National Wound Care Strategy Programme

Lower Limb Wounds

Foot Ulcer Recommendations August 2023

Working in partnership with

The AHSN Network

NHS

Table of Contents

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Glossary:

ABPI: Ankle brachial pressure index (ABPI) is a non-invasive method of assessing peripheral arterial perfusion in the lower limb by measuring the ratio of systolic blood pressure at the ankle against that in the arm using a manual “Doppler” ultrasound device.

Acute Limb Ischaemia: Rapid decrease in blood flow to the lower limb due to acute occlusion. Symptoms occur suddenly and include acute pain, pallor, pulseless, perishingly cold paraesthesia / acute sensory change, paralysis/ acute motor dysfunction.

ANTT: Aseptic non-touch technique. This is the practice of avoiding contamination by not touching key elements of the wound or the dressing, e.g., the inside surface of a sterile dressing where it will be in contact with a wound.

At risk foot: Describes a foot at risk of ulceration and amputation, due to compromised tissue viability.

Charcot foot: A progressive, degenerative condition affecting the joints of the foot or ankle. It is characteristically marked by bone fragmentation, swelling, erythema, pain and joint deformity and typically occurs following loss of nerve sensation associated with various systematic diseases (such as diabetes, syphilis, and spina bifida).

Chronic Kidney Disease: is defined as a reduction in kidney function or structural damage (or both) present for more than 3 months, with associated health implications[1].

Chronic Limb Threatening Ischaemia (CLTI): is a clinical syndrome defined by the presence of peripheral arterial disease (PAD) in **combination** with rest pain, gangrene, or a lower limb ulceration greater than 2 weeks in duration[2].

Chronic oedema: Is defined as swelling that lasts more than 3 months[3].

Diabetic Foot Ulcer: Foot ulcer in an individual with diabetes mellitus.

Erythema: Inflammation of the skin, often referred to as ‘redness’ although it may present differently in a range of skin tones.

Foot Ulcer: A break in the skin of the foot that occurs below the ankle.

Healed: Is defined as complete epithelialisation.

High Risk Foot: A foot in which more than one risk factor presents e.g., a combination of loss of sensation, signs of peripheral arterial disease, significant callus, significant structural deformity.

Load: A generic term that covers all forces, including pressure and shear, applied to the skin and subcutaneous tissues. Also known as mechanical load.

Load Redistribution: The principle whereby local, focussed plantar pressure, friction or shear forces are decreased by increasing the weightbearing surface area over which the load is distributed.

Neuropathy: Damage to one or more nerves that typically results in numbness (sensory neuropathy), tingling, muscle weakness (motor neuropathy) and pain in the affected area. Autonomic neuropathy (damage to nerves that are part of the autonomic nervous system) can lead to symptoms such as dizziness, night sweats and constipation. Within the foot, it commonly causes dysfunction within the sweat glands of the foot, causing dry skin, which can cause cracking, fissures and render calluses thicker and harder. Peripheral neuropathy (damage to peripheral nerves) increases the risk of ulceration through loss of protective sensation and the development of foot deformities, particularly clawing of the toes.

Peripheral Arterial Disease (PAD): is a common condition where a build-up of fatty deposits in the arteries restricts blood supply to the limbs.

Osteomyelitis: An infection of the bone. Symptoms may include pain in a specific bone with overlying redness, or change in colour in dark skin tones, fever, and weakness. Osteomyelitis is diagnosed by imaging and can be resolved with early use of antibiotics, but surgical intervention can also be required. People are at increased risk of osteomyelitis if bone is exposed, or if they have an ulcer that is located over a bony prominence.

Offloading: The relief of mechanical stress (pressure) from a specific region of the foot.

Offloading device: Any custom-made or prefabricated device designed with the intention of relieving mechanical stress (pressure) from a specific region of the foot (e.g., total contact cast (TCC), (non-removable walker, knee-high walker, ankle-high walker, ankle foot orthoses, healing sandal, cast shoe, forefoot offloading shoe, etc.). Note that this excludes footwear.

