Native Knee Aspiration Guideline

All healthcare professionals must exercise their own professional judgement when using guidelines. However any decision to vary from the guideline should be documented in the patient records to include the reason for variance and the subsequent action taken.

Introduction

- The aim of this guideline is to provide a knowledge base to standardise care for patients who require aspiration of a native knee joint.
- The term "native knee joint" is used to describe a knee with **no** prosthetic material in situ
- To explain what complications can occur as a result of the aspiration
- To explain what equipment to use
- Explain how to safely aspirate a native knee joint.
- Explain the actions and rationale for knee aspiration.

This guideline is for use by the following staff groups:
All medical staff / practitioners who have been trained appropriately to undertake **aseptic** native knee aspiration.

Exclusions
This guideline does not include aspiration of prosthetic Joints.

Lead Clinician(s)

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Guideline reviewed and approved on by Trauma and Orthopaedic Clinical Governance Meeting:	15th September 2023
Review Date: This is the most current document and is to be used until a revised version is available	

Previous key amendments to this guideline

Date	Amendment	Approved by:
16 /12/2020	Guideline to be approved by	Trauma and Orthopaedic Governance meeting
15th Sept 23	Document reviewed and approved	Trauma and Orthopeadic

Guideline

This guideline focuses on the management of patients who require native knee aspiration.

INDICATIONS FOR JOINT ASPIRATION

This guideline is for **native** knee joints only, not for aspirating prosthetic joints.

Diagnostic Benefits:

To aid diagnosis in a patient who has a joint effusion of unknown origin.

To aid diagnosis and direct targeted antimicrobial therapy in a patient who has suspected septic arthritis of the knee joint.

To aid diagnosis in a patient with suspected crystal arthritis for example gout and pseudo-gout.

Aspiration of an acute painful haemarthrosis. Anticoagulation therapy is not a contraindication to knee aspiration.

Therapeutic Benefit:

A joint aspiration can relieve the pain by reducing the swelling in the knee. Removing the excess fluid will reduce the intra-articular pressure.

It may also be beneficial to relieve pressure in the knee, caused by haemorrhage (for example trauma involving an acute ACL rupture).

Equipment required

- Clean trolley

- Sterile dressing pack
- Sterile gloves
- Apron
- 2% Chloroprep stick
- Sterile dressing
- Needle
- Sterile syringe 20mls
- 2 specimen pots
- Histology request form and Microbiology request form for culture and sensitivity.
- Some consultants may wish to send synovial fluid in blood culture bottles; this should be a consultant decision as blood culture bottles are validated for blood, not synovial fluid. The laboratory will not reject samples in blood culture bottles sent from the bedside or theatre however this should be a consultant decision.

How to find the Microbiology and Histology request forms on ICE

- For Microbiology select Microbiology on the top panel.
- Select left hand panel then choose Micro other.
- In the fluids column select fluid culture.
- In the drop down section select knee fluid.
- For Histology select Specialties, and then choose the Trauma and Orthopaedic panel on the left hand side.
- Select the Histology / Cytology section.
- Select Non Gynae cytology for histology specimen.

Knee Aspiration technique

- Ensure fully informed verbal consent to procedure is taken
- The patient should lie still on a couch with their leg slightly flexed and a pillow under the knee can sometimes help.
- Using a strict aseptic technique,
- Ensure 2% Chloroprep stick is used to clean the skin

- Entry can be made from either the lateral or medial side of the patella.
- Aseptically insert the needle horizontally into the joint, in the gap between the femur and the patella.
- Aspiration can be performed through the same needle ensuring strict aseptic technique.
- When the needle is behind the patella, it is in the joint space.
- You can then aspirate fluid, place in two specimen pots, one to go to microbiology for culture and sensitivity and one to go to histology for crystal analysis.
- Place a sterile dressing over the aspiration site.
- After aspiration, the joint should be rested for 24 hours.
- Inform the patient it may take up to three days to get a final result.
- Document procedure in the patient notes.
- Ensure your specimens are sent to both histology and microbiology.
- If you require an urgent gram stain, please telephone microbiology to inform them.

Potential complications from the procedure

The following, although rare, can occur after a joint aspiration:

Infection: Signs of infection include gradually worsening pain over several days; you must inform the patient to contact their GP in working hours if this happens and if they feel unwell or develop a temperature. Advise them out-of-hours to call NHS direct. Advise them if they become severely unwell to attend A&E urgently.

Post aspiration pain: The aspiration can cause a flare of pain in a small number of patients. Advise the patient that this should resolve with cold, heat or simple painkillers.

Advise the patient to rest at home with their knee elevated for about **24 hours**. Advise them that they may feel moderate pain, but it usually goes away within **24 hours** and they should

be able to resume moderate activities the next day. Advise them to remove the bandage / dressing the day after aspiration.

What to do if the patient is septic

If the patient presents with sepsis, then you must follow the Sepsis pathway and antibiotics must be started. See the Trust's antibiotic prescribing guideline "Microguide" for antibiotic choice.

If a diagnosis of septic arthritis is being investigated, a patient should not be routinely sent home whilst cultures are awaited.

Please discuss with your Consultant if they wish antibiotics to be started whilst waiting for the culture result.

Knee Aspirate Analysis

The most important reason for performing joint fluid analysis is to rule out septic arthritis. Synovial fluid analysis can demonstrate local inflammatory response, infection and the presence of crystals. Synovial fluid effusions are classified into five general aetiologic categories: non-inflammatory responses, inflammation, infection, crystal-induced and haemorrhage. The most common diseases associated with each category are summarized in the following table.

Effusion	Diseases
Non-inflammatory	osteoarthritis, trauma, osteochondritis, pigmented villonodular synovitis, sickle cell disease, neuropathic
Inflammation	rheumatoid arthritis, SLE, ankylosing spondylitis, ulcerative colitis, psoriasis, reactive
Infection	bacteria, fungi (rare), mycobacteria (rare)
Crystal	gout, pseudo gout
Haemorrhage	trauma, haemophilia, haemangioma, pigmented villonodular synovitis, anticoagulant therapy, tumours

The following tests can be performed on synovial fluid.

- **Visual examination** (performed by both microbiology and histopathology laboratories). Normal synovial fluid has a slight yellow tinge and is slightly viscous. Inflamed synovial fluid is usually turbid and more liquid.

- **Cell count and differential** (i.e. counting the number of red cells and white cells; test is performed semi-quantitatively by microbiology (expressed as absent, scanty, moderate and numerous; and qualitatively by histopathology). A cell count cannot be performed if clots are present in the sample. The differential count determines which cells are "pus cells" (i.e. neutrophils) and which are mononuclear cells (usually lymphocytes).

- **Gram stain & culture (performed by microbiology)**

  - $>10^5$ bacteria/ml of synovial fluid are required to produce even a scanty positive Gram stain. A negative Gram stain therefore does not exclude infection. A positive Gram stain implies a high infective burden
  - The laboratory performs two culture based tests: **direct and enrichment**. In direct culture, synovial fluid is directly streaked onto agar plates and incubated. Plates are read daily and kept up for 48 hours before being discarded. A drop of synovial fluid is also inoculated into enrichment broth, a more sensitive culture technique but also prone to contamination. The broth is examined daily for seven days before being discarded. Please contact the laboratory if infection with rare organisms such as Mycobacteria or fungi is suspected as special culture techniques are needed.
  - Detection of bacterial DNA is also possible and particularly useful if infection is suspected but the sample is culture-negative (e.g. if antibiotics have been administered prior to sample collection). Sensitivity testing cannot be provided using PCR-based methods. Two tests are available:
  - **16S rDNA PCR**. This is "pan-bacterial PCR" and will detect a large range of bacterial species. It is less sensitive that enrichment culture (lower limit of detection is approximately 10^3 organisms per ml of fluid). A negative 16S rDNA PCR does NOT exclude infection
  - **Species-specific PCR**, e.g. *S. aureus* specific PCR. These are more sensitive than 16S rDNA PCR but only report the presence or absence of the specific organism under investigation.

- Polarizing light microscopy for crystals (performed by histopathology).

The following table summarises the typical laboratory findings for each category of joint disease.

Test	Normal	Non-inflammatory	Inflamed but not infected	Infected (bacteria)	Crystal	Haemorrhage
Clarity	Clear	Slightly turbid	Turbid	Turbid	Turbid	Bloody
Colour	Yellow	Yellow	Yellow	Turbid	Yellow-milky	Red-Brown
Viscosity	High	Reduced	Low	Low	Low	Reduced
Mucin clot	Firm	Firm to friable	Friable	Friable	Friable	Friable
Clotted	No	Occasional	Occasional	Often	Occasional	Yes
White cells	None – occasional	None – occasional	Moderate to numerous	Numerous	Moderate to numerous	Moderate to numerous
%Polys (called "pus cells" by the microbiology laboratory	<25	<30	>50	>90	<90	<50
Crystals	Absent	Absent	Absent	Absent	Present	Absent

References

Salvati G, Punzi L, Pianon M, et al. [Frequency of the bleeding risk in patients receiving warfarin submitted to arthrocentesis of the knee]. Reumatismo 2003; 55:159.

Ahmed I, Gertner E. Safety of arthrocentesis and joint injection in patients receiving anticoagulation at therapeutic levels. Am J Med 2012; 125:265.

Yui JC, Preskill C, Greenlund LS. Arthrocentesis and Joint Injection in Patients Receiving Direct Oral Anticoagulants. Mayo Clin Proc 2017; 92:1223.

https://patient.info/doctor/joint-injection-and-aspiration

SMI B26: Investigation of fluids from normally sterile sites. Public Health England. Issued 2nd October 2018. Accessed 26th November 2020. Available at: https://www.gov.uk/government/publications/smi-b-26-investigation-of-fluids-from-normally-sterile-sites

Monitoring Tool

How will monitoring be carried out?	Reflective Audit of all patients who require knee aspiration to ensure guideline met
When will monitoring be carried out?	Assign audit to Directorate audit projects
Who will monitor compliance with the Guideline?	Clinical Lead for Trauma and Orthopaedics

Standards:

Item	%	Exceptions
All patients will be given a knee aspiration Patient information leaflet	100	None

CONTRIBUTION LIST

Key individuals involved in creating this guideline

Name	Designation
Corinna Winkworth	Surgical Care Practitioner T & O
Mr A Pearse	T&O Consultant
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Circulated to the following individuals for comments

Name	Designation
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Mr N Aslam	T&O Consultant
Mr S Sadiq	T&O Consultant
Mr M Shahid	T&O Consultant
Mr A Munjal	T&O Consultant
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Mr P Craig	T&O Consultant
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Circulated to the following CD's/Heads of dept for comments from their directorates / departments

Name	Directorate / Department
Mr C Docker	T&O Clinical Director
Sarah Shingler	Chief Nursing Officer
Stacey Waldron	Divisional Director of Nursing
Cearann Reen	Matron T&O Worcester
Tracey Dennehy	T&O Lead Trauma Nurse Practitioner

Circulated to the chair of the following committee's / groups for comments

Name	Committee / group
	Surgical Directorate Governance Committee

Supporting Document 1 – Equality Impact Assessment form

To be completed by the key document author and included as an appendix to key document when submitted to the appropriate committee for consideration and approval.

Please complete assessment form on next page;

Herefordshire & Worcestershire STP - Equality Impact Assessment (EIA) Form
Please read EIA guidelines when completing this form

Section 1 - Name of Organisation (please tick)

Herefordshire & Worcestershire STP		Herefordshire Council		Herefordshire CCG	
Worcestershire Acute Hospitals NHS Trust	✓ ✓	Worcestershire County Council		Worcestershire CCGs	
Worcestershire Health and Care NHS Trust		Wye Valley NHS Trust		Other (please state)	

Name of Lead for Activity	**Corinna Winkworth**

Details of individuals completing this assessment	**Name**	**Job title**	**e-mail contact**
	Corinna Winkworth	**Surgical Care Practitioner**	**Corinna.winkworth@nhs.net**
Date assessment completed	**26/11/2020**		

Section 2

Activity being assessed (e.g. policy/procedure, document, service redesign, policy, strategy etc.)	**Title:** Native knee aspiration			
What is the aim, purpose and/or intended outcomes of this Activity?	Guideline to focus on the management of patients who require native knee aspiration			
Who will be affected by the development & implementation of this activity?	❑	Service User	✓❑	Staff
	✓❑	Patient	❑	Communities
	❑	Carers	❑	Other _____
	❑	Visitors	❑	
Is this:	✓❑ Review of an existing activity ❑ New activity			

	❑ Planning to withdraw or reduce a service, activity or presence?
What information and evidence have you reviewed to help inform this assessment? (Please name sources, eg demographic information for patients / services / staff groups affected, complaints etc.	Peer Consensus. Updated Literature review.
Summary of engagement or consultation undertaken (e.g. who and how have you engaged with, or why do you believe this is not required)	Circulated to wider group for comments
Summary of relevant findings	Comments received from peer consensus were actioned.

Section 3

Please consider the potential impact of this activity (during development & implementation) on each of the equality groups outlined below. **Please tick one or more impact box below for each Equality Group and explain your rationale**. Please note it is possible for the potential impact to be both positive and negative within the same equality group and this should be recorded. Remember to consider the impact on e.g. staff, public, patients, carers etc. in these equality groups.

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
Age		✓		The guideline takes age in to account. The guideline is for all medical staff / practitioners who have been trained appropriately to undertake native knee aspiration.
Disability		✓		The guideline takes disability in to account. The guideline is for all medical staff / practitioners who have been trained appropriately to undertake native knee aspiration.
Gender Reassignment		✓		The guideline takes gender reassignment in to account. The guideline is for all medical staff / practitioners who have been trained appropriately to undertake native knee aspiration.
Marriage & Civil Partnerships		✓		The guideline takes marriage and civil partnerships in to account. The guideline is for all medical staff / practitioners who have been trained appropriately to undertake native knee aspiration.
Pregnancy & Maternity		✓		The guideline takes pregnancy and maternity in to account. The guideline is for all medical staff / practitioners who have been trained appropriately to undertake native knee aspiration.
Race including Traveling Communities		✓		The guideline takes Race including traveling communities in to account. The guideline is for all medical staff / practitioners who have been trained appropriately to undertake native knee aspiration.
Religion & Belief		✓		The guideline takes Religion and Belief in to account. The guideline is for all medical staff /

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
				practitioners who have been trained appropriately to undertake native knee aspiration.
Sex		✓		The guideline takes sex in to account. The guideline is for all medical staff / practitioners who have been trained appropriately to undertake native knee aspiration.
Sexual Orientation		✓		The guideline takes sexual orientation in to account. The guideline is for all medical staff / practitioners who have been trained appropriately to undertake native knee aspiration.
Other Vulnerable and Disadvantaged Groups (e.g. carers; care leavers; homeless; Social/Economic deprivation, travelling communities etc.)		✓	✓	The guideline takes other vulnerable and disadvantaged groups in to account. The guideline is for all medical staff / practitioners who have been trained appropriately to undertake native knee aspiration. We would endeavour to bring back to patients to clinic to discuss results if discharged pending culture.
Health Inequalities (any preventable, unfair