Management of inpatient diabetes foot

Attachments:

Attachment 1 – Main Guideline

1.0 Statement

This clinical guideline provides clear guidance for all health professionals in the detection and management of diabetes foot ulcer, diabetes foot infection and suspected critical limb ischaemia in the diabetes foot – a major cause of avoidable lower limb amputations in hospital. The major goals are to reduce the incidence of lower limb amputations in the Trust and to reduce the morbidity and mortality from confirmed cases.

Specific aims are:

- To ensure patients who are admitted with a diabetes foot ulcer are correctly assessed by healthcare professionals;
- To ensure that healthcare professionals undertake the correct management of diabetes foot problems as an inpatient;
- To ensure NICE compliance on the management of diabetes foot problems.

2.0 Definitions

A diabetes foot ulcer is defined as localized injury to the skin and/or underlying tissue, below the ankle, in a person with diabetes.

Diabetic foot infection is infection that can develop in the skin, muscles, or bones of the foot as a result of nerve damage and poor circulation that is associated with diabetes.

Critical limb ischaemia refers to a condition characterized by chronic ischemic at rest pain, ulcers, or gangrene in one or both legs attributable to objectively proven arterial occlusive disease.

3.0 Accountabilities

The Diabetes High Risk foot Multidisciplinary Team are accountable for the initial ratification of this guideline. They are responsible for the ongoing monitoring and development of practice in Management of Diabetes inpatient foot disease treatment in the Trust.

Healthcare Professions leaders and managers (medical, nursing, midwives and other allied healthcare professionals) are accountable for distributing this guideline to all relevant staff within their spheres of responsibility.

All relevant healthcare staff are accountable for following this guideline and for reporting any incidents of non-compliance (whether this has had an adverse effect or not).

Admitting Team: the admitting team (which may comprise medical staff, physicians associates, registered midwives, advanced nurse practitioners and

nonmedical prescribers) must ensure that the management of diabetes inpatient foot disease is adhered to.

4.0 Policy Detail

See Guideline body

5.0 Financial Risk Assessment

1	Does the implementation of this document require any additional Capital resources	No
2	Does the implementation of this document require additional revenue resources	No
3	Does the implementation of this document require additional manpower	No
4	Does the implementation of this document release any manpower costs through a change in practice	No
5	Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programs or allocated training times for staff.	No

6.0 Equality Impact Assessment

An initial equality analysis has been carried out and it indicates that there is no likely adverse impact in relation to Personal Protected Characteristics as defined by the Equality Act 2010.

7.0 Maintenance

The guideline will be reviewed at least every three years or sooner if dictated by changes in national guidance. The Diabetes High Risk Foot Multidisciplinary Team will be responsible for coordinating the review and ratifying any amendments prior to final approval by the Trust Management Team.

8.0 Communication and Training

This guideline will be available on the trust intranet website under the diabetes & endocrinology department. No additional training is required for medical staff who are accessing this document

9.0 Audit Process

Diabetes foot audit is regularly undertaken as part of the National Diabetes Inpatient Audit (NADIA) which happens annually and National Diabetes Foot Audit (NDFA).

Criterion	Lead	Monitoring method	Frequency	Evaluation
Evidence of compliance of inpatient foot management in diabetes	National Inpatient Audit (National) National Diabetes Foot Audit (national)	Annual	Yearly	Diabetes High Risk Foot Multidisciplinary service

10.0 References

This policy has been developed in response to the following documents:

- Nice Guideline NG19: Diabetic Foot problems: prevention and management. National institute of Clinical Excellence. Published 26 August 2015 (updated 2019)
- Wolverhampton Diabetes Centre Guideline: In-patient management of diabetic foot problems
- Andrew J.M. Boulton, David G. Armstrong, Stephen F. Albert, Robert G. Frykberg, Richard Hellman, M. Sue Kirkman, Lawrence A. Lavery, Joseph W. LeMaster, Joseph L. Mills, Michael J. Mueller, Peter Sheehan, Dane K. Wukich. Comprehensive Foot Examination and Risk Assessment.Diabetes Care Aug 2008, 31 (8) 1679-1685
- Royal Wolverhampton NHS Trust: Adult Antimicrobial guideline ver 1.3
- Diabetes UK – Putting Feet First Campaign.
- https://www.diabetes.org.uk/putting-feet-first
- SIGN 116 Management of diabetic foot disease March 2010: https://www.sign.ac.uk/media/1054/sign116.pdf
- Ipswich Touch Test (Touch the Toe Test). https://www.diabetes.org.uk/Documents/Guide%20to%20diabetes/monitoring/Touch-the- toes-test.0812.pdf