Offloading intervention: Any intervention undertaken with the intention of relieving mechanical stress (pressure) from a specific region of the foot (includes surgical offloading techniques, fitting of offloading devices, footwear, and other offloading techniques).

Pressure: Results from the application of a force perpendicular (i.e., at right angles) to the surface of the skin. The pressure compresses the tissues and can distort or deform the skin, subcutaneous tissues and muscles.

Shear: Causes layers of body tissues to move relative to each other and may occur superficially (e.g., as a result of a force applied parallel to the surface of the skin) or more deeply (e.g., as the result of deformation of skin and muscle when pressure is applied over a bony prominence). Significantly, this results in cellular deformation.

SINBAD: is a standardised system to document the severity of a diabetic foot ulcer (Site, Ischaemia, Neuropathy, Bacterial Infection, Area, and Depth).

Therapeutic footwear: Generic term for footwear designed to have a therapeutic effect that cannot be provided by or in a conventional shoe. Custom-made shoes or sandals, custom-made insoles, extra-depth shoes and custom-made or prefabricated medical grade footwear are examples of therapeutic footwear.

Toe Pressure (TP): provides a functional measure for small arteries in periphery of the lower limb. TP is used when screening for peripheral arterial disease (PAD) of the lower limb, particularly in the presence of lower limb medial arterial calcification common in those with diabetes. A toe pressure of ≥60mmHg indicates adequate perfusion to heal a foot ulcer if other factors are optimised.

WIfI: A classification system derived from an acronym of three elements Wound, Ischaemia, Foot Infection. This system has been developed to classify wounds for people with or without diabetes. WIfI outlines the three areas that need to be addressed and helps predict the amputation risk in particular for people who have CLTI of any severity.

Introduction

The National Wound Care Strategy Programme (NWCSP) has been commissioned by NHS England to improve the care of pressure ulcers, lower limb wounds and surgical wounds. This document focuses on foot ulcers, which are a common manifestation of wounds affecting the lower limb.

In England, there is considerable variation in foot ulcer management and outcomes, thereby increasing care costs[4] and extending healing times. Foot ulcers are precursors of lower limb amputations both in people with and without diabetes. While the quality of foot ulceration care has steadily improved for people with foot ulceration and diabetes, care for those without diabetes lags behind[5]. People with diabetes who develop foot ulceration can access expert multidisciplinary treatment far more easily than those without diabetes.

Those with foot ulceration, whether associated with diabetes or not, are at high risk of lower limb amputation and associated with higher mortality rate[5].

Foot ulceration is usually caused by combination of factors including peripheral arterial disease, peripheral neuropathy, and infection and rapid assessment, diagnosis and treatment is crucial for all those who develop it.

This is particularly important for individuals who do not have diabetes, since they account for all major amputations[5], however, they have not had the same historic rapid access to foot services.

The establishment of diabetic foot clinics has done much to address the needs of those with diabetic foot ulceration, but such clinics have not been historically designed or resourced to meet the needs of people with foot ulcers without diabetes. The NWCSP recognises that whilst some healthcare services have adopted a more generic ‘high risk foot’ approach to address this inequality, more needs to be done to ensure that all people with foot ulcers can access appropriate, timely care.

There is a strong argument that equitable commissioning of accessible services for all foot ulceration would reduce unwarranted variation of care, increase the implementation of evidence-based care, and discourage the over-use of therapies for which there is insufficient evidence. It is envisaged that these changes would result in higher healing rates and lower recurrence rates and therefore offer a cost-effective option.

Prevention of injuries (which may be the start of lower limb ulceration) is outside the remit of the NWCSP, but early appropriate care can prevent foot wounds becoming foot ulcers.

