# Document Control

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|---|---|---|---|
| **Title**<br>**Antibiotic guidelines for skin and soft tissue indications** | | | |
| **Author** | | | **Author's job title**<br>Consultant Microbiologist<br>Antibiotic Pharmacist |
| **Directorate**<br>Diagnostic | | | **Department**<br>Pathology |
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| 0.1 | Mar 2011 | Draft | First draft for consultation |
| 0.2 | Apr 2011 | Draft | Addition of audit criteria. Change to fluclox dosing in arteriopaths. Change to penicillin allergy regime for bites. |
| 1.0 | May 2011 | Final | Approved by the Lead Clinician for Drug and Therapeutics Group on 12th May 2011. |
| 1.1 | May 2011 | Revision | Minor amendments by Corporate Affairs to update to latest template. Rebuilt hyperlinks to appendices. |
| 1.2 | Nov 2016 | Update | References updated, split guidance by app sections into skin and soft tissue / bone and joint. |
| 2.0 | Dec 2016 | Final | RxGuidelines format updated<br>Change to recommendation for penicillin allergy and bites (to doxycycline + metronidazole)<br>Addition of guidance for breast abscess |
| 2.1 | Dec 2016 | Updated | Switch clari/mtz to clind for non-lactational mastitis |
| 2.2 | Mar 2019 | Revision | Necrotising fasciitis types switched as per international definitions. Approved at DTC as minor amendment. |
| 2.3 | Mar 2020 | Revision | References reviewed, updated. Approval process updated. |
| 3.0 | Nov 2020 | Final | Human and Mammalian Animal Bites section updated with additional criteria as specified in NICE NG184 Human and Animal Bites antimicrobial prescribing guideline. Submitted to IPDG 24th November and approved. |
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| | |
|---|---|
| **Consulted with the following stakeholders:**<br>• Antibiotic Working Group<br>• Consultant Diabetologists<br>• Consultant Vascular Surgeons | |
| **Approval and Review Process**<br>• Antibiotic Working Group<br>• Infection Prevention and Decontamination Group<br>• Clinical Audit and Guidelines Group | |
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# 1. Purpose

**1.1.** This document sets out Northern Devon Healthcare NHS Trust's best practice guidelines for appropriate microbiological investigation and antimicrobial prescribing in adult patients with skin and soft tissue infections.

**1.2.** This guideline applies to all adults and must be adhered to. Special considerations exist for pregnant and breastfeeding patients; liaise with specialist clinicians as appropriate in these cases. See separate guidance for paediatric patients.

**1.3.** Non-compliance with this guideline may be for valid clinical reasons only. The reason(s) for non-compliance must be documented clearly in the patient's notes.

**1.4.** This guideline is primarily aimed at all prescribing teams but other staff (e.g. nursing staff, pharmacists) may need to familiarise themselves with some aspects of the guideline.

**1.5.** Implementation of this guideline will ensure that:

- Skin and soft tissue infections are managed according to current evidence and standards of practice in the wider healthcare community.
- A standard of care is specified to facilitate a consistent approach between surgery, tissue viability, endocrinology, microbiology and pharmacy in terms of patient management, specimen processing and drug availability.

# 2. Responsibilities

**2.1.** Responsibility for education and training on antibiotic use lies with the Lead Consultant Microbiologist for Antibiotic Stewardship. It will be provided through formal study days and informal training on the ward.

**2.2.** The author will be responsible for ensuring the guidelines are reviewed and revisions approved by the Clinical Audit and Guidelines Group in accordance with the Document Control Report.

**2.3.** All versions of these guidelines will be archived in electronic format by the author within the Antibiotic Stewardship policy archive.

**2.4.** Any revisions to the final document will be recorded on the Document Control Report.

**2.5.** To obtain a copy of the archived guidelines, contact should be made with the author.

**2.6.** Monitoring of implementation, effectiveness and compliance with these guidelines will be the responsibility of the Lead Clinician for Antibiotic Stewardship. Where non-compliance is found, the reasons for this must have been documented in the patient's medical notes.

## Role of Antibiotic Working Group (AWG)

**2.7.** The AWG is responsible for:

- Leading antibiotic guideline development and review within Northern Devon Healthcare Trust
- Involving all relevant stakeholders in guideline development and review

# 3. Contacts

**3.1.** Contact numbers:

| | |
|---|---|
| • Microbiologist | Bleep 193. Via switchboard out of hours. |
| • Antibiotic Pharmacist | Bleep 029 (Mon-Fri only) |

# 4. Management of Skin and Soft Tissue infections

**4.1.** See appendix 1

# 5. Monitoring Compliance with and the Effectiveness of the Guideline

## Suggested Audit Criteria

**5.1.** Key performance indicators comprise:

- Number of patients treated for cellulitis with an MRSA screen taken on initiation of treatment.
- Number of patients treated for cellulitis and superficial surgical wound infections according to treatment protocols (particularly MRSA status and inappropriate use of co-amoxiclav)

## Process for Implementation and Monitoring Compliance and Effectiveness

**5.2.** This guideline will be published on BOB and cascaded via the intranet.

**5.3.** Incidents involving skin and soft tissue infection should be reported according to the Trust's Incident Reporting Policy. Critical incident reports relating to skin and soft tissue infection will be collated by the Antibiotic Pharmacist. Results will be reported on an annual basis to the Infection Prevention and Decontamination Group.

