines in relation to antibiotic dosage
- PEDIS grade as part of the IWGDF/IDSA guideline (2023) can be used to indicate infection severity (Fernández-Torres, 2020; Table 6). Local antimicrobial guidelines should then be followed for appropriate antibiotic choice and dose
- Consider the history and timeline of infection:
  - Is this the first presentation of infection or do antibiotics need changing due to treatment failure?
  - Are there any microbiology results to guide prescribing?
  - Is there any history of previous antimicrobial resistance?
  - Is the PwD on any other medication that may influence the type, dose or duration of antibiotics?
  - Ulcers treated for previous infections are more likely to be polymicrobial
- Once the antibiotic treatment has started, monitor the PwD as per your local guidelines
- Ensure there is a plan for escalating any deterioration, especially out of normal office hours. Issue 'red-flag' advice and emergency contacts.

Identifying SEPSIS: seek medical help urgently if the PwD experiences any of these signs:

S Slurred speech or confusion
E Extreme shivering or muscle pain
P Passing no urine in a day
S Severe breathlessness
I It feels like you're going to die
S Skin mottled or discoloured
(The UK Sepsis Trust, 2024)

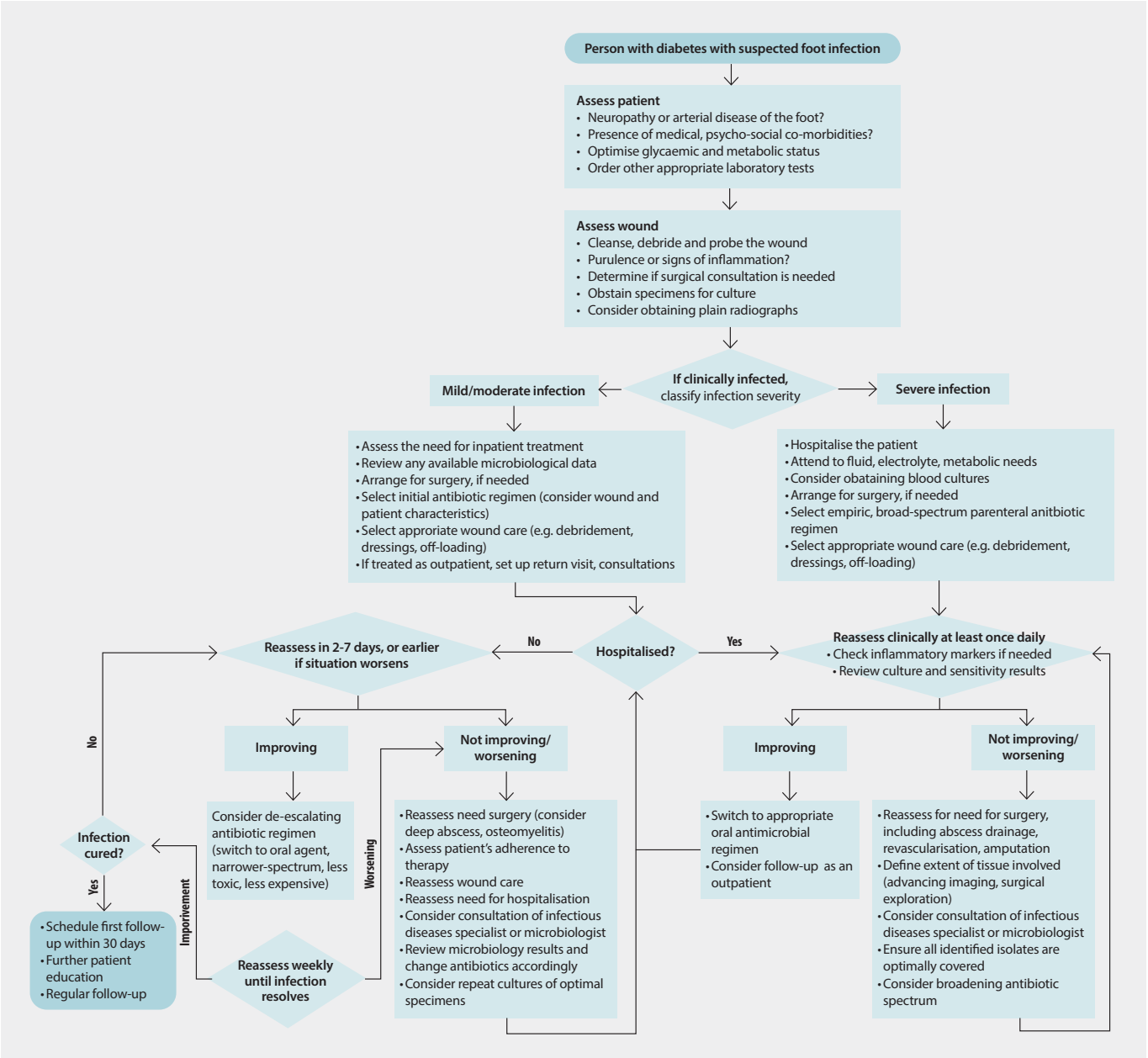

Figure 4: The diagnosis and management pathway in the multidisciplinary diabetic foot clinic (IWGDF/IDSA, 2023).

Having the confidence to review and stop antibiotic treatment

The NICE NG19 guideline provides a good starting point and practical steps to gain confidence in looking at the holistic picture and reviewing the antibiotic treatment decisions appropriately (**Figure 5, page 21**; NICE, 2019).

There is also a need to support prescribers

in improving their confidence in stopping antibiotic treatment for PwD, where appropriate. A case was presented by the expert panel as an example where antibiotics were prescribed continuously for 3 months. This was due to lack of confidence and fear of deterioration. To stop the overuse of antibiotics, it is important to stop the treatment when the infection symptoms have resolved. The PwD should complete any prescribed antibiotic course, and be reviewed clinically on completion of the course. If the infection is not resolved, the treatment should be reviewed and a further course prescribed as per local guidelines. The PwD should be reviewed regularly, and the wound monitored to ensure early intervention if the infection reappears.