Part A - Document Control

Procedure/ Guidelines number and version **Management of inpatient diabetes foot**	Version 1.0	**Status:** Final		**Author:** The Diabetes High Risk Foot Multidisciplinary Team **Chief Officer Sponsor:** Chief Medical Officer
Version / Amendment History	Version 1.0	Date	Author	Reason
	1.0	18.5.2021	C. Hariman	Updated template from previous Guideline and added NICE Guideline 2019 NG19 amendment – Guideline to be implemented Trust-wide

Intended Recipients: All clinical staff caring for patients over the age of 16.	
Consultation Group / Role Titles and Date: High Risk Diabetes Multi-Disciplinary team members Dr. C. Hariman, Consultant Diabetes & Endocrinology Mr. S. Hobbs, Consultant Vascular Surgery Dr. J. Macve, Consultant Microbiologist Susan Huddart, Senior Podiatrist	
Name and date of group where reviewed	Diabetes + Endocrinology Governance meeting Trust Policy Group – November 2021
Name and date of final approval committee	Diabetes + Endocrinology Governance meeting Trust Management Committee – November 2021
Date of Procedure/Guidelines issue	December 2021
Review Date and Frequency	November 2024
Training and Dissemination: Dissemination of Guideline will be available on Intranet site.	
Publishing Requirements: Can this document be published on the Trust's public page:	

Yes If yes you must ensure that you have read and have fully considered it meets the requirements outlined in sections 1.9, 3.7 and 3.9 of OP01, Governance of Trust-wide Strategy/Policy/Procedure/Guidelines and Local Procedure and Guidelines, as well as considering any redactions that will be required prior to publication.	
To be read in conjunction with: Royal Wolverhampton NHS Trust: Adult Antimicrobial guideline	
Initial Equality Impact Assessment: No – not required (Discussed with Equality, Diversity, Inclusion and Engagement Officer) **Full Equality Impact assessment (as required): Completed NA** If you require this document in an alternative format e.g., larger print please contact Policy Administrator 8904 for Trust- wide documents or your line manager or Divisional Management office for Local documents.	
Contact for Review	Dr. C. Hariman. Diabetes + Endocrinology Consultant
Monitoring arrangements	Annual Diabetes for Foot Audit as part of the National Diabetes Inpatient Audit (NADIA)
Document summary/key issues covered.	
Key words for intranet searching purposes	Diabetes foot inpatient guideline

(Part B) Ratification Assurance Statement

Name of document: Management of inpatient diabetes foot

Name of author: Dr. Christian Hariman
Job Title: Clinical lead in High Risk Diabetes Foot Service

I, the above named author confirm that:

- The Guidelines (please delete) presented for ratification meets all legislative, best practice and other guidance issued and known to me at the time of development of the said document.

- I am not aware of any omissions to the said document, and I will bring to the attention of the Executive Director any information which may affect the validity of the document presented as soon as this becomes known.

- The document meets the requirements as outlined in the document entitled Governance of Trust- wide Strategy/Policy/Procedure/Guidelines and Local Procedure and Guidelines(OP01).

- The document meets the requirements of the NHSLA Risk Management Standards to achieve as a minimum level 2 compliance, where applicable.

- I have undertaken appropriate and thorough consultation on this document and I have detailed the names of those individuals who responded as part of the consultation within the document. I have also fed back to responders to the consultation on the changes made to the document following consultation.

- I will send the document and signed ratification checklist to the Policy Administrator for publication at my earliest opportunity following ratification.

- I will keep this document under review and ensure that it is reviewed prior to the review date.

Signature of Author:

Date: 25.5.2021

Name of Person Ratifying this document (Director or Nominee):
Job Title: Chief Medical Officer
Signature:

- I, the named Director (or their nominee) am responsible for the overall good governance and management of this document including its timely review and updates and confirming a new author should the current post-holder/author change.

To the person approving this document:

Please ensure this page has been completed correctly, then print, sign and email this page only to: The Policy Administrator

IMPLEMENTATION PLAN

To be completed when submitted to the appropriate committee for consideration/approval