# 6. Equality Impact Assessment

**6.1.** The author must include the Equality Impact Assessment Table and identify whether the policy has a positive or negative impact on any of the groups listed. The Author must make comment on how the policy makes this impact.

**Table 1: Equality impact Assessment**

| Group | Positive Impact | Negative Impact | No Impact | **Comment** |
|---|---|---|---|---|
| Age | X | | | Separate guidance for paediatrics |
| Disability | | | X | |
| Gender | | | X | |
| Gender Reassignment | | | X | |
| Human Rights (rights to privacy, dignity, liberty and non-degrading treatment) | | | X | |
| Marriage and civil partnership | | | X | |

| | | | | |
|---|---|---|---|---|
| Pregnancy | | X | | Some treatment advice may harm the unborn foetus, discuss on a case-by-case basis with Obstetricians and Pharmacy for advice. |
| Maternity and Breastfeeding | | X | | Some treatments may be excreted in breast milk. Discuss on a case-by-case basis with Paediatricians and Pharmacy for advice. |
| Race (ethnic origin) | | | X | |
| Religion (or belief) | | | X | |

## 7. References


- NICE. 2019. National Guideline NG125: Surgical Site Infections: Prevention and Treatment.
  *When surgical site infection is suspected (i.e. cellulitis), either de novo or because of treatment failure, give the patient an antibiotic that covers the likely causative organisms. Consider local resistance patterns and the results of microbiological tests in choosing an antibiotic.*
- NICE. 2012 last updated Feb 2017.. Clinical Guideline CG139: Healthcare-associated Infections: Prevention and Control in Primary and Community Care.
- NICE. 2018. NICE CKS: Bites – human and animal.
  http://cks.nice.org.uk/bites-human-and-animal#!management

  *•For both prophylaxis and treatment of an infected human bite, prescribe a 7-day course of co-amoxiclav.*
  *•For people who are allergic to penicillin prescribe a 7-day course of:*
  *◦Metronidazole plus clarithromycin.*

  For prophylaxis and treatment of an infected animal bite, prescribe a 7–day course of co-amoxiclav.
  For people who are allergic to penicillin, prescribe:
  ◦Metronidazole plus doxycycline
- NICE. 2020. Human and Animal Bites: Antimicrobial Prescribing NICE guideline [NG184].
  https://www.nice.org.uk/guidance/ng184/chapter/Recommendations
  Inclusion of safeguarding advice for vulnerable patients presenting with bite wounds, reference to birds and exotic animals requiring referral to microbiologist, criteria on when bites qualify for prophylaxis/treatment updated.

- NICE. 2018. NICE CKS: Mastitis and Breast Abscess. http://cks.nice.org.uk/mastitis-and-breast-abscess

  *Expert opinion in the review article Mastitis and breast abscess published in the BMJ is that because it can be very difficult to differentiate between infectious and non-infectious non-lactational mastitis at an early stage, antibiotics should be prescribed in all cases.*
  *For non-lactating women, CKS recommends co-amoxiclav first-line, with a combination of clarithromycin or erythromycin plus metronidazole as an alternative for women who are allergic to penicillin.*
  *This is because unlike in lactational mastitis where the most common causative organism is Staphylococcus aureus the most common organisms associated with infectious mastitis in non-lactating women are S. aureus, enterococci, and anaerobic bacteria and co-amoxiclav is a beta-lactamase resistant antibiotic with a broader spectrum of activity than flucloxacillin*
  *For women who are allergic to penicillin, metronidazole is added to a macrolide for anaerobic cover.*

- NICE. 2019. NICE Guideline NG19: Diabetic Foot Problem: Prevention and Management.

  *Investigation*
  *If a diabetic foot infection is suspected and a wound is present, send a soft tissue or bone sample from the base of the debrided wound for microbiological examination. If this cannot be obtained, take a deep swab because it may provide useful information on the choice of antibiotic treatment.*
  *Consider an X-ray of the person's affected foot (or feet) to determine the extent of the diabetic foot problem.*
  *Think about osteomyelitis if the person with diabetes has a local infection, a deep foot wound or a chronic foot wound.*
  *Be aware that osteomyelitis may be present in a person with diabetes despite normal inflammatory markers, X-rays or probe-to-bone testing.*
  *If osteomyelitis is suspected in a person with diabetes but is not confirmed by initial X-ray, consider an MRI to confirm the diagnosis.*
  *Treatment*
  *For mild diabetic foot infections, initially offer oral antibiotics with activity against gram-positive organisms.*
  *Do not use prolonged antibiotic treatment (more than 14 days) for the treatment of mild soft tissue diabetic foot infections.*
  *For moderate and severe diabetic foot infections, initially offer antibiotics with activity against gram-positive and gram-negative organisms, including anaerobic bacteria*
  *Offer prolonged antibiotic treatment (usually 6 weeks) to people with diabetes and osteomyelitis, according to local protocols.*

