

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 initial treatment of Orthopaedic Prosthetic Joint Infections (PJI). As well as this it outlines the MDT structure from which ongoing management should be discussed and planned.

For surgical prophylaxis, and for orthopaedic infections excluding prosthetic joint infections, see separate guidelines ["UHL Adult Orthopaedic Infection Guidelines"](#)

Summary of antimicrobial guidelines for suspected acute PJI

1. All suspected acute PJIs should be discussed with the on-call orthopaedic team
2. Antibiotics should **not** be given in a non-septic patient prior to **deep tissue sampling in theatre**
3. In a septic patient where PJI is suspected, then manage as per Trust [sepsis guidelines](#)
4. In non-septic patients, **commence antibiotics only once deep tissue samples have been taken**. If the causative organism is already known then commence antibiotics in conjunction with advice from microbiology. Otherwise give **empirical antibiotics as per section 2.5**.
5. Antimicrobial therapy should then be tailored following discussion at the Orthopaedic-Microbiology MDT, and/or East Midlands South Special Orthopaedic Network (EMSSON) MDT.

2. Guideline Standards and Procedures

2.1 General prescribing information

These guidelines only set out the initial treatment of prosthetic joint infection. All cases and ongoing treatment should be discussed in an MDT with input from microbiology and/or infectious disease teams.

Always take an allergy and past medical history. 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.

2.2 Clinical presentation

Clinical presentation can be either acute or chronic.

Acute prosthetic joint infection should be considered in any patient who has acute onset of joint pain, systemic symptoms such as fever, or any of the following at the implant site; effusion, erythema, warmth, oedema, induration, sinus tract, wound breakdown, or purulent discharge.

Chronic presentations can have more subtle signs and symptoms, including early implant failure, symptoms of implant loosening such as start-up pain, or sequela such as dislocation.

There should be a high index of suspicion of prosthetic joint infection in the post-operative period, in those who have systemic predisposition to infection e.g. immunosuppressed, and those who have undergone revision operations, multiple operations, or have had previous prosthetic joint infections.

2.3 Initial assessment and management of suspected prosthetic joint infections

Following history and examination the following minimum investigation should be requested;

1. Bloods – including FBC, CRP, U&E and LFTs.
2. Blood cultures are mandatory if acute infection is suspected.
3. Radiographs – plain film AP and lateral of the affected joint – these may not be useful in the acute setting, however may show loosening in more chronic presentation, and help identify alternative pathology such as fracture.
4. Investigation of any alternative source of infection e.g CXR, Urine MC+S.
5. Wound swabs are not diagnostic for PJI, and should not be taken (unless otherwise indicated)

All suspected or confirmed acute prosthetic joint infections, or unwell patients with suspected or confirmed chronic prosthetic joint infections should be referred to the orthopaedic registrar on-call.

Suspected chronic prosthetic joint infection requires urgent outpatient review and investigation.

Joint aspiration of a prosthetic joint should only be performed by the orthopaedic team, in an appropriately clean environment.

Identification of causative organism(s) is critical in the management of prosthetic joint infections, therefore specimens should be acquired **before** commencing antibiotic therapy.

If prosthetic joint infection is suspected, then in the absence of sepsis, antibiotic therapy should be held pending acquisition of tissue samples for diagnosis. If there is a suspected concurrent infection such as LRTI, then consider holding antibiotics pending orthopaedic review.

In a septic patient with suspected prosthetic joint infection, take blood cultures, then commence antibiotics, following the Trust guidelines of [“Sepsis and Septic Shock”](#)

2.3 Diagnosis

Diagnosis should be made using the [EBJIS \(2021\)](#) definition of prosthetic joint infection.

Antibiotics should ideally not be administered for 2 weeks prior to sampling, unless the patient is systemically unwell.

Aspiration +/- biopsy should be undertaken in an appropriate theatre / clean procedure environment.

Fluid aspirates should be directly inoculated in to a **“FAN” broth culture bottle** (not blood culture bottles). Fluid should be collected in a sterile syringe and transferred to the FAN bottle with a new untouched needle. The cap of the FAN bottle should be cleaned with chloraprep for 30 second and allowed to fully dry prior to transfer.

Leucocyte esterase analysis (using urine dipstick) can be performed on any synovial fluid sample. If blood-stained then it should be centrifuged at bedside prior to analysis, and results should be documented.

At surgery, **five samples should be taken for microbiological analysis.**

- Each sample should be taken from untouched tissue, using separate, untouched instruments. Each sample should be placed directly into separate sterile containers.
- Delay decreases yield, so all samples require **urgent microbiological processing**, with extended culture.
- **The laboratory should be contacted to inform the biomedical scientist that samples are being sent and these should be sent urgently** from which ever site the specimens are taken at.