The process for developing and updating these recommendations

The original recommendations were developed using an evidence-informed approach including the consideration of research evidence, healthcare resources, clinical settings, and patients’ preferences[6]. The original recommendations were based on evidence retrieved using a systematic search strategy (outlined in Appendix 1) which was subsequently sense-checked with academics, health practitioners and patients and carers, before a wider consultation with those registered with the NWCSP stakeholder forums. This update has followed the same process but following feedback from stakeholders, it has been decided to publish the foot ulcer recommendations and leg ulcer recommendations as separate documents. Together, these form the suite of lower limb wound recommendations.

The purpose of these recommendations

The purpose of these recommendations is to provide clear advice to health and care professionals, service managers and commissioners about the fundamentals of evidence-informed care for people with foot ulcers, regardless of their underlying pathologies. Implementing these recommendations will achieve better patient outcomes and more effective use of healthcare resources.

The recommendations outline a pathway of care that promotes early assessment and diagnosis, enabling fast access to evidence-informed therapeutic interventions, with rapid escalation of treatment or service provision for people requiring more complex care.

The recommendations thus offer a framework for the development of local delivery plans that include consideration of:

- Relevant research evidence (where it exists) to inform care.
- Configuration of services and deployment of workforce.
- Appropriate education for that workforce.
- Relevant metrics to measure quality improvement.

These recommendations also signpost clinicians, managers and commissioners to relevant clinical guidelines or outline evidence-informed care that will improve healing and optimise the use of healthcare resources. They do not replace existing evidence-informed clinical guidelines or replace clinical judgement and decision making in relation to the needs of the individual patient. They are intended for use in all clinical care settings and aim to support the implementation of evidence-based clinical practice.

Recommendations

1. Identification and immediate and necessary care

1. **Immediately escalate to the relevant clinical specialist, those with the following 'red flag' symptoms/ conditions:**

- Acute infection *(Mild, moderate, or severe)*[7].
- Deep or tracking foot ulcers where abscess or osteomyelitis is suspected[7].
- Symptoms of sepsis[8].
- Acute or suspected chronic limb threatening ischaemia[9,10,11,12], *(e.g., PAD **in combination** with rest pain, gangrene, or a lower limb ulceration> 2 weeks in duration).*
- Suspected acute deep vein thrombosis (DVT).
- Suspected skin cancer.
- Unexplained inflamed foot (possible acute Charcot foot).

2. Arrange for referral for assessment and treatment as follows:

- ***Diabetic foot ulcer – for a person being admitted to hospital or the detection of diabetes related foot problems if the person is already in hospital.***
  Refer within 24 hours of the initial examination of the person's feet to multidisciplinary foot service[7].

- ***Diabetic Foot ulcer: all other settings***
  Refer within 1 working day of the initial examination of the person's feet to the multidisciplinary foot care service or foot protection service[7].

- ***Foot ulcer – non diabetes related: all settings***
  Refer within 1 working day of the initial examination of the person's feet to the multidisciplinary foot care service, or foot protection service[11].

If a wound is due to thermal injury or trauma, consider referral to the appropriate service e.g., burns and plastics, trauma, orthopaedic service.

If there is also leg ulceration, refer to the NWCSP Leg Ulcer Recommendations[13].

For people with complex comorbidities and/or receiving end of life palliative care, seek input from their other clinicians responsible for their care to agree an appropriate care plan.

3. Treat any foot wound infection in line with NICE Guideline (NG19) Diabetic Foot Ulcer Infection[7] or in line with locally developed guidance for managing foot ulcer infection[12].

4. Cleanse the wound bed, skin around the ulcer, consider debridement and apply emollient to intact skin as required.

5. Record image(s) of the wound using digital imaging[14] and include in any onward referral.

6. Apply a simple, low adherent dressing with sufficient absorbency.

7. Implement offloading or pressure redistribution strategies to the affected area [7].

8. Signpost to relevant, high-quality information in a relevant format (e.g., braille, different languages) and identify, discuss, and incorporate opportunities for supported self-management into the treatment plan in line with each individual's capacity, capability and wishes.