- Ferreira, A; Bolland, MJ; Thomas, MG. 2016 Meta-analysis of randomised trials comparing a penicillin or cephalosporin with a macrolide or lincosamide in the treatment of cellulitis or erysipelas. Infection;44(5):607-15. doi: 10.1007/s15010-016-0895-x. *[equal efficacy]*
- Jenkins, T. C., Knepper, B. C., Jason Moore, S., Saveli, C. C., Pawlowski, S. W., Perlman, D. M., McCollister, B. D. and Burman, W. J. (2014), Comparison of the microbiology and antibiotic treatment among diabetic and nondiabetic patients hospitalized for cellulitis or cutaneous abscess. J. Hosp. Med., 9: 788–794. doi: 10.1002/jhm.2267 *[prevalence of G+ve and G-ve organisms similar in diabetic/non-diabetic patients, different empirical guidance using broader-spectrum agents for diabetic patients probably not warranted]*
- Aboltins, CA; Hutchinson, AF; Sinnappu, RN; Cresp, D; Risteski, C; Kathirgamanathan, R; Tacey, MA; Chiu, H; Lim, K. 2014. Oral versus parenteral antimicrobials for the treatment of cellulitis: a randomized non-inferiority trial. Antimicrob Chemother doi:10.1093/jac/dku397.
- NCEPOD. 2014. Lower Limb Amputation: Working Together A review of the Care received by patients who underwent major lower limb amputation due to vascular disease or diabetes. A report by the National Confidential Enquiry into Patient Outcome and Death. http://www.ncepod.org.uk/2014report2/downloads/WorkingTogetherFullReport.pdf
- Johns Hopkins Antibiotic Guide [online] *diagnostic and differentials, investigations*


# 8. Associated Documentation

- Incident reporting policy
- Antibiotic guidelines for management of severe sepsis and septic shock
- Antibiotic prescribing policy
- Penicillin allergy policy
- Antibiotic guidelines for surgical prophylaxis

# 9. Appendix 1- Cellulitis

## 9.1. Name of guideline on app

Cellulitis

## 9.2. Location on app

Infection
Secondary Care
Adult treatment
Skin and Soft Tissue
Cellulitis

## 9.3. Header

Cellulitis is a clinical diagnosis based on erythema (in chronic ulcers this should extend more than 2cm beyond the ulcer edge), pain and warmth. NB. Please refer to separate guidance for diabetic skin infections and ophthalmic infections

**9.4.** Diagnosis and things to watch out for…

**Cellulitis is a clinical diagnosis based on**

- Erythema (in chronic ulcers this should extend more than 2cm beyond the ulcer edge)
- Pain
- Warmth
- Swelling
- Fever, malaise, nausea and rigors may accompany or precede skin changes

**Things to watch out for**

- Recurrent episodes of cellulitis
- Recent skin-breaking injury prior to skin infection occurring – particularly note:
  - acquired in marine/soil environment
  - human/animal bite (see separate guidance if so)
  - area/country where acquired, if travel history
- Immunosuppression
  - **Patients' immunosuppressing drugs should be managed in conjunction with their parent specialty – especially if for solid organ transplant**

**Cellulitis is often misdiagnosed. Be wary of :**

- Chronic venous changes (often discolouration, pain and swelling but lacking significant warmth or systemic signs of infection)
- 'Bilateral' cellulitis – usually this is congestive cardiac failure.
- Non-infective changes in the skin around chronic ulcers

**Other relevant guidance**

- See general information (below) for Eron Classification decision aid whether to admit or treat as outpatient
- Necrotising Fasciitis is a surgical emergency. Suspect if systemic signs, or local pain is out of proportion to superficial local signs. See separate guidance for necrotising fasciitis.
- In septic shock (i.e. hypotension not responsive to fluid challenge, use the septic shock algorithm.
- See Ophthalmology Guidelines for management of pre-orbital and orbital cellulitis (organisms may be different)

**9.5.** Always Remember To…

- Send blood cultures if a patient has systemic signs of infection

- Pus sample if oozing wound (try to capture in bottle - swab may inhibit growth)
- Pay attention to complaints of severe or rapidly changing pain – necrotising fasciitis develops extremely fast with little warning
- Always mark the edge of a cellulitic area with a pen.
- There is usually a portal of entry and this may require additional management (eg. Ulcer, scratch or bite, Athlete's foot)
- Elevation and rest may be important, especially if not settling

### 9.6. Treatment

Eron Classification 1 – Treat as outpatient with oral antibiotics

Eron Classification 2 – Admission may not be necessary if the patient is suitable for management under the MAU cellulitis protocol (see BOB)

Eron Classification 3 or 4 – Admit for hospital treatment and observation

Exceptions: regardless of infection severity, recommended to admit patients with cellulitis affecting anatomical areas where the consequences of tissue damage would be critical (facial / peri-orbital cellulitis)

There is little evidence that IV antibiotics improve outcome, and high doses of oral antibiotics are likely to be equally effective.

