# UHL Adult Orthopaedic Infection Guidelines (excluding Prosthetic Joint Infections)

University Hospitals of Leicester NHS
NHS Trust

B40/2021

## 1. Introduction and Who Guideline applies to

This document sets out the University Hospitals of Leicester (UHL) NHS Trust's Policy and Procedures for clinical diagnosis, investigations and treatment of Orthopaedic infections. This policy does not apply to treatment of patients with diabetic foot osteomyelitis and patients with infected metal work.

The antibiotic doses in this guideline are intended for adult patients with normal renal and liver function, and are not applicable to pregnant or breast feeding patients unless otherwise stated. Refer to Microbiologist/ Pharmacist for further advice in these patients.

For surgical prophylaxis see separate guidelines available on insite.

## 2. Guideline Standards and Procedures

### *2.1 General prescribing information.*

If longer antibiotic courses are required for in-patients than recommended in these guidelines the prescriber must contact microbiology and document a verification code on the prescription chart.

Always take an allergy history before prescribing any drug.

For information on contraindications, cautions, drug interactions and adverse effects refer to the British National Formulary (www.bnf.org) or the Medicines Compendium (http://emc.medicines.org.uk/).

### *2.2 Septic Arthritis*

Clinical diagnosis

Septic arthritis should be suspected in patients presenting with a short history of painful, hot and swollen joint(s) with restriction of movement.

Investigations

1. Synovial fluid aspirate for microscopy, Gram stain, culture and histology.
2. Blood cultures (two sets) in patients with systemic signs and symptoms of infection.
3. Bloods: full blood count, CRP, urea and electrolytes, serum urate and liver function tests.
4. Plain radiograph of affected joint(s), MRI scan and USS may all be justified.

Treatment

All suspected cases of native joint septic arthritis should be referred to an orthopaedic surgeon for assessment. Joint aspiration is key to diagnosis and management. Surgical debridement and joint washout is expected. Time to joint washout is an auditable standard.

Empirical antibiotics can be started if initial aspirate Gram stain is negative or in patients with signs of sepsis (where joint aspiration is likely to be delayed). Ensure blood cultures are taken prior to antibiotics in patients with sepsis.

<table>
<tr><th>Septic arthritis (native joint)</th><th>1st Line Antibiotics</th><th>2nd Line antibiotics/Penicillin allergy</th><th>Treatment duration</th><th>Comments</th></tr>
<tr><td>No known risk factors</td><td>Flucloxacillin 2g QDS IV</td><td>Vancomycin IV dosed as per chart</td><td rowspan="3">Empiric treatment should only be used for up to 5 days. Antibiotic treatment thereafter should be tailored to the joint aspirate culture results.<br><br>Total duration of treatment: 6 weeks.</td><td rowspan="5">Ensure blood cultures, joint aspirates and deep tissue specimens are collected where possible prior to commencement of antimicrobial therapy to aid diagnosis.<br><br>Review all empiric treatment with Gram stain results and again by day 5 with culture results.<br><br>It may be possible to convert treatment to oral antibiotics on discussion with a microbiologist when clinical response is satisfactory.</td></tr>
<tr><td>Risk factors present: frail, elderly (age>80), recurrent UTIs, end stage renal failure, recent hospitalisation</td><td>Piperacillin/ tazobactam 4.5g TDS IV</td><td rowspan="2">Vancomycin IV dosed as per chart<br><br>AND<br><br><u>Either:</u><br><br>Ceftazidime 1g TDS IV (non-anaphylactic penicillin allergy)<br><br><u>Or</u><br><br>Ciprofloxacin 750mg BD PO (anaphylactic penicillin allergy)</td></tr>
<tr><td>Previous history of MRSA colonisation or infection</td><td>Vancomycin IV dosed as per chart<br><br><u>And</u><br><br>Piperacillin/ tazobactam 4.5g TDS IV</td></tr>
<tr><td>Suspected gonococcal septic arthritis</td><td>Ceftriaxone 2g OD IV</td><td>Discuss with Microbiology</td><td>2 weeks for uncomplicated infections</td></tr>
<tr><td>Septic arthritis in patients with sickle cell disease</td><td>Ceftriaxone 2g BD IV</td><td>Discuss with Microbiology</td><td>4-6 weeks</td></tr>
</table>

### *2.3 Osteomyelitis*

Clinical diagnosis

*Acute osteomyelitis*: usually presents with gradual onset of symptoms over several days and responds to antimicrobial treatment. Symptoms include dull pain at the involved site (with or without movement). There may be localised tenderness, swelling, erythema and warmth. Systemic symptoms such as fever and rigors may also be present. Patients with osteomyelitis involving the hip, vertebrae, or pelvis may present with few signs or symptoms other than pain.