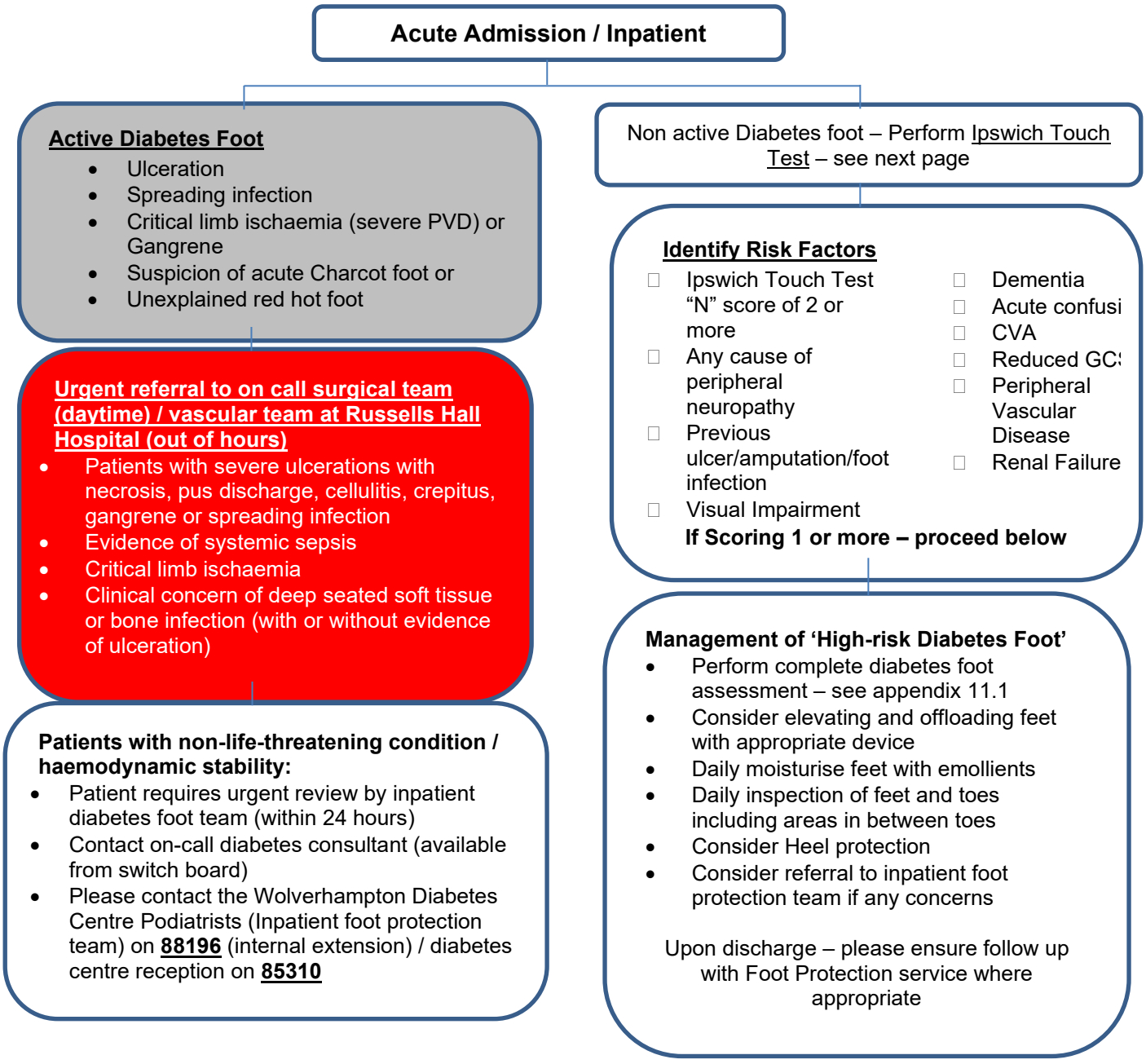
Version 1.0	**Management of Diabetes Inpatient Foot Guideline**	
Reviewing Group	Diabetes Department Governance	**Date reviewed:** 27.8.2021
Implementation lead: C. Hariman		

Implementation Issue to be considered (add additional issues where necessary)	**Action Summary**	**Action lead / s (Timescale for completion)**
Strategy; **Consider** (if appropriate) 1. Make Department aware of guideline	Departmental information via governance meeting	C. Hariman 3 months
1. Training; NA	NA	
Development of Forms, leaflets etc.;	NA	
Procedure/Guidelines communication;		
Financial cost implementation Consider Business case development	NA	
Other specific issues / actions as required e.g. Risks of failure to implement, gaps or barriers to implementation	NA	

1. Attachment 1 - Main Guideline

Care of a patient with diabetes admitted with a diabetes foot problem
OR
Detection of foot problems in an inpatient with diabetes.

ALL INPATIENTS WITH DIABETES MUST HAVE AN INITIAL FOOT ASSESSEMENT WITHIN 24 HOURS OF ADMISSION



Ipswich Touch Test

The test allows a quick and easy method in assessing diabetes neuropathy. For detailed foot assessment refer to Appendix-1.

Step 1: Assessing sensation in all patients with diabetes on admission

- Expose feet fully by removing shoes and socks.
- Inform the patient that you will be touching their feet. Confirm with the patient which is their right and left leg by lightly touching each leg and stating "**this is your right side**" and "**this is your left side**".
- Ask the patient to close their eyes throughout the examination, and ask them to state either "**left**" or "**right**" when you touch their appropriate toes.
- Perform the test in the sequence 1-6 as denoted in the diagram by lightly touching with your index finger on the tip of the patient's toes marking "**Y**" if the patient correctly identifies the sensation and marking "**N**" if the patient is unable to correctly identify the sensation.
- Continue to perform the test on all 6 toes and record the number of "**N**" occurrences.
- A score of 2 or more "**N**" denotes a risk of diabetes neuropathy and would warrant further investigation / examination – see Appendix 1 for full diabetes foot assessment & Appendix 2 on how to perform Ipswich Touch Test.