**First Line: (***Check MRSA status)*

**Flucloxacillin 1g QDS PO** or **Flucloxacillin 1g QDS IV**

Increase to 2g QDS if vascular compromise to affected region, or severe disease

**Second Line (penicillin allergy): (***Check MRSA status)*

**Clindamycin* 450mg QDS PO**

***Clindamycin sensitivity can be inferred from clarithromycin sensitivity

*Clindamycin has excellent bioavailability and rarely needs to be given intravenously.*

**MRSA Positive:**

**Vancomycin IV** (dose according to Trust protocol)

Discuss oral switch with Microbiologist

**Duration**

Usually 7 days total treatment

**OPAT (third line for patients who are unable to take oral flucloxacillin, but can be managed at home with IVs)**

**Ceftriaxone IV in MAU clinic as per protocol**

### 9.7. If No Better…

If not improving on oral antibiotics, attention to source control, rest, elevation, and compliance with antibiotics are more likely to be important.

Response to treatment may take 48 hours to become apparent on skin. Fevers and rigors (if present) should cease sooner. Re-examine with a view to scanning affected area(s) if fevers persist or haemodynamic instability.

In patients not responding to treatment consider underlying infection eg. Osteomyelitis

Review diagnosis - is this really cellulitis, just chronic venous changes, or other inflammatory skin condition (eg. pyoderma, malignancy)?

Recurrent episodes of cellulitis, more than 2 in 12 months, particularly at the same site, require discussion with microbiology re: antibiotic prophylaxis if other preventative measures such as compression hosiery and good hygiene have failed.

### 9.8. Organisms and Sensitivities

| | Flucloxacillin | Clindamycin | Doxycycline |
|---|---|---|---|
| **S. aureus (Methicillin sensitive)** | 100% | 88% | **94%** |
| **MRSA** | 0% | 34% | **95%** |
| **Group A Streptococcus** | **100%** | **89%** | **70%** |

### 9.9. General Interest and other points

- In patients with cellulitis after exposure to sea water then consider using Doxycycline 100mg BD PO (to cover Vibrio spp.)
- Eron Classification System for rating severity:

- **Class I** – there are no signs of systemic toxicity and the person has no uncontrolled co-morbidities.
- **Class II** - the person is either systemically unwell or systemically well but with a co-morbidity (for example peripheral arterial disease, chronic venous insufficiency, or morbid obesity) which may complicate or delay resolution of infection.
- **Class III** - the person has significant systemic upset such as acute confusion, tachycardia, tachypnoea, hypotension, or unstable comorbidities that may interfere with a response to treatment, or a limb-threatening infection due to vascular compromise.
- **Class IV** - the person has sepsis syndrome or a severe life-threatening infection such as necrotizing fasciitis

### 9.10. Other Relevant Guidelines

Antibiotic Guidelines for Bone and Joint Infections

Antibiotic Guidelines for Sepsis and Septic Shock

Antibiotic Guidelines for Ophthalmic Infections

### 9.11. Version Control

Antibiotic Guidelines for Skin & Soft Tissue Infections v2.4 19112020

# 10. Appendix 2 – Surgical Site Infection

### 10.1. Name of guideline on app

Surgical Site Infection

### 10.2. Location on app

Infection
Secondary Care
Adult treatment
Skin and Soft Tissue
Surgical Site Infection

### 10.3. Header

Superficial wound infections are generally caused by the same organisms as cause cellulitis. Deep wound infections may be caused by a variety of bacteria.

### 10.4. Diagnosis and things to watch out for…

Superficial surgical site infections (involving the dermis) are caused by the same organisms that cause cellulitis (*S. aureus* and haemolytic streptococci)

Deeper infection may involve other organisms, and generally requires debridement or drainage of underlying collections.

Necrotising Fasciitis is a surgical emergency. Suspect if systemic signs, or local pain is out of proportion to superficial local signs. See separate guidance [link to app guideline].

In septic shock (i.e. hypotension not responsive to fluid challenge, use the septic shock [link to app guideline] algorithm.

### 10.5. Always Remember To…

Send blood cultures if a patient has systemic signs of infection
Always mark the edge of a cellulitic area with a pen.

### 10.6. Antibiotic Guidelines

Superficial wound infection

Treat as per cellulitis guidelines [link to app guideline]

Deep Wound Infection

Usually requires imaging to define collections that may require drainage.