*Chronic osteomyelitis*: may present with pain, erythema, or swelling. Fever is usually absent. Chronic osteomyelitis may also present with intermittent flares of pain and swelling. The presence of a sinus tract is pathognomonic of chronic osteomyelitis. Deep or extensive ulcers that fail to heal after several weeks of appropriate ulcer care should be investigated for chronic osteomyelitis, especially if the ulcer lesions overlie bony prominences.

Investigations

1. Bone biopsy and sinus swab specimens for culture and histology.
2. Blood cultures (two sets) in patients with systemic signs or symptoms of infection.
3. Bloods: full blood count, CRP, urea and electrolytes, serum urate and liver function tests.
4. Imaging: Plain radiographs, CT or MRI as appropriate.

Treatment

Acute osteomyelitis can often be treated with antimicrobials. Large collections should be drained. Patients should be discussed with an orthopaedic surgeon or spinal surgeon (discitis and vertebral osteomyelitis) to facilitate obtaining appropriate specimens.

Treatment of discitis and vertebral osteomyelitis in particular is highly dependent on obtaining a microbiological diagnosis as the potential range of causative pathogens is wide.

Treatment of chronic osteomyelitis is mainly surgical.

Treatment of diabetic foot osteomyelitis is detailed in separate guidance.

| Osteomyelitis | 1st Line Antibiotics | 2nd Line antibiotics/Penicillin allergy /History of MRSA infection or colonisation | Treatment duration | Comments |
|---|---|---|---|---|
| Osteomyelitis (acute, no prosthesis) | Flucloxacillin 2g QDS IV | Vancomycin IV dosed as per chart | 6 weeks | Ensure blood cultures, bone biopsies and/or deep tissue specimens are collected where possible prior to commencement of antimicrobial therapy to aid diagnosis.<br><br>Review all empiric treatment by day 5 with culture results.<br><br>It may be possible to convert treatment to oral antibiotics on discussion with a microbiologist when clinical response is satisfactory. |
| Osteomyelitis (acute, prosthesis present) | Discuss with microbiology | | | |
| Discitis, vertebral osteomyelitis | Empirical treatment should be avoided unless the patient is neutropenic or shows signs of sepsis. Discuss with microbiology. | | 6 weeks | |
| Chronic osteomyelitis | Surgical debridement is mainstay of treatment. Discuss with microbiology. | | 12 weeks | |
| Osteomyelitis in patients with sickle cell disease | Ceftriaxone 2g BD IV | Discuss with microbiology. | 6 weeks | |

### *2.4 Pyomyositis*

Clinical presentation

This can mimic septic arthritis and acute osteomyelitis especially around the hip. It is usually diagnosed on MRI scanning. The treatment should be mainly antimicrobial with surgery rarely performed.

Investigations

1. Blood cultures (two sets) in patients with systemic signs or symptoms of infection.
2. Aspiration of bursal fluid for microbiological culture.
3. MRI or USS scanning

Treatment

Empirical treatment can be started once appropriate cultures are obtained. It is important to review treatment with culture results when available and adjust accordingly.

| | 1st Line Antibiotics | 2nd Line antibiotics/Penicillin allergy /History of MRSA infection or colonisation | Treatment duration | Comments |
|---|---|---|---|---|
| Pyomyositis | Flucloxacillin 2g QDS IV<br><br>Oral conversion: Flucloxacillin 1g QDS PO | Vancomycin IV dose as per chart<br><br>Oral conversion: Doxycycline 200mg OD PO (check sensitivities prior to conversion) | 2 weeks | Review culture results and adjust treatment accordingly. IV to oral switch appropriate when there is no systemic signs of infection and good clinical response. |

### *2.5 Infected Bursitis*

Clinical presentation

The most common sites of septic bursitis are the olecranon, prepatellar, and superficial infrapatellar bursae. Patients typically present with erythema, pain and swelling at the site of the bursa. Fever may be present. Cellulitis and induration of overlying skin may also be present. There may be signs of abrasions or trauma associated with the skin overlying the bursa. Septic bursitis is sometimes accompanied by septic arthritis.