B. Assessment, Diagnosis and Treatment

Assessment and diagnosis:

1. Undertake an assessment within the following timeframes,

    - Diabetic foot ulcer – in hospital within 24 hours of referral[7].
    - Diabetic foot ulcer – all other settings within 2 working days of referral[7].
    - Foot ulcer – non-diabetes related within 7 working days of referral[11].

2. Assess and identify causes and risk factors for non-healing by undertaking and documenting a comprehensive assessment of both lower limbs that includes:

    - Full history, including any previous history of foot ulceration and underlying cause.
    - Review of medication.
    - Review of footwear.
    - Pain and analgesia needs.
    - Psychosocial needs.
    - Possible infection.
    - Nutrition.
    - Screening for diabetes.
    - Record image(s) of wound using digital imaging[14].
    - Assess the ulcer in line with the wound minimum data set[15].
    - Undertake a lower limb assessment that includes:
        - Peripheral vascular assessment[7] (Including ABPI and/or toe pressures using manual APBI measurement devices[16]).
        - Assessment for sensation[7].
        - Skin or lymphoedematous changes.
        - Biomechanical review and assessment of musculoskeletal function[7].
        - A classification system such as SINBAD (for DFU) or WIfI to include in referral to vascular services. Calculating the WIfI score is an indicator of the risk of amputation and benefit of revascularisation (See Appendix 2).

3. Diagnose and identify the causes of non-healing and formulate a treatment plan to address those causes.

Treatment:

4. Optimise the management of contributing disease (e.g., diabetes[17, 18], chronic kidney disease[1], PAD[9]).

5. Offer analgesia to alleviate pain if required.

6. Use aseptic non-touch technique (ANTT) to cleanse the wound bed and intact skin around the ulcer.

7. If appropriate, debride the wound.
   Sharp debridement should only be undertaken by healthcare professionals with the relevant training and skills.

8. Apply a low adherent dressing with sufficient absorbency.

9. Offer advice on skin care, footwear, exercise and mobility, rest, limb elevation (to include both limbs) nutrition, smoking cessation, and weight loss.

10. Identify, discuss, and incorporate opportunities for supported self-management into treatment plan in line with the individual's and their carers' capacity, capability and wishes.

11. Provide the individual and their relevant healthcare providers responsible for supporting ongoing care with verbal and written information about:

    - The diagnosis of the ulcer.
    - When to seek advice and specific information (including names and phone numbers) about who to contact from the previous clinical care provider.
    - If image(s) of the ulcer have been captured, these should be shared with the individual (if they wish) and the healthcare provider responsible for ongoing care using NHS compliant digital technology.
    - Signs of infection.
    - Hygiene (including hand hygiene).
    - Advice on dressing changes and taking image(s) of their own ulcer to monitor healing.

For non-diabetes related foot ulcers

Care should remain under a multidisciplinary foot care service, foot protection service or in line with locally developed services.

12. If there is evidence of peripheral arterial disease, refer to vascular services for possible vascular intervention in line with NICE Clinical Guideline (CG147) Peripheral arterial disease[9]: diagnosis and management using the NWCSP PAD/CLTI referral form[19] or equivalent in line with locally agreed processes.

13. If there is evidence of venous disease, consider referral to vascular services for diagnosis of venous disease (e.g., clinical assessment with duplex venous scan) and, if indicated, vascular intervention using the NWCSP Venous Disease Assessment and Referral Form template[19] or equivalent or equivalent in line with locally agreed processes.

14. If there is foot ulceration and concurrent lymphoedema then care should be given from a clinician with capabilities to manage lymphoedema and include:

- Advice on exercise to increase lymphatic uptake, which may include walking or chair-based exercises.
- Elevation of limb where exudate is significant.
- Compression but with consideration to
    - Protecting the forefoot and toes from increased oedema,
    - Compression starting from the smallest circumference (e.g., the toes) and if needed extending above the knee.
    - Advice on nutrition and weight loss where appropriate with referral to bariatric services if indicated[20].