Causative organism(s) will depend on the location of the collection.

Consider withholding treatment prior to sampling.

Consider treating as a superficial wound infection in the absence of a formal diagnosis.

### 10.7. If No Better…

Response to treatment may take 48 hours to become apparent.
Consider scanning the site of infection to identify collections
Ask - is this really infection, or just expected inflammatory post-operative changes?

### 10.8. Organisms and Sensitivities

See cellulitis

### 10.9. General Interest and other points

Surgical site infection can be divided into:

- Superficial infection (involving skin and subcutaneous fat only)
- Deep infection (involving deep soft tissues, such as muscle and fascia)
- Organ-space infection

Superficial wound infections are generally caused by the same organisms as cause cellulitis

- Wounds may be colonized with faecal flora (eg. Coliforms and anaerobes).

These are rarely of clinical significance.

Deep wound infections may be caused by a wide variety of bacteria

- The causative agents will depend on the likely source of infection.
- Most of these infections will require consideration of drainage of collections and possibly prolonged antibiotic courses

Rapid presentations following surgery (within the first 48 hours) may indicate toxin producing pathogens, particularly if rapid spread, pain out of proportion to the wound appearance.

### 10.10. Other Relevant Guidelines

### 10.11. Version Control

Antibiotic Guidelines for Skin & Soft Tissue Infections v2.4 19112020

## 11. Appendix 3 – Mammalian and Human Bites

### 11.1. Name of guideline on app

Animal and Human Bites

### 11.2. Location on app

Infection
Secondary Care
Adult treatment
Skin and Soft Tissue
Mammalian Animal and Human Bites

### 11.3. Header

Irrigate the wound thoroughly with warm running tap water, or normal saline to remove dirt and bacteria.

### 11.4. Diagnosis and things to watch out for…

**Human Bites:**

Causative organisms – mainly *S. aureus*, but also anaerobes and *Streptococci*.

- Thorough irrigation with soap and warm water, or normal saline is important. Use a needle to irrigate inside puncture wounds if necessary.
- Assess risk of tetanus, HIV, Hepatitis B and C.
- Hepatitis B vaccination is strongly recommended in non-vaccinated patients.
- Antibiotic prophylaxis is advised.

**Traditional Animal Bites (cat, dog, small mammals, farm animals [excl. pigs/boar]):**

Causative organisms as for human bites, plus *Pasteurella multocida*. 80% of cat bites become infected, 5% of dog bites become infected.

- Antibiotics are not generally needed if the wound is more than 2 days old and there is no sign of local or systemic infection.
- Although tetanus after animal bites is rare, all guidelines in common use advise tetanus prophylaxis, with immunoglobulin and toxoid to be administered to patients with a history of two or fewer immunizations

**Bat and Other Wild Mammalian Animal Bites:**

Bats are regarded as a high rabies risk in the UK. Other wild animals in the UK are not currently thought to pose a rabies risk. Take a travel history from patients with animal bites to ensure rabies risk properly assessed. Inform Microbiology Consultant and refer to the Public Health England website for the most up-to-date advice on rabies prophylaxis by species/country.

Bites from wild rodents can cause serious illness due to non-bacterial organisms; pigs and other wild mammalian animals harbour unusual bacterial organisms – contact Microbiology Consultant for advice.

**Exotic Animals (incl. pets), Marine Life and Bird Bite/Peck Wounds:**

Unusual organisms may be present. Referral to Microbiology Consultant for advice on sampling and antimicrobial prescribing advice required.

### 11.5. Always Remember To…

Ascertain blood-borne virus status of human bite donors if possible, refer to the post-exposure prophylaxis guidance in the Management of Inoculation Injuries Policy on BOB.

Inform Microbiology consultant if bat bite, or animal bite acquired abroad and follow PHE advice regarding rabies.

Referral to Microbiology Consultant for advice if wild or exotic animal (incl. pets), marine life or bird bite/peck wounds.

Refer to safeguarding guidance on BOB if concerns about bite wounds or injuries in vulnerable patients.

Take a swab if wound is purulent or discharging frank pus to send for MC&S.

Send 2 sets of blood cultures if febrile or rigors, or otherwise systemically unwell (e.g. GI upset).