Investigations

1. Blood cultures (two sets) in patients with systemic signs or symptoms of infection.
2. Aspiration of bursal fluid for microbiological culture.
3. Plain radiograph to assess for evidence of trauma or osteomyelitis.

Treatment

Empirical treatment can be started once appropriate cultures are obtained. It is important to review treatment with culture results when available and adjust accordingly.

| | 1st Line Antibiotics | 2nd Line antibiotics/Penicillin allergy | Treatment duration | Comments |
|---|---|---|---|---|
| Mild/ moderate bursitis | Flucloxacillin 1g QDS PO | Doxycycline 200mg OD PO<br>History of MRSA infection or colonisation: discuss with microbiology | 7 days | Review in clinic after 7 days |
| Severe bursitis | Flucloxacillin 2g QDS IV (for minimum 2 and up to 5 days)<br><br>Oral conversion: Flucloxacillin 1g QDS PO for total treatment time 2 weeks and review | Vancomycin IV dose as per chart(for minimum 2 and up to 5 days; adjust dose if >65 yrs or renal impairment; monitor blood levels)<br><br>Oral conversion: Doxycycline 200mg OD PO (check sensitivities prior to conversion)<br>History of MRSA infection or colonisation: discuss with microbiology | 2 weeks and review | Review culture results and adjust treatment accordingly. IV to oral switch appropriate when there is no systemic signs of infection and good clinical response. Reassess in clinic- up to 6 weeks may be required |

### *2.6 Human and Animal Bites and Dirty Puncture Wounds*

- Manage the wound with irrigation and debridement as necessary.
- Check tetanus status.
- Surgical exploration of wound may be required. Consider surgical wound debridement if there is suspicion of puncture wounds entering joints or tendon sheathes or other important structures and consider the amount of soft tissue damage caused by crushing injury.
- Any discharge should be swabbed and sent for microscopy and culture.
- Animal bites: Rabies must be considered in bites from all bats (UK and abroad) and terrestrial animals from abroad. Contact virology on-call to discuss.
- Human bites: Consider blood borne viruses (BBV) risk with HIV, Hepatitis B and Hepatitis C infections.

If the bite is uninfected, prophylactic antibiotics (max. 3 days) may be indicated in some scenarios:

| Type of bite | Bite has not broken the skin | Bite has broken the skin but not drawn blood | Bite has broken the skin and drawn blood |
|---|---|---|---|
| Human bite | Do **not** offer antibiotics | Consider antibiotics if it is in a high-risk area* or person at high risk** | Offer antibiotics as below |
| Cat bite | Do **not** offer antibiotics | Consider antibiotics if the wound could be deep | Offer antibiotics as below |
| Dog or other traditional pet bite | Do **not** offer antibiotics | Do **not** offer antibiotics | Offer antibiotics as below if it has caused considerable, deep tissue damage or is visibly contaminated (for example, with dirt or a tooth). Consider antibiotics if it is in a high-risk area or person at high risk |

*High-risk areas include the hands, feet, face, genitals, skin overlying cartilaginous structures or an area of poor circulation.

**People at high risk include those at risk of a serious wound infection because of a co-morbidity (such as diabetes, immunosuppression, asplenia or decompensated liver disease).