Rescue/back-up antibiotics for preventing DFI progression

For people living with diabetes, there is a strong case to provide 'rescue' antibiotics for some selected PwD. This can help to avoid delay in accessing necessary antibiotics as soon as an infection arises. There are situations where a course of 'back-up' antibiotics can save precious time. Some examples of these instances include travel, weekends (when most specialist services may not be available) and presence of risk factors that mean an infection may progress very quickly. Due to the risk of rapidly spreading infection, it is crucial that the PwD is educated on when they should start antibiotics, and to also contact their HCP for an urgent review.

Dressing change as an opportunity to review for DFIs

Due to the fast and devastating impact of a missed DFI, each dressing change of a DFU should act as an opportunity to review the wound. Dressing selection for DFUs is mostly performed by community and primary care-based nurses and support workers, especially if the wound is mistakenly believed to be non-complex. It is essential to remember that PwD with DFUs are all complex. Their wound dressing is rarely uncomplicated, due to the number of factors that should be checked at each dressing change. Primary care HCPs working with PwDs are likely to be looking at wounds on a regular basis, ranging from daily to two-three times per week. It is important that the primary care HCPs and support staff know that an infection in a diabetic foot wound can present in several, less obvious ways. They should be aware of the importance of timely escalation if there are any suspicious symptoms, or if the PwD does not appear their usual self.

If there is a suspicion of infection, the primary care support staff should be encouraged to share wound photographs and a list of symptoms to escalate appropriately. At each dressing change, they act as the 'eyes' and the 'ears' of the specialist team, who may not be able to see the patient in person. In many areas in the UK, once a case has been escalated, the specialist and community care staff can access the same records and see any new plans for reviewing and monitoring. Not all regions have universal shared health records between primary and secondary care. Frontline HCPs should be supported to improve confidence in escalating concerns to the nearest available MDFT.