### 11.6. Things to Watch Out For (Red flags)

- Pain out of proportion to apparent injury, with signs of infection – follow necrotising fasciitis guideline
- Unstable vital signs on routine observations or signs of shock – alert seniors and resus team
- Extreme swelling – with or without dressing or cast on wound, or compromised circulation (capillary refill time >1 second) to affected limb(s) and crushing injury / bone and nerve damage suspected or confirmed –
  - suspect compartment syndrome and request urgent orthopaedic review
  - commence enhanced monitoring of affected limb(s) perfusion
- Rapidly spreading bruising, haematoma or frank blood loss from wound
- Patient expresses feeling of impending doom
- Non-verbal or vulnerable patient communication cues for signalling increased pain or distress

### 11.7. Antibiotic Guidelines

**Only patients fitting these criteria should be offered the antibiotics listed below, see "Diagnosis and Things to Watch Out For…" and "Always Remember To.." sections for further advice:**

- Unwell, or obviously infected wound from human, cat, dog or traditional pet or farm animal (excluding pigs) bite - e.g. increased pain, inflammation, fever, lymphangitis, discharge or an unpleasant smell. NB. if cardiovascular compromise, take blood cultures and wound swabs prior to antibiotics

- Cat or human bite with broken skin if any of:
  - Wound has drawn blood
  - High-risk area: hands, feet, face, genitals, skin overlying cartilaginous structures or area of poor circulation (even if no bleeding)
  - Serious infection risk due to co-morbidities - diabetes, immunosuppression, asplenia, decompensated liver disease (even if no bleeding).
  - Wound could be deep

- Dog or other "traditional" pet or farm animal (excluding cats and pigs) which has broken the skin **and drawn blood** only if any of:
  - High-risk area: hands, feet, face, genitals, skin overlying cartilaginous structures or an area of poor circulation
  - Serious infection risk due to co-morbidities - diabetes, immunosuppression, asplenia, decompensated liver disease
  - Penetration of bone, joint, tendon or vascular structures
  - Deep, puncture or crush wound, or has caused significant tissue damage
  - Visibly contaminated with dirt or foreign body (e.g. tooth) in wound

**First Line:**

**Co-amoxiclav 625mg TDS PO**

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OR if systemically unwell

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Co-amoxiclav 1.2g TDS IV (review daily, aim to IV-PO switch @ 48 hours)

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**Second Line (penicillin allergy):**

**Doxycycline 100mg OD PO**

plus

**Metronidazole 400mg TDS PO**

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OR if systemically unwell

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**Cefuroxime 1.5g TDS IV** (review daily, aim to IV-PO switch @ 48 hours)

plus

**Metronidazole 500mg TDS IV** (review daily, aim to IV-PO switch @ 48 hours)

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**Severe penicillin allergy:**

**As per second line for oral option**

---

OR if systemically unwell

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**Ciprofloxacin 400mg TDS IV** (review daily, aim to IV-PO switch @ 48 hours)

plus

**Clindamycin 450mg QDS IV** (review daily, aim to IV-PO switch @ 48 hours)

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**Duration**

Usually total duration (IV & PO combined) for 5 days if uncomplicated, course may be extended to 7 days if significant tissue destruction or penetration of bone/joint/tendon/vascular structures.

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**Rabies vaccine may be recommended after discussion of a case with PHE**. Ask how urgently this is needed in each case. Out of hours, if urgent supply required, contact the on call Pharmacist via switchboard

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**See General Interest for Empirical Treatment Advice in Other Species**

**11.8.** If No Better…

Response to antibiotic treatment may take 48 hours to become apparent.

Follow up culture and sensitivity results on pathology and discuss with Microbiology Consultant if concerns.

Severe pain developing out of proportion to the affected area may indicate developing necrotising fasciitis, or if crush injuries - a compartment syndrome.

- Urgent senior orthopaedic and general surgeon review is required.
- Enhanced Nursing observations for vital signs and checking circulation in affected limb(s) should be commenced immediately whilst awaiting review.

Be aware of non-verbal behavioural cues in vulnerable patients who are deteriorating and unable to communicate.

In patients not responding to treatment consider underlying infection eg. Osteomyelitis and need for debridement

11.9. Organisms and Sensitivities

See under diagnosis for organisms, and cellulitis guidelines for sensitivities

11.10. General Interest and other points

**Other Species:**

**Monkey Bites:**

Herpes B virus is a rare cause of serious infection after bites from macaque monkeys, and prophylaxis with valaciclovir should be strongly considered

**Valaciclovir 1g TDS PO** for 14 days

**Seal Bites:**

Localised infection due to marine *Mycoplasmas* have been reported, and may not appear for several weeks. Phone Microbiology Consultant to discuss.

11.11. Other Relevant Guidelines

Antibiotic Guidelines for Bone and Joint Infections

Antibiotic Guidelines for Sepsis and Septic Shock

Management of Inoculation Injuries Policy

Safeguarding referrals and advice via Trust intranet pages

11.12. Version Control

Antibiotic Guidelines for Skin & Soft Tissue Infections v2.4 19112020

# 12. Appendix 4 – Diabetic foot ulcers

12.1. Name of guideline on app

Diabetic Foot Ulcers

12.2. Location on app

Infection
Secondary Care
Adult treatment
Skin and Soft Tissue
Diabetic Foot Ulcers

12.3. Header

Treatment is based on infection severity – which should be assessed according to the criteria in the diagnostic notes below. Ensure prompt referral to vascular surgeons and diabetic foot services on diagnosis (see general interest for details).