Three separate samples should also be taken for histological analysis (EBJIS 2021).

Mycobacterial and fungal culture needs to be considered at the time of taking samples and requested so the lab can process appropriately.

2.4 Treatment – Surgical

When indicated, debridement, antibiotics, and implant retention (DAIR) should be performed urgently by an experienced arthroplasty surgeon.

Isolated ‘washout’ (arthroscopic or open) is indicated as a temporising or life-saving measure to reduce the septic load in an unwell patient or where frank pus is present, prior to definitive DAIR or revision procedure by an arthroplasty surgeon. Specimens should be taken as above at the time of this procedure.

If a surgery is performed urgently and is unable to be discussed at an MDT pre-operatively, then it should be formally discussed retrospectively at the next available opportunity.

2.5 Treatment – Antimicrobial

In a **septic** patient where PJI is suspected, then manage as per Trust [sepsis guidelines](#). Blood cultures should be taken before antibiotics are administered.

In **non-septic** patients, **commence antibiotics only once deep tissue samples have been taken in theatre**. If the causative organism is *already* known then commence antibiotics in conjunction with advice from microbiology.

Empirical intra and post-operative antibiotics for suspected/confirmed PJI (Initial 5-day prescription, pending culture result):

First Line	Moderate Penicillin Allergy (rash only, no anaphylaxis)	Severe Penicillin Allergy (anaphylaxis)
IV Piperacillin-Tazobactam 4.5g TDS and IV Vancomycin*	IV Ceftazidime 2g BD and IV Vancomycin*	IV Meropenem 1g TDS and IV Vancomycin* OR PO/IV Ciprofloxacin 750mg BD, and IV Vancomycin*

*Vancomycin loading and subsequent dosing as per adult [vancomycin guidelines](#)

Subsequent antibiotic choice and treatment duration should be determined through MDT discussion (Orthopaedic-Microbiology MDT and/or EMSSON MDT) with involvement of Infectious Diseases and/or Microbiology consultant input.

If there are antibiotic allergies to any of the second line agents or to Vancomycin, then please discuss with microbiology

2.6 Consultant ownership, MDT and national registry

Consultant in charge:

The responsibility for PJI care, both during inpatient stays and outpatient follow-up, should be assumed by either the consultant performing the index surgery, or a consultant whose practice specializes in revision arthroplasty surgery. In instances where initial admission is under the care of a non-arthroplasty surgeon, collaborative input must be sought for investigation and initial management, with consultant-to-consultant handover of care where infection is probable of confirmed.

MDT:

All patients undergoing an operation (aside from aspiration or biopsy) for suspected prosthetic joint infection must be discussed at the weekly Arthroplasty MDT (EMSSON, Fridays) and/or Orthopaedic-Microbiology MDT (Tuesdays).

Any patient who undergoes an urgent or emergency operation for suspected or confirmed prosthetic joint infection without the opportunity for discussion at the MDT should be discussed retrospectively at the next available opportunity.

Any patient with confirmed prosthetic joint infection who is not for surgical management should also be discussed at the EMSSON MDT.

Registry:

All cases should be recorded on both NJR and BAJIR databases.

3. Education and Training

Training of theatre team

4. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Compliance with advised antimicrobial therapy, and time of delivery	Orthopaedic audit	Daniel Howard	3 yearly	Orthopaedic M&M
Micro and histology sampling number and technique.	Orthopaedic audit	Daniel Howard	3 yearly	Orthopaedic M&M
Compliance with discussion of patients at appropriate MDT	Orthopaedic audit	Daniel Howard	3 yearly	Orthopaedic M&M
Recording of case information of appropriate registries.	Orthopaedic audit	Daniel Howard	3 yearly	Orthopaedic M&M

5. Supporting References (maximum of 3)

McNally M, Sousa R, Wouthuyzen-Bakker M, Chen AF, Soriano A, Vogely HC, Clauss M, Higuera CA, Trebše R. The EBJIS definition of periprosthetic joint infection. Bone Joint J. 2021 Jan;103-B(1):18-25.

BOAST – Investigation and Management of Prosthetic Joint Infection in Knee Replacements, British Orthopaedic Association, August 2020

Investigation and Management of Peri-Prosthetic Joint infections (PJI), British Hip Society Surgical Standard,

6. Key Words

Prosthetic joint, Infection, PJI, Hip, Knee, Arthroplasty, THR, TKR, UKR, Hemiarthroplasty

CONTACT AND REVIEW DETAILS	
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Details of Changes made during review: 	