Antibiotic choice:

| | **1st Line Antibiotics** | **2nd Line antibiotics/Penicillin allergy** | **Treatment duration** | **Comments** |
|---|---|---|---|---|
| Non-infected bites and puncture wounds (prophylaxis) | Co-amoxiclav 625mg TDS PO | Doxycycline 200mg OD PO<br><br>AND<br><br>Metronidazole 400mg TDS PO | 3 days | |
| Infected bites and puncture wounds (treatment) | Co-amoxiclav 625mg TDS PO<br><br>If Nil by mouth: Co-amoxiclav 1.2g TDS IV | Doxycycline 200mg OD PO<br><br>AND<br><br>Metronidazole 400mg TDS PO<br><br>If Nil by mouth: Ceftriaxone 2g BD IV<br><br>AND<br><br>Metronidazole 500mg TDS IV | 5 days | Ensure swabs are sent if discharge from wound present.<br><br>Severe soft tissue infection from bites may require prolonged treatment. Discuss with microbiology ideally after culture results are available. |

### *2.7 Open Fractures and Deep Lacerations with Tendon/Nerve Damage*

| | 1st Line Antibiotics | 2nd Line antibiotics/ Penicillin allergy | Treatment duration | Comments |
|---|---|---|---|---|
| Open Fractures | Co-amoxiclav 1.2 g TDS IV | Clindamycin 600mg QDS IV | Continue until first debridement. At the time of first debridement, antibiotics should be continued until soft tissue closure or for a maximum of 72 hours, whichever is sooner. | Skeletal stabilisation and soft tissue closure: Co-amoxiclav regardless of MRSA status. For MRSA positive or MRSA unknown patients, also add Teicoplanin. Consult surgical prophylaxis guidelines for dosing.<br><br>These should not be continued post operatively. |
| Lacerations with tendon or nerve damage | Flucloxacillin 1g QDS PO | Doxycyline 200mg OD PO<br><br>History of MRSA infection or colonisation: discuss with microbiology | 5 days | |

## 3. Education and Training

*None*

## 4. Monitoring Compliance

| What will be measured to monitor compliance | How will compliance be monitored | Monitoring Lead | Frequency | Reporting arrangements |
|---|---|---|---|---|
| Time to diagnosis | Orthopaedic infection audit | A. Abraham | 3 yearly | Orthopaedic M&M |
| Time to surgery | Orthopaedic infection audit | A. Abraham | 3 yearly | Orthopaedic M&M |
| Compliance with antimicrobial policy in septic arthritis | Septic arthritis audit | A. Abraham | Audit at 1 year from implementation | Orthopaedic M&M |
| Compliance with antimicrobial policy | Trust wide antimicrobial prescribing audit | A. Abraham | 3 yearly | Orthopaedic M&M |
| Response to treatment | Orthopaedic infection audit | A. Abraham | 3 yearly | Orthopaedic M&M |
| Conversion to outpatient treatment | Orthopaedic infection audit | A. Abraham | 3 yearly | Orthopaedic M&M |
| Success of treatment | Orthopaedic infection audit | A. Abraham | 3 yearly | Orthopaedic M&M |

## 5. Supporting References (maximum of 3)


1. Mathews CJ, Kingsley G, Field M, et al. Management of septic arthritis: a systematic review. *Ann Rheum Dis*. 2007;66(4):440-445. doi:10.1136/ard.2006.058909
2. Human and animal bites: antimicrobial prescribing. NICE guidelines. https://www.nice.org.uk/guidance/ng184/
3. BAPRAS/BOA Standards for the management of open fractures of the lower limb (Sep 2009)


## 6. Key Words

Septic Arthritis, Osteomyelitis, Infected Bursitis, Open fractures, soft tissue injuries, lacerations, bites, dirty wounds, orthopaedic infection

| CONTACT AND REVIEW DETAILS | |
|---|---|
| **Guideline Lead (Name and Title)**<br>Mr Alwyn Abraham (Consultant Orthopaedic Surgeon)<br>Dr Felicia Lim (Consultant Medical Microbiologist) | **Executive Lead**<br>Medical Director |

**Details of Changes made during review:**

Removal of prosthetic joint infection guidelines
Inclusion of Gram negative cover for high risk septic arthritis patients.
Addition of pyomyositis section
Removal of infected metalwork section.
Addition of risk assessment table for bites and option for patients nil by mouth.
Expansion of septic arthritis and osteomyelitis treatment advice according to risk factors.
10/5: ceftriaxone doses updated in light of new laboratory breakpoints suggesting 'high dose' for Staph aureus. Regime for treatment of infected bite in patients who are NBM updated in light of MHRA warning re: quinolones