## 12.4. Diagnosis and things to watch out for…

Severity should be assessed according to the following criteria:

| Severity | Clinical signs |
|---|---|
| **Not infected** | **Wound lacking evidence of purulence, or any manifestations of infection** |
| **Mild** | **2 or more manifestations of inflammation (purulence, erythema, pain, tenderness, warmth, induration), but erythema less than 2cm from margin, no other complications, and no systemic manifestations.** |
| **Moderate** | **As above, in patient who is systemically well and metabolically stable, but with one or more of the following signs: cellulitis more than 2cm, lymphangitic spreading, spread beneath superficial fascia, deep-tissue abscess, gangrene.** |
| **Severe** | **Infection in a patient with systemic signs of infection (eg. fever, rigors, leucocytosis)** |
| **Severe sepsis** | **Patient with severe infection with hypotension not responding to fluid challenge.** |

A surgical opinion should be obtained if there is evidence of a deep abscess, extensive bone or joint involvement, crepitus, substantial gangrene or necrotising fasciitis. Evaluation and correction of arterial supply is particularly important.

## 12.5. Always Remember To…

Check the MRSA status and ensure an MRSA screen has been sent. In mild infection, determining the MRSA status of a patient may be helpful.

In infected ulcers, sampling should be carried out in all patients with moderate/severe infection – a wound swab after cleaning and debridement is often adequate, although a tissue biopsy is the gold standard.

Wound care (especially debridement and off-loading) is essential to successful outcome.

## 12.6. Antibiotic Guidelines

Mild Infection (see table in “diagnosis and things to watch out for” tab)

**Treat as per cellulitis guidelines [link to app guidelines], usually oral treatment for one week**

Moderate / Severe Infection (see table in “diagnosis and things to watch out for” tab)

**Treat as per cellulitis guidelines [link to app guidelines], usually oral treatment for two-four weeks**

Severe Sepsis (see table in “diagnosis and things to watch out for” tab) [closed]

**Vancomycin IV** dose according to Trust protocol

*Plus*

**Piperacillin-Tazobactam (Tazocin®) 4.5g TDS IV**

Antibiotics should be rationalised on the basis of culture results, although addition of cover for anaerobes and gram negative organisms may not be required, even if isolated from a post-debridement specimen.

**12.7.** If No Better…

Check the MRSA status.

Consider broadening treatment if mild-moderate infection failing to respond, based on lab results (usually co-amoxiclav).

Contact microbiology to discuss antibiotic treatment options for severe cases

Refer for consideration of debridement under vascular surgeons. Evaluation and correction of arterial supply is particularly important.

Consider Osteomyelitis if:

- Ulcer not healed after 6 weeks of therapy
- If bone is visible or can be probed
- A swollen foot with a history of foot ulceration
- A sausage toe
- An unexplained high WBC
- Radiological evidence of bone destruction

**12.8.** Organisms and Sensitivities

Empirical antibiotic choice should be targeted against *Staph. aureus*. In severe sepsis, the spectrum must be extended to cover MRSA, *Pseudomonas* and anaerobes, pending culture results.

### 12.9. General Interest and other points

see links for North Devon Diabetes Footcare Pathway

**Community podiatry**:

- 01271 341509
- ndht.podiatry@nhs.net

**NDDH foot clinic:**

- ndht.diabeteshotfoot@nhs.net

**Diabetes on call Foot Team:**

- For anything to be referred within 24 hours (Mon-Fri) 01271 322424
- For anything out of hours via vascular on call via Musgrove Park Hospital 01823 33344

### 12.10. Other Relevant Guidelines

Antibiotic Guidelines for Bone and Joint Infections

Antibiotic Guidelines for Sepsis and Septic Shock

### 12.11. Version Control

Antibiotic Guidelines for Skin & Soft Tissue Infections v2.4 19112020

# 13. Appendix 5 – necrotising fasciitis

### 13.1. Name of guideline on app

Necrotising Fasciitis

### 13.2. Location on app

Infection
Secondary Care
Adult treatment
Skin and Soft Tissue
Necrotising Fasciitis

### 13.3. Header

Necrotising fasciitis should be considered in patients with unexplained limb pain, or disproportionate pain with only minor skin changes. Necrotising fasciitis is a surgical emergency.

### 13.4. Diagnosis and things to watch out for…

Patients are very ill with disproportionate pain and only minor skin changes in the early phases.

From a rapidly advancing erythema, painless ulcers may appear as the infection spreads along the fascial planes.

Patients may present with skin vesicles, bullae, oedema, crepitus, erythema and fever.

Patients often have signs of severe sepsis, including high temperature, tachycardia, hypotension and altered level of consciousness

Incision and probing can assist in diagnosis in cases of doubt. If there is no resistance to probing subcutaneously (fascial plane), then the diagnosis is necrotising fasciitis.

### 13.5. Always Remember To…

Escalate suspected cases to senior clinicians promptly, and ensure the on-call surgical team are made aware.