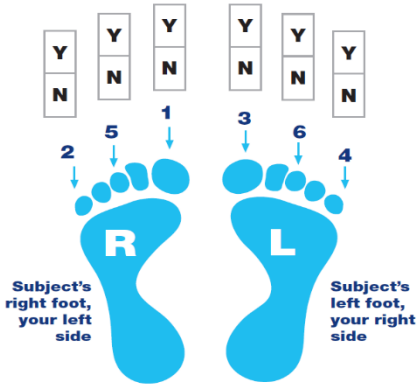
REMINDER

Using the index finger, **touch the tips of toes following the sequence** from 1 to 6 shown in photos and drawings shown on page 2.

The touch must be **light as a feather**, and very brief (1–2 seconds): **DO NOT** press, prod or poke.

Remember: If the touch has not been felt do not press harder, and **DO NOT** try again. You can only touch each toe **ONCE**; if not felt this must be recorded by circling '**N**' on the diagram right. **There is no second chance.**

If the subject correctly says right or left, circle '**Y**' on the diagram right.



Step 2: Identifying Risk Factors

- ☐ Ipswich Touch Test "N" score of 2 or more
- ☐ Any cause of peripheral neuropathy
- ☐ Previous ulcer/amputation/foot infection
- ☐ Visual Impairment
- ☐ Renal Failure
- ☐ Dementia
- ☐ Acute confusion
- ☐ CVA
- ☐ Reduced GCS
- ☐ Peripheral Vascular Disease

Number of Risk Factors identified = _____

If Scoring 1 or more – proceed to step 3

Step 3: High Risk foot care steps (if score of 1 or more in step 2)

- Elevate and offload feet with appropriate device.
- Daily moisturise feet with emollients.
- Daily inspection of feet and toes including areas in between toes and heels.

2. Infection Management of Diabetic foot wounds and ulcers

Non-bacterial foot infections such as athlete's foot should be treated promptly and effectively to avoid progression to more complex problems.

Suspected bacterial infection complicating foot ulcers and wounds should be under diabetes specialist review. Such cases should not be managed by other general medical teams or solely by surgical teams. Patients admitted to hospital with a foot related problem should similarly have the specialist diabetes foot MDT involvement as soon as possible and preferably within 24 hours of admission.

Remember that clinical signs of inflammation may be less obvious in an ischaemic foot.

General approach to diabetic foot ulcer management

Specimens for culture

- Clinically uninfected ulcers do not need to be cultured.
- Please consider taking specimen culture before starting antibiotic unless a delay in clinical treatment may cause harm (e.g. evidence of sepsis).
- Other wounds should almost always be cultured.
- Superficial wound swabs for culture are rarely of help – enterococci, pseudomonas and anaerobes are frequently isolated from diabetic foot wounds, often representing colonization rather than infection.
- Deep tissue culture by aspiration of purulent secretions or of an abscess cavity, curettage of post-debridement wound base, punch biopsy and extruded or biopsied bones are the best specimens for culture.
- Blood cultures should be undertaken in systemically unwell patients.

Diagnosing and classifying infection

It is recommended that the presence and severity of infection be classified using the Infectious Disease Society of America classification system.

Grade 1	No infection	No purulence or signs of infection.
Grade 2	Mild infection	No systemic illness and evidence of either a. Pus or b. Two or more signs of symptoms of inflammation (erythema, warmth, pain, tenderness, induration) – any cellulitis <2cm around the wound and confined to the skin or subcutaneous tissue.
Grade 3	Moderate infection	No systemic infection **and** evidence of **either** a. Lymphatic streaking, deep tissue infection (involving subcutaneous tissue, fascia, tendon, bone) or abscess, or b. Cellulitis >2cm around the wound.
Grade 4	Severe infection	Any infection with systemic toxicity Presence of critical ischaemia of the involved limb may make the infection severe

Diagnosing bone infection (Osteomyelitis)

If there is clinical suspicion of acute osteomyelitis, plain X-ray is the usual first investigation although serial X-rays may be required. Where the clinical suspicion remains high and plain X-ray is not diagnostic, carry out an MRI or consider white cell scanning if MRI is contraindicated. Probe to bone test is no longer acceptable as a means to exclude or diagnose osteomyelitis.