Dressing selection for DFIs

It is important to remember that the objectives of wound dressing are:

- To produce rapid and cosmetically acceptable healing
- To remove or contain odour
- To reduce pain
- To prevent or combat infection
- To contain exudate
- To cause minimum distress or disturbance to the PwD
- To hide or cover a wound for cosmetic reasons
- A combination of two or more of the above.

Refer to your local Wound Management Formulary for dressing selection.

It is important to consider wound characteristics when choosing the most appropriate dressing (e.g. epithelialising

versus granulating versus sloughy versus necrotic wounds). The choice of dressing may be limited by the availability in local formulary. Therefore, it is important to have a broad overall view of the area to be dressed (e.g. the foot can be a difficult-to-dress area for a non-specialist). A 'do no harm' approach should be taken, based on the dressing guidance from local formularies. There are some basic precautions that must be considered when applying a dressing to a DFI:

- Ensure the dressing is not too bulky so the PwD can use their shoes. PwD may need to be provided with temporary accommodative footwear so that they have the most appropriate dressing for their wound(s)
- Consider the impact of any missing digits or toes. This can affect the placement and securing of products used for dressing
- Do not use occlusive dressings, unless specifically advised by the specialist diabetes foot clinic. They are contra-indicated in the presence of PAD
- To promote self-care and improve PwD engagement, dressings should be easy to apply; selecting an easy-to-use dressing can also mean that unregistered support staff can be more involved in routine wound care
- Avoid over-usage of antimicrobial dressings