15. If appropriate, treat any foot wound infection in line with NICE Guideline (NG19) Diabetic Foot Problems[7] or in line with locally developed guidance for managing foot ulcer infection. Where appropriate:
    - Send a soft tissue or bone sample from the base of the debrided wound for microbiological examination[7].
    - If this cannot be obtained, take a deep swab because it may provide useful information on the choice of antibiotic treatment[7].
    - Consider an X-ray if you suspect osteomyelitis (probe to bone), or to determine the extent of the foot problem[7].

16. Implement offloading and pressure redistributing strategies to affected area, which includes advising rest and elevation[4]. In line with the NICE Clinical Guideline for Pressure Ulcers (CG179)[20], use pressure-redistributing devices and strategies to minimise the risk of pressure ulcers developing.

    When choosing the most appropriate offloading and pressure redistributing device, consider the clinical assessment of the wound and the person's preference appropriate to the clinical circumstances.

For diabetes related foot ulcers

Care should remain under a multidisciplinary foot care service or foot protection service.

17. Refer to the NICE Guideline (NG 19) Diabetic foot problems: prevention and management[7], which outlines recommended treatment for diabetic foot ulcers.

For foot ulceration of other and uncertain aetiology

18. Refer to appropriate service for an opinion depending on symptoms and local arrangements e.g., dermatology/rheumatology/vascular/endocrinology.

C. Ongoing care of foot ulceration

At each dressing change:

1. **Immediately escalate to the relevant clinical specialist, those with the following 'red flag' symptoms/ conditions:**

    - Acute infection *(Mild, moderate, or severe)*.
    - Deep or tracking foot ulcers where abscess or osteomyelitis is suspected.
    - Symptoms of sepsis.
    - Acute or suspected chronic limb threatening ischaemia, *(e.g., PAD **in combination** with rest pain, gangrene, or a lower limb ulceration> 2 weeks in duration).*
    - Suspected acute deep vein thrombosis (DVT).
    - Suspected skin cancer.
    - Unexplained inflamed foot (possible acute Charcot foot).

2. Treat any person with a foot wound infection in line with NICE Guideline (NG19) Diabetic Foot Ulcer Problems[7] or in line with locally developed guidance for managing foot ulcer infection.

3. Offer analgesia to alleviate pain if required.

4. Use ANTT to cleanse the wound bed and skin around the ulcer.

5. If appropriate, debride the wound bed and remove any devitalised tissue.

6. Apply a simple low-adherent dressing with sufficient absorbency and apply emollients to intact skin as required.

7. If being treated with offloading or pressure redistributing device, review reduction in ulcer size and consider whether this should be adapted.

8. Review care and identify, discuss, and incorporate opportunities for supported self-management into treatment plan in line with the individual's and their carers' capacity, capability and wishes.

9. Review effectiveness of treatment plan and if there is deterioration, escalate in line with local pathways.

D. Review of healing

At 4 weekly intervals (or more frequently if concerned):

1. Monitor for healing by:

    - Completing ulcer assessment in line with the wound minimum data set.
    - Taking digital wound image(s) and comparing with previous images.
    - Measure the wound for reduction in size.

2. Review effectiveness of treatment plan and consider if the underlying pathologies have been identified or optimised.

    Foot ulcers that show no significant progress towards healing or are deteriorating should be escalated for advice in line with local care pathways e.g., multidisciplinary foot service, advanced podiatrist, vascular service, podiatric surgery, orthopaedic service.

3. Review opportunities for supported self-management and discuss and incorporate into treatment plans as agreed with the individual. This may include remote monitoring techniques.

At 12 weeks:

4. Monitor for healing by:

    - Complete a comprehensive reassessment including toe pressures, if appropriate.
    - Taking digital wound image(s) and comparing with previous images.
    - Measure the wound for reduction in size.

5. Review effectiveness of treatment plan.

    Foot ulcers that remain unhealed should be escalated for advice and possible surgical consultation in line with local care pathways e.g., multidisciplinary foot service, advanced podiatrist, vascular service, podiatric surgery, orthopaedic service.