Differentiating Osteomyelitis from Acute Charcot foot

Differentiating acute Charcot and osteomyelitis can be difficult and both conditions frequently occur simultaneously. Diagnosis is based on good history and examination and is assisted by obtaining supplementary investigations including X-ray, MRI, Isotope bone and white cell scans. These patients should generally be under the remit of the specialist foot MDT.

General principles of antibiotic use

Prophylactic antibiotic use

There is no evidence for prophylactic antibiotics in clinically uninfected foot ulcers and antibiotics should therefore be used only in those with clinical signs of infection.

Do not offer antibiotics to prevent diabetic foot infections. Give advice about seeking medical help if symptoms of a diabetic foot infection develop.

Therapeutic antibiotic use

Start antibiotic therapy for people with suspected diabetic foot infection as soon as possible. Please take samples for microbiology testing before or as close as possible to the start of antibiotic therapy.

When prescribing antibiotics for a diabetic foot infection, please give advice about:

- Possible adverse effects of the antibiotic(s);
- Seeking medical help if symptoms worsen rapidly or significantly at any time, or do not start to improve within 1 to 2 days.

Initial therapy is frequently empirical, based on the presumed pathogen and local epidemiological and susceptibility information.

Any previous microbiology results MUST be reviewed prior to prescribing empirical antibiotic therapy.

This guidance is of value until further microbiological investigations and clinical response shed further light on the nature of the infection, where available.

Direct contact with local microbiologists may be necessary for advice on specialized use of these or other antibiotics.

Intravenous or oral therapy

Oral antibiotic therapy should be given first line if the person can take oral medicines and the severity of their condition does not require intravenous antibiotics.
The choice of antibiotic and the route of delivery should reflect the severity of the infection. Intravenous antibiotics are only required in patients with foot infection with:

- Systemic ill-health;
- Deep or tracking infection;
- Complicating necrosis or gangrene;
- Those that have not improved or deteriorate on oral antibiotics.

When intravenous antibiotics are used, a review is required within 48 hours or until the patient is no longer toxic, is able to take oral drugs and the foot lesion is showing definite signs of improvement.

Duration of treatment

- Duration of treatment should similarly be adjusted according to the severity of

the infection and be guided by clinical improvement.
- In general, the duration of antibiotic should be kept to a minimum.
- Review the need for continued antibiotics regularly.

Allergies include skin rashes and anaphylaxis but do not include minor side-effects such as nausea. The nature of any antibiotic allergy needs to be fully elucidated and clearly documented.

Before prescribing any empirical antibiotic therapy, the following questions must be addressed:

1. Has the patient received any recent antibiotic treatment (in the last 3 months), either from the GP or from the hospital? If so, which antibiotic(s) and duration?
2. Does the patient have any previous positive microbiology, either from samples sent by the GP of the hospital? If so, what are the results and the antibiotic sensitivity patterns?
3. Does the patient have any allergy to antibiotics, if so what is the nature of these? This MUST be clearly documented in the patient's notes.
4. Has the patient had any recent hospital admission for management of the diabetic foot? If so, what treatment was given?
5. What is the patient's MRSA status?

The answers to the above questions will greatly influence **initial** choice of antibiotic therapy. Therefore, care must be taken to ensure that these questions are answered fully and clearly.

Wound Management

- Debridement is thought to be essential for optimal healing (Foster and Edmunds, 2000). Where significant arterial disease is absent, callous together with any necrotic, non-viable tissue, should be removed with a sterile scalpel using an aseptic technique.
- Sharp debridement of diabetic foot ulcers should only be undertaken by the specialist foot service, specialist practitioners or surgical teams.
- Debridement may also be undertaken using larvae or appropriate dressings that promote debridement.
- In the ischaemic foot, it may not be appropriate to use a debriding dressing which hydrates necrotic tissue converting it into wet gangrene. The patient's vascular status must always be assessed prior to any debridement.
- Sharp debridement where there is an ischaemic component should only be considered following discussion with specialist diabetes foot team, vascular team or Tissue Viability Service.

The Rational for debridement:

- Allows the true dimensions of an ulcer to be assessed,
- Allows the drainage of exudates and removal of dead tissue rendering infection less likely;
- Enable a deep swab to be taken;
- Encourages healing by restoring a chronic wound to an acute wound.

Wound swabbing

Should be undertaken following debridement (refer to antibiotic guidance).

Wound cleansing

Refer to the dressing clinical practice in Royal Marsden or http://intranet.xrwh.nhs.uk/policies_and_strategies/nursing_clinical_pract/general_nursing_cps.aspx.