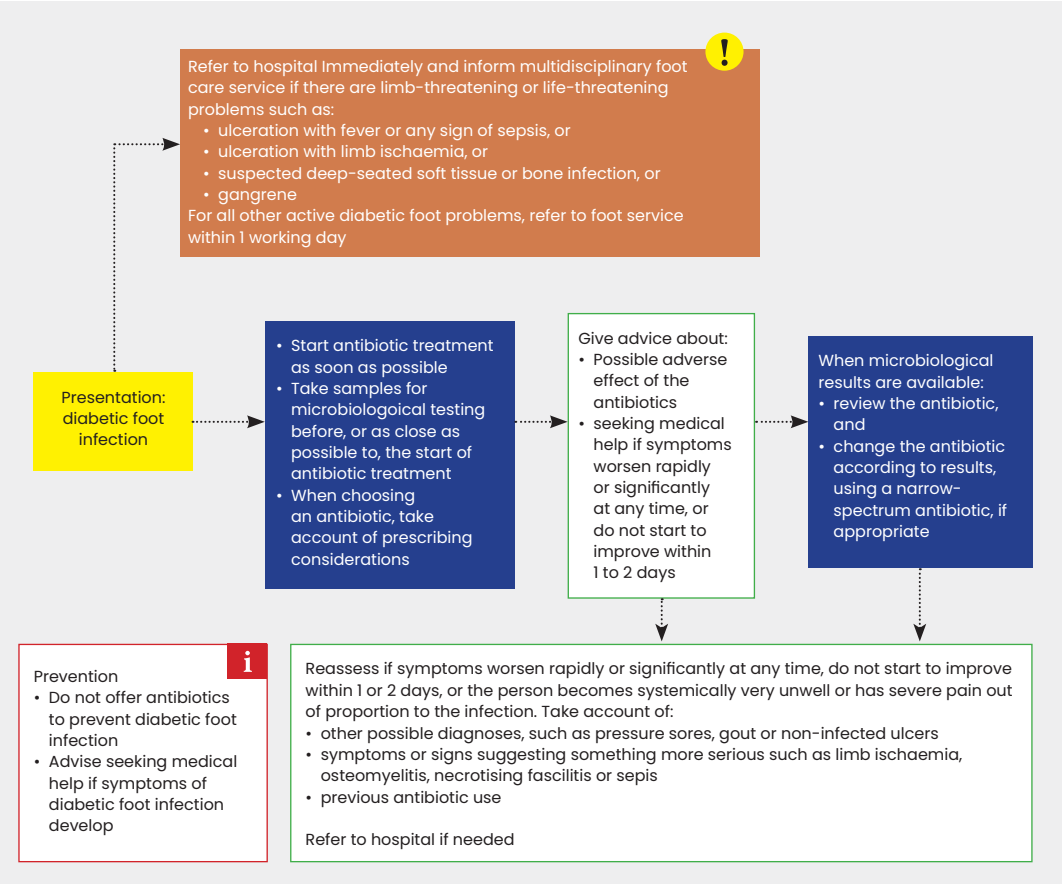

Figure 5: The visual summary of the NICE NG19 guideline that lays down the principles of antimicrobial prescribing in DFIs (NICE, 2019). Scan the QR code below to access the guideline.

Antimicrobial stewardship in DFIs

Antibiotics are an essential tool in reducing limb- and life-threatening infections in the diabetic population. However, bacterial resistance to antibiotics has been increasing and, over the past 20 years, there has been little achieved in stopping this rise (Uçkay et al, 2019). The outcome, if not challenged now, will be disastrous for the general population and worse for those with diabetes. Antibiotic resistance has been attributed to (Leigh, 2017):

- Lack of antibiotic regulation in human use (in some countries, selling antibiotics over the counter)
- Poor infection control practices
- Overprescribing of broad-spectrum antibiotics
- Increase in the number of high-risk patients
- Lack of rapid testing for infective bacterial species
- Inappropriate prescribing
- Use of antibiotics in agriculture
- Global travel
- Poor sanitation.

It is important to achieve the balance between limiting the duration of antibiotics while prescribing for the correct length of time. The aim is to ensure the infection is adequately treated and has resolved. Undertreating infection can also induce antimicrobial resistance. Prophylactic use of antibiotics should be avoided.

DFIs caused by multidrug resistant organisms (MDROs) are on the rise and it is of paramount importance to follow the principles of antibiotic stewardship when prescribing antibiotics for DFIs (Yang et al, 2024).

The 'Start Smart Then Focus' (SSTF) guideline advises to 'assess, investigate, prescribe and document' (UK health Security Agency, 2023). It provides a toolkit for antimicrobial stewardship for secondary care HCPs and leaders involved in inpatient care settings, including acute, community and mental health trusts. The antimicrobial prescribing and stewardship (APS) competency framework from the UK Department of Health & Social Care and the UK Health Security Agency provides guidance on improving antimicrobial prescribing and stewardship (GOV.UK, 2023).

Evidence indicates that >90% of patients considered to have a penicillin allergy are not truly allergic to penicillin and associated β-lactams (Lee, 2020). This results in patients being denied or unnecessarily avoiding potentially first-line, lifesaving treatments. Inappropriate penicillin allergy labels may negatively impact antimicrobial stewardship by leading to use of potentially less effective and broader-spectrum antimicrobials, increasing the risk of AMR and impacting patient care.

MYTH

If a PwD's blood sugar is under control, they are unlikely to get a DFI.

TRUTH

DFIs can occur in any DFU. Therefore, even if a PwD's blood sugar level is well-controlled, their metabolic, immune and nervous systems may still not function optimally to prevent DFIs from occurring.

PRACTICE POINT in DFIs

HCPs managing a DFI must remember to communicate the characteristics of an infected foot to the relevant specialist as accurately as possible to avoid any confusion. Where possible, use standard language from a diagnostic tool (as listed in **Table 3**) and highlight the tool you are referring to.

PRACTICE POINT in DFIs

Always consider the likelihood of a DFI and its complications. Approximately half of DFUs become infected. The mortality rate in people with diabetic foot problems is >30% in 5 years. The rate of minor and major amputations is 46% and 56%, respectively, with DFIs being a major contributor to amputations.