    For those where there is no progress to healing and other or further treatment is not possible, seek to agree an appropriate care plan which may include palliation of symptoms as an acceptable outcome.

E. Care following healing

For all types of foot ulcers, offer care as follows:

1. Advice should be given on how to reduce the risk of re-ulceration. This should be tailored to the individual but should consider, skin care, footwear, hosiery, healthy eating, and exercise, (and if appropriate, smoking cessation).

2. Verbal and written information about the diagnosis and ongoing treatment plan should be provided and discussed along with details of where to contact if there are any issues.

3. Opportunities for supported self-management should be identified, discussed, and incorporated into treatment plans as agreed with the individual.

4. If a pressure redistributing/offloading device or therapeutic footwear has been issued, an appropriate timeframe should be agreed to review and replace with advice to seek earlier review if any issues noted.

5. Advise that changes in lower limb symptoms should prompt the individual to seek earlier review which should include a comprehensive lower limb assessment that includes:

    - Peripheral vascular assessment (including ABPI and/or TP using manual ABPI measurement devices).
    - Assessment for sensation.
    - Biomechanical and assessment of musculoskeletal function.

For healed non-diabetes related foot ulcers

6. Review of individuals who are at high risk of recurrence should be made on a case-by-case, risk-assessed basis. If regular routine reviews are judged necessary, these should be carried out at least every two months.

7. If there is concurrent chronic oedema and a healed foot ulcer, on-going management should be provided by a lymphoedema service or in line with local pathways.

8. If there are no risk factors present, then no further care is required but advise to seek immediate clinical advice if there is recurrence of symptoms or ulceration.

For healed diabetes related foot ulcers

9. Every individual who has diabetes and had a foot ulcer is considered high risk. This requires lifelong ulcer prevention strategies with an appropriately trained team of healthcare professionals that addresses all ulcer prevention cornerstones as part of integrated care[24]. Regular reviews should be offered every 1 to 2 months if there are no immediate concerns in line with NICE Guideline (NG 19) Diabetic Foot Problems: Prevention and Management.

10. This review should be carried out in the foot protection service in line with NICE Guideline (NG 19) Diabetic foot problems[7] and should include:
    - Assessment of the feet.
    - Advice about, and provide, skin and nail care of the feet.
    - Assessment of the biomechanical status of the feet, including the need to provide specialist footwear and orthoses.
    - Assessment of the vascular status of the lower limbs.

For healed foot ulcers of other or uncertain aetiology

11. No further care required but advise to seek immediate clinical advice if there is recurrence of symptoms or ulceration.

Explanatory notes

Identification and immediate and necessary care

The severity and treatment of any foot ulcer infection should be in line with NICE Guideline (NG19) Diabetic Foot Problems or locally developed foot ulcer infection management guidance. In the absence of such guidance, healthcare professionals should be encouraged to develop local guidance in collaboration with microbiology services.

There should be equal access to diagnostics (such as x-ray and blood tests) for all people who present with foot ulceration and suspected osteomyelitis, regardless of underlying disease.

People presenting with CLTI are at an advanced stage of peripheral arterial disease and usually have significant other cardiovascular disease and comorbidities. There is clear evidence to support referral into vascular services for revascularisation to prevent limb loss supported by clear referral pathways.

The absence of foot pulses is not included as a 'red flag' symptom because pulse palpation has poor sensitivity and specificity as a diagnostic sign for inadequate arterial supply.

Charcot foot usually presents in a person with neuropathy, as an unexplained, erythematous, hot, swollen foot. In some cases, there can be early changes to the shape of the foot. If there is no ulceration, it is highly unlikely to be cellulitis. Key to treatment is getting the weight off the foot, with treatment that usually involves a below knee boot or cast. Urgent referral should be made in line with local pathways.

Increased plantar pressure is a causative factor in the development of foot ulcers. Effective offloading treatment includes advice on non-weightbearing with elevation, use of crutches or other aids, or alternative offloading devices such as surgical boots, insoles.