Dressing selection

All dressings should provide the optimum wound healing environment, and each stage of wound healing requires a specific type of dressing. Regular dressing change is crucial in the management of diabetic foot wounds due to the risk of rapid deterioration.
http://trustnet.xrwh.nhs.uk/departments-services/t/tissue-viability-team/wound-formulary/

Wound type	Aim of management	Dressing	Other considerations
Eschar	Rehydrate eschar.	Refer to wound formulary and local wound pathways.	Dry gangrene must not be rehydrated. Consider high risk of wet wound to infection & deterioration where vascular supply is compromised.
Sloughly	Removal of debris from the wound bed.	Refer to wound formulary and local wound pathways.	High risk of infection with wet wound. Moisture balance versus moist wound healing.
Infected	Treat infection, manage exudates and odour.	Refer to wound formulary and local wound pathways.	
Granulating	Create a moist environment, manage exudate.	Refer to wound formulary and local wound pathways.	
Epithelialising	Create a moist environment	Refer to wound formulary and local wound pathways.	

3. Antibiotic Therapy

When choosing an antibiotic therapy for people with suspected diabetic foot infections, please take into account:

- The severity of diabetic foot infection (mild, moderate, severe);
- The risk of developing complications;
- Previous microbiology results;
- Previous antibiotic use;
- Patient's preference.

When microbiological results are available:

- Review the choice of antibiotic and
- Change the antibiotic according to results, using a narrow-spectrum antibiotic, if appropriate.

To initiate antimicrobial therapy for infections related to diabetes foot disease, please refer to the Antimicrobial Guideline Site (link provided below).

Seek specialist advice when prescribing antibiotics for a suspected diabetic foot infection in children and young people under 18 years old.

Guidelines for Empirical Treatment > Skin and Skin Structure > Diabetic foot infection

https://viewer.microguide.global/trw/adult

Reassessment

Reassess people with a suspected diabetic foot infection if symptoms worsen rapidly or significantly at any time, do not start to improve within 1 to 2 days, or the person becomes systemically very unwell or has severe pain out of proportion to the infection. Take account of:

- Other possible diagnoses, such as pressure sores, gout or non-infected ulcers;
- Any symptoms or signs suggestion a more serious illness or condition such as limb ischaemia, osteomyelitis, necrotizing fasciitis or sepsis;
- Previous antibiotic use.

Diabetes Foot Ulcer (PLEASE REFER TO THE MOST UP TO DATE GUIDELINE IN THE LINK ABOVE)

Osteomyelitis + Soft Tissue Infection (PLEASE REFER TO THE MOST UP TO DATE GUIDELINE IN THE LINK ABOVE)

4. Referral process for inpatient diabetes foot problems

- Contact the on-call Diabetes Consultant (available from switch board).
- Please contact the Wolverhampton Diabetes Centre Podiatrists (Inpatient foot protection team) on **88196** (internal extension) / diabetes Centre reception on **85310.**

5. Pressure Relief

Foot ulcers are often caused by pressure. This may be due to deformity, gait or inappropriate footwear. When dressing a wound, deflective padding, insoles, footwear and casts must be considered to redistribute pressure away from ulceration and so allow healing.

Caution must be taken with all non-removable devices in the presence of sensory neuropathy and in the presence of active ulceration.

Consideration for formal offloading devices and footwear should be via the specialist diabetes service with appropriate liaison with orthotics and orthopaedic services.

- Semi-compression felt – this adhesive-backed padding may be cut to the shape of the foot to deflect pressure away from an area so as to encourage healing to take place.
- Insoles – to redistribute plantar pressures away from plantar ulcers and also provide suitable cushioning. They may need to be accommodated in bespoke shoes or extra-depth stock shoes.
- Temporary footwear – may be required to accommodate dressings, insoles or deformity to offload pressure from ulcerated sites.
- Bespoke footwear – to accommodate deformity. Incorporated moulded insoles will remove pressure from vulnerable areas to allow ulcers to heal and reduce the risk of further ulceration occurring.
- Air Casts – lightweight removable plastic casts lined with air cells that are inflated with a hand bulb to a total contact fit, reducing plantar pressure by spreading the weight-bearing onto a larger area. These casts limit joint mobility; have plaserzote (polyethylene foam) insoles which cushion rocker bottom soles to reduce pressure through the plantar surface during gait.
- Total Contact Casting (below-knee cast / Scotch Cast Boot) – fibreglass casts used to minimise peak plantar pressure to aid healing of plantar ulcers.
- Consider mobility aids e.g. crutches and wheelchairs.

6. Charcot foot in diabetes

Charcot neuro-arthropathy is a potentially severely disabling complication of diabetes that can result in morbidity, mortality through decreased mobility, and increased foot ulcer and amputation risks.

When to suspect?

It should be suspected in any patient with diabetes who complains of a hot and / or swollen foot. If suspected, such patients should be brought to the attention of the specialist foot MDT for early review.

How to confirm diagnosis?

The diagnosis of acute Charcot is largely clinical. A hot swollen foot with active inflammation and not as much discomfort is typically seen. Patients are expected to have underlying neuropathy and often have adequate (or even dynamic) peripheral circulation.

The aim of assessment is to exclude other common differential diagnoses including infection, non-Charcot acute arthritis (e.g. gout), DVT, etc.) and to arrive at an effective short, intermediate and long-term treatment plan. The objective is to prevent deformity and the complications of deformity including ulcer.

Baseline observations – full foot examination, record foot deformity by clinical photography, measure skin temperature bilaterally to document differential (≥ 2 ^{0}C is abnormal).

Baseline investigations – to exclude infection and other causes of acute arthropathy

- Routine bloods including FBC, ESR, U+E, CRP, HbA1c.
- Plain foot and ankle X-ray – to document baseline; X-rays may be normal in the early stages of the Charcot process and may not become abnormal for weeks.
- If plain X-ray is suggestive and infection is not considered a significant possibility, no further imaging may be needed to confirm diagnosis although serial X-rays are recommended to monitor responses.
- Where X-ray is normal, please confirm diagnosis with either an MRI (preferred especially if concomitant ulcer) or isotope bone scan (if MRI contra-indicated / not tolerated or infection not considered likely). Increased uptake on bone scan indicates active pathology but does not differentiate between infection and arthropathy and may require further nuclear imaging (white cell labelled scan).

Infection reasonably excluded – infection is unlikely if the patient is apyrexial, the WBC is normal and there is no foot ulceration or other obvious portal of entry of infection.

Unable to exclude infection – infection must not be missed. Discuss with consultant radiologist to consider MRI scan or labelled WBC scan. If unable to confidently exclude infection, discuss with consultant orthopaedic surgeon regarding the possibility of bone biopsy for culture.

How to manage if suspicion confirmed?

Immobilizing the joint and offloading the foot is the mainstay of treatment during the acute phase of Charcot.

Most patients can be managed on partial weight bearing using Air Cast Walkers, although compliance to its use has to be constantly reinforced. This is particularly useful for patients with concomitant ulcers.

Assessing activity / quiescence is very difficult but local foot temperature is the best clinical guide and must be documented at every review. Repeat imaging tests are rarely required.

Treatment and care plans

- Immobilize the joint by casting.
- If confirmed Charcot neuro-arthropathy – consider IV Pamidronate 60mg in 200ml N-Saline over 4 hours and repeat once at 72 hours if no response clinically.
- Review mobility, social and work situation: may need liaison with family, social services, physiotherapy and occupational therapy.
- It is usually necessary to have a multidisciplinary team review to ensure all aspects of the care plan are coordinated.
- The MDT review conclusions must be documented and formally communicated to all members of the team and to primary care.
- Follow-up must be effectively organized with the specialist medical team and the high-risk foot service.

7. Vascular assessment

Ischaemia is one of the strongest factors that contribute to both the development of infection and the non-healing nature of these infections.

Vascular assessment during foot examination should be undertaken in the patient's barefoot (without socks / stockings) by palpating **Posterior Tibialis (PT)** and **Dorsalis Pedis (DP)** pulses. They should be characterized and documented as either present or absent.

Features that may indicate peripheral vascular disease includes symptoms of claudication, resting pain or non-healing ulcers.

Patients with symptoms of vascular disease or the absence of palpable pulses on foot screening / examination should undergo further evaluation by means of Doppler ultrasound probe or a measurement of ankle brachial pressure index (ABPI) should be undertaken.

ABPI

The ABPI can be calculated by dividing the systolic ankle pressure with the higher of the two systolic brachial pressures (usually the left arm).

- ABPI > 0.9 is normal
- ABPI < 0.8 is usually associated with claudication
- ABPI < 0.4 is usually associated with rest pain / tissue necrosis

Beware that arterial calcinosis may cause misleading results of ABPI due to the non-compressible nature of the arteries. Inability to occlude the vessel during ABPI assessment or an ABPI >1.3 should raise suspicions.

For patients with suspected acute ischaemia with necrosis / gangrene

Patients with suspected acute ischaemic foot with / without evidence of necrosis or gangrene – please contact the vascular surgical team or Surgical Registrar on call (out of hours) immediately.