Early management involves

- ⇨ Resuscitation
- ⇨ Early and aggressive debridement of involved skin, subcutaneous fat and fascia
- ⇨ Blood cultures
- ⇨ Imaging

### 13.6. Antibiotic Guidelines

**Meropenem 2g TDS IV** *Plus* **Clindamycin 600mg QDS IV / PO**

*And consider*

**Normal Human Immunoglobulin 2g/kg in a single dose** (obtain from blood transfusions)

Consider further doses if clinical response

Add **Vancomycin** (dose according to Trust protocol) if any risk factors for MRSA

*This regimen should be used in all cases of penicillin allergy, unless there has been previous anaphylaxis to carbapenems – in which case, phone Microbiology Consultant to discuss.*

**13.7.** If No Better…

This condition requires ongoing senior clinician review.

Re-imaging and re-exploration in theatres may be necessary. Consider osteomyelitis, discuss antibiotic management with Microbiology Consultant.

Patients who have undergone debridement(s) ± amputation should be referred to tissue viability CNS team, and plastic surgery for review.

Co-morbidities should be controlled as far as possible – diabetes is a risk factor for developing necrotising fasciitis and will impair healing

**13.8.** Organisms and Sensitivities

Type 1 NF (synergistic gangrene) and is caused by anaerobes and Gram negative organisms (usually originating from the bowel)

Type 2 NF is caused by toxin producing Group A *Streptococcus*

Type 3 NF (Gas gangrene) is a deeper infection of the muscle tissues, usually caused by *Clostridium perfringens* and is treated in the same manner as necrotising fasciitis. Debridement is by necessity much more extensive. It is comparatively rare.

**13.9.** General Interest and other points

The use of clindamycin is thought to reduce bacterial toxin production.

**13.10.** Other Relevant Guidelines

**13.11.** Version Control

Antibiotic Guidelines for Skin & Soft Tissue Infections v2.4 19112020

# 14. Appendix 6 – Breast abscess and mastitis

**14.1.** Name of guideline on app

Breast abscess

**14.2.** Location on app

Infection
Secondary Care
Adult treatment
Skin and Soft Tissue
Breast abscess and mastitis

### 14.3. Header

Lactational and non-lactational mastitis are managed differently

### 14.4. Diagnosis and things to watch out for…

In women with a breast abscess, antibiotics alone without removal of pus are unlikely to be curative. However, a thoroughly performed, ultrasonography-guided aspiration may be curative, and culture of pus may enable optimisation of antibiotic treatment.

Even when clinical examination shows signs of an abscess, an ultrasound is useful because it may identify more than one collection of pus that may otherwise be missed

### 14.5. Always Remember To…

- Give Analgesia
- Advise warm compress or bathe or shower with warm water
- If lactational mastitis, advise regular expressing of milk or continuing to feed if infant tolerates milk from affected breast.

### 14.6. Antibiotic Guidelines

Treatment is generally oral, unless systemically unwell

**Lactational mastitis First line**

**Flucloxacillin 500mg PO four times a day** (1g QDS IV if systemic symptoms)

**Lactational mastitis Penicillin allergy**

**Clarithromycin 500 mg twice a day**

**Non-lactational mastitis First line**

**Co-amoxiclav 625 mg three times a day** (1.2g TDS IV if systemic symptoms)

**Non-lactational mastitis Penicillin allergy**

**Clindamycin 450mg four times a day PO**

**Duration**

10 days

### 14.7. If No Better…

**If symptoms fail to settle after 48 hours of first-line antibiotic treatment:**

- Check that the woman has taken the antibiotic correctly.
- Consider the possibility of an alternative diagnosis (such as breast cancer or a breast abscess).
  - If an abscess is suspected, be aware that malaise and fever may have subsided if antibiotics have been started.

- **If mastitis recurs,** manage as for treatment failure. In addition:
  - Identify and manage any predisposing factors, such as:
    - Nipple damage from skin conditions such as psoriasis, eczema, infection, or Raynaud's disease of the nipple .
  - Ensure that the woman is aware of measures to prevent recurrence, such as stopping smoking and maintaining good hygiene.

### 14.8. Organisms and Sensitivities

Lactational mastitis : *S. aureus*

Non-lactational mastitis : *S. aureus,streptococci, anaerobes*

### 14.9. General Interest and other points

Advise lactating women to continue breastfeeding if possible (including from the affected breast).

If this is too painful, or the infant refuses to breastfeed from the affected breast, advise the woman to express the milk (by hand or with a breast pump) until she is able to resume breastfeeding from that breast.

Because milk stasis is often the initiating factor in lactational mastitis, the most important management step is frequent and effective milk removal. Sudden cessation of breastfeeding in women with lactational mastitis increases the risk of abscess formation

### 14.10. Other Relevant Guidelines

### 14.11. Version Control

Antibiotic Guidelines for Skin & Soft Tissue Infections v2.4 19112020