No robust evidence has been identified to support the superiority of any dressing type over another for standard care of foot wounds. Therefore, simple low-adherent dressings with sufficient absorbency are recommended as first-line care but this recommendation does not replace clinical judgement and decision making in relation to the needs of the individual patient.

Some people in the last few weeks of life may benefit from some of the standard therapeutic interventions for lower limb ulceration to improve their quality of life. However, the complexity of the health needs of these people means that a multi-disciplinary approach is particularly important in planning their healthcare to optimise outcomes and reduce the risk of harm.

'Footcare services' can be based in both acute and community services. The service structure is usually composed of a foot protection service (FPS), (which may be referred to as a community podiatry team) and an acute hospital-based service. The acute service has regular and additional multidisciplinary input and may be referred to as the MDFT (multidisciplinary footcare teams)[25]. MDFTs typically include podiatrists, with input from orthotists, diabetologists, microbiologists, general practice physicians, nursing; vascular, orthopaedic and plastic surgeons, pharmacists, and physiotherapists.

Assessment, Diagnosis and Treatment

Assessment and Diagnosis

There are no published assessment times for foot ulcers without diabetes, however the underlying reason for non-healing is likely to be due to peripheral arterial disease (PAD) and therefore the PAD quality improvement framework times for assessment have been used to inform this recommendation.

The Global Vascular Guidelines[10] have adopted WIfI as the preferred wound classification system for podiatry, vascular and all lower-limb teams, particularly to support the identification and management of chronic limb-threatening ischaemia (CLTI). CLTI differs from critical limb ischaemia (CLI) in that CLI is simply severe chronic ischaemia[22] in a limb, whereas CLTI can be ANY severity of clinically diagnosed PAD, PLUS a limb wound of >2 weeks duration, with or without associated infection. This categorises limb threat in a much broader group of people with lower limb wounds and is relevant for people who have PAD, both with and without diabetes. This is particularly important given that around half of all non-traumatic lower-limb amputations occur in people without diabetes. The WIfI classification system is not meant to function as a stand-alone clinical decision-making tool. Patient risk factors and comorbidities also play a major part in selecting the best therapy.

Accurate wound assessment is essential for monitoring wound healing as wound size and wound bed status form the baseline against which all subsequent treatment effectiveness will be measured. Wound imaging should be incorporated into wound assessment and regarded as part of standard practice.

Skin changes include assessment of skin colour, temperature, presence of callus or oedema, fungal infection, pre-ulcerative signs such as haemorrhage or fissures[23].

Structural foot deformities and abnormalities, such as flatfoot, hallux valgus, claw toes, Charcot neuroarthropathy and hammer foot, contribute to abnormal plantar pressures. Deformities to the foot alter the spatial location of the STJ axis and change the effect of external and internal forces on the structural components of the foot. Failure to address these biomechanical abnormalities result in ulceration.

Treatment

There should be equal access to treatments for all people with foot ulceration, regardless of underlying disease.

Dressing selection should take account of current research evidence as well as patient preferences and cost.

Offloading and pressure redistribution: non-removable knee-high offloading devices should be considered as first choice offloading interventions for those with diabetes[23].

Appendix 1: Search strategy for research evidence

The search strategy was limited to pre-appraised sources of research evidence, using a 4S approach[1] to structure a search strategy as shown.

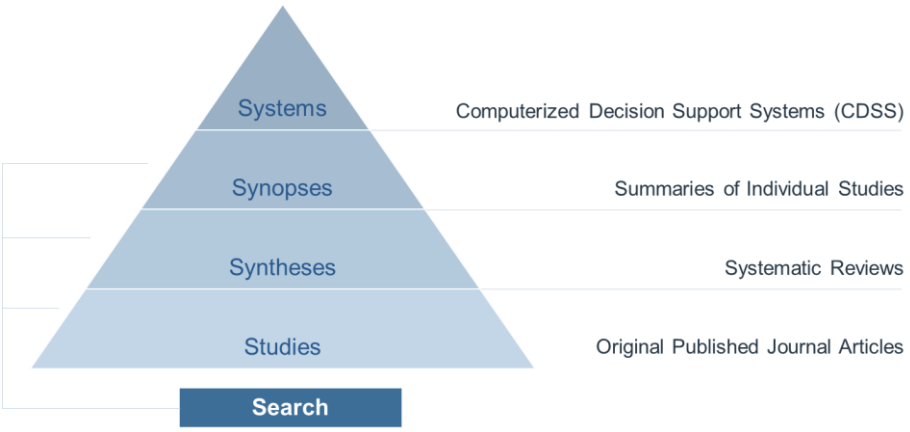
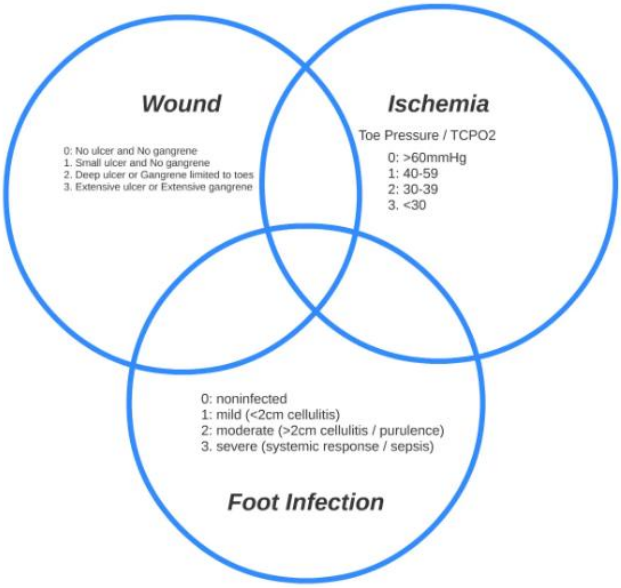


Figure 1 4S search strategy approach

- *Systems*: searched UK computerised decision support systems for chronic lower limb wounds.
- *Synopses*: searched for summaries of the current state of knowledge about the prevention and treatment of chronic lower limb wounds.
- *Syntheses*: searched the Cochrane Library of Systematic Reviews to identify reviews for chronic lower limb wounds foot ulcer treatment.
- *Studies*: searched the NIHR library for NIHR funded studies completed after publication of the relevant Cochrane systematic reviews for foot ulceration.

[1] Haynes RB Of studies, syntheses, synopses, and systems: the "4S" evolution of services for finding current best evidence *BMJ Evidence-Based Medicine* 2001;6:36-38.

Appendix 2: WIfI



Component	Score	Description		
W (Wound)	0	No ulcer (ischaemic rest pain)		
	1	Small, shallow ulcer on distal leg or foot without gangrene		
	2	Deeper ulcer with exposed bone, joint or tendon ± gangrenous changes limited to toes		
	3	Extensive deep ulcer, full thickness heel ulcer + calcaneal involvement ± extensive gangrene		
I (Ischaemia)		ABI	Ankle pressure (mmHg)	Toe pressure or $TcPO_2$
	0	≥0.80	>100	≥60
	1	0.60-0.79	70-100	40-59
	2	0.40-0.59	50-70	30-39
	3	<0.40	<50	<30
fI (foot Infection)	0	No symptoms/signs of infection		
	1	Local infection involving only skin and subcutaneous tissue		
	2	Local infection involving deeper than skin/subcutaneous tissue		
	3	Systemic inflammatory response syndrome		

Example: A 65-year-old male diabetic patient with gangrene of the big toe and a <2 cm rim of cellulitis at the base of the toe, without any clinical/biological sign of general infection/inflammation, whose toe pressure is at 30 mmHg would be classified as Wound 2, Ischaemia 2, foot Infection I (WIFI 2-2-1). The clinical stage would be 4 (high risk of amputation). The benefit of revascularisation (if feasible) is high, also depending on infection control.

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