8. References

- Nice Guideline NG19: Diabetic Foot problems: prevention and management. National institute of Clinical Excellence. Published 26 August 2015 (updated 2019)
- Wolverhampton Diabetes Centre Guideline: In-patient management of diabetic foot problems
- Andrew J.M. Boulton, David G. Armstrong, Stephen F. Albert, Robert G. Frykberg, Richard Hellman, M. Sue Kirkman, Lawrence A. Lavery, Joseph W. LeMaster, Joseph L. Mills, Michael J. Mueller, Peter Sheehan, Dane K. Wukich. Comprehensive Foot Examination and Risk Assessment.Diabetes Care Aug 2008, 31 (8) 1679-1685
- Royal Wolverhampton NHS Trust: Adult Antimicrobial guideline
- Diabetes UK – Putting Feet First Campaign. https://www.diabetes.org.uk/putting-feet-first
- SIGN 116 Management of diabetic foot disease March 2010: https://www.sign.ac.uk/media/1054/sign116.pdf
- Ipswich Touch Test (Touch the Toe Test). https://www.diabetes.org.uk/Documents/Guide%20to%20diabetes/monitoring/Touch-the-toes-test.0812.pdf

9. Appendix

9.1 Initial Assessment

All patients with diabetes admitted to hospital should have their shoes, socks, bandages and dressings removed to examine for:

- **Neuropathy**
  Use a 10g monofilament across different dermatomes on both the plantar and dorsal aspect.
- **Limb ischaemia**
  Palpate dorsalis pedis and posterior tibialis pulses. Confirm with handheld Doppler probe if pluses are not palpable by hand. Consider performing an Ankle-Brachial Pressure Index (ABPI) if ischaemia is suspected.
- **Ulceration**
  Inspect heels, plantar, dorsal aspect and inter-digital spaces for ulcerations. Observe site, size and appearance of the ulcer.
- **Callus**
  Inspect areas of the foot that are likely to be exposed to high frictions such as heel, plantar aspect of each metatarsal phalangeal heads, lateral aspect of the foot, etc.
- **Infection / Inflammation**
  Inspect and mark areas of infection / inflammation. Identify source if possible (e.g. cracked skin, ulcers, etc).
- **Deformity**
  Observe for any foot deformities, previous amputations and general appearance of both feet.
- **Gangrene**
  Observe and mark the skin for any changes in appearance suggesting gangrene.
- **Charcot arthropathy**
  Look for foot deformities that suggest Charcot arthropathy. Compare temperature between both feet. Suspect acute Charcot arthropathy if there is redness, swelling, warmth or deformity in an foot with intact skin.
- **Shoes / footwear**
  Inspect the general condition of patient's footwear. Does it provide sufficient protection and support for the patient's foot without overtly increasing the risk of callus or ulcer formation (too tight or too loose?).
- Document findings that may have been identified from the examination and inspection above.

Please **classify and document** the patient's foot into one of 4 categories**:**

Active	• Ulceration • Spreading infection • Critical limb ischaemia (severe PVD) . • Gangrene . • Suspicion of acute Charcot foot . • Unexplained red hot foot with / without pain
Red – High	• Previous ulceration • Previous amputation • On Renal replacement therapy (dialysis / transplant) • Sensory Neuropathy and Peripheral arterial disease together • Sensory Neuropathy with callus and/or deformity • Non-critical lower limb peripheral arterial disease with callus and/or deformity
Amber – Moderate	• Deformity • Sensory Neuropathy • Lower limb peripheral arterial disease
Green - Low	• No risk factors present (ulcers/deformity/neuropathy/arterial disease) • Presence of callus without risk factors

Any new and/or existing diabetic foot problems identified must be documented.

9.2 How to perform Ipswich Touch Test (Touch the toes Test) – Step by Step guide

STEP-BY-STEP INSTRUCTION

HOW TO PERFORM THE TEST

The test simply involves very lightly touching six toes, three on each foot as shown to find out how many of the touches are felt. Importantly the touch must be gentle, light as a feather and brief.

VERY IMPORTANT!

- **The touch must be light as a feather, and brief (1–2 seconds): do not press, prod or poke tap or stroke the skin.**
- **If the person did not respond do not attempt to get a reaction by pressing harder. They did not feel; this should be recorded as not felt.**
- **You must not touch each toe more than once. If not felt do not repeat the touch, there is no second chance.**

1. Remove socks and shoes and rest the subject with their feet laying on a sofa or bed.
2. Remind them which is their RIGHT and LEFT leg, pointing this out by firmly touching each leg, saying ***"this is your right"*** when the right leg is touched and ***"this is your left side"*** when the left is touched. If you face the soles of their feet their right is on your left (see reference guide, page 1).
3. Ask them to close their eyes and keep them closed until the end of the test.
4. Inform them that you are going to touch their toes and ask them to say right or left as soon as they feel the touch and depending on which foot was touched.
5. Perform the touch, using your index (pointing finger) as shown in the photos and diagrams.
6. The pictures also show which six toes should be touched and the sequence.
7. So, start by lightly touching the tip of the toe marked 1 (right big toe) with the tip of your index finger. The patient will respond by saying ***"right"*** if they feel the touch.
8. Record the result by circling '**Y**' on the attached record sheet. If they did not respond, circle '**N**'.
9. Now move to the toe marked 2, the right little toe, record the result, followed by the toe marked 3, the left big toe etc.
10. Continue until all the six toes has been checked.