Gaining access to multidisciplinary DFI management and seeking help with confidence

Because DFIs are associated with a multi-system invovlement in the body, it is crucial to manage them within the MDFT (McDermott et al, 2024; Hsu et al, 2024). There is a need for HCPs at all levels, specialists or otherwise, to be confident in speaking with their senior or specialist colleagues. Development of clinicians to improve this confidence should be actively supported. For example, if a HCP finds signs of DFI and/or critical ischaemia (assessed by a positive Buerger's sign) in their patient, they should have the confidence to escalate this to a multidisciplinary diabetic foot clinic or the nearest vascular clinic. Comprehensive record-keeping, with photographs, should ensure continuity of care among different clinicians. The SBAR (Situation, Background, Asssessment, Recommendation) tool is an effective communication tool to help HCPs escalate a DFI (NHS, 2010).

The role of unregistered support workers

Care homes rely largely on non-registered staff for the provision of care. Unregistered staff should always be supervised by their registered colleagues, and work only to a defined care plan. They should receive training to identify when they need to escalate. Due to workload and logistics issues, HCPs working in district nursing and community settings may not have the confidence and consistency in monitoring at-risk patients daily.

Regardless of the clinical setting, if there is any suspicion of infection, it must be escalated to specialist care immediately, even if it is via a telephone conversation and/or photographs if no local special facilities are available. Remote advice and decision-making has been effective in making appropriate use of resources and clinician time, particularly during the coronavirus disease-19 pandemic. Unregistered support workers can take several actions in identifying a DFI. They can take and store photographs, which can be very helpful for comparing and assessing whether a wound is deteriorating; when taking photographs, it can also be helpful to record the unaffected limb for the sake of comparison.

DFI monitoring by registered HCPs

People with a DFI may be treated as outpatients. However, there is a need for consistent monitoring and review between the MDFT members and the PwD as per NICE and IWGDF/IDSA algorithms (NICE, 2019; IWGDF/IDSA, 2023).

For PwDs admitted to hospital, DFI review should consider the severity of infection and any concerns should be escalated appropriately. Review by the specialist MDFT clinic can help monitor and reduce the risk of further complications, by proactive and timely application of evidence-based actions. As DFIs may progress rapidly, it is crucial that all MDFT members have full access to patient data and all MDFT members take responsibility for clear and concise team communications (NLM, 2023b).

Although antibiotics are the fundamental treatment of DFI, some severe infections may lead to tissue damage, abcess formation, and necrosis, which need operative debridement and drainage. The members of the MDFT have to make an important decision as to whether to proceed to operative drainage (Edmonds and Sumpio, 2019).

Summary

With the rapid global rise of diabetes and its complications, DFIs pose a significant healthcare challenge for PwD, HCPs and healthcare systems. DFIs lead to amputation, increased morbidity and mortality and significantly impaired quality of life. The earlier a DFI is diagnosed and managed, the better the outcomes may be for the person living with diabetes. Unmet needs exist in the UK in improving DFI diagnosis and management processes. The expert panel has identified several of these needs and provided practical solutions.

DFIs often accompany a complex clinical picture. This can make the differential DFI diagnosis a confusing process. Because 'time is tissue', early diagnosis is important to save PwDs from amputations and other surgery-related complications. There is also a need to improve awareness for care staff at all levels to identify DFIs in people with dark skin tones. The practical tips provided in this consensus document can help improve the rate of early DFI diagnosis in the UK.

When escalating the case of a person with a DFI, it is crucial for all HCPs and support staff to communicate and document information with clarity and use phrases that provide bite-sized, actionable information for all MDFT members. The SBAR tool can help HCPs escalate a DFI (NHS, 2010). Once a DFI diagnosis has been confirmed, the challenges of antibiotic stewardship pose another hurdle for all HCPs. This is a significant issue because, once infected, DFUs tend to have an increased tendency for re-infection, increasing risks for both limb and life of the person living with diabetes.

At all levels of care in the UK, there is a need to increase the confidence and awareness among registered HCPs and unregistered care staff about the process through which to escalate the case of a PwD with a suspected or deteriorating DFI. There is also a need to improve patient education and promote self-care for DFI prevention. This consensus document lays down the foundation to address these unmet needs and can act as the go-to manual for resources on major DFI-related issues encountered in primary and secondary care in the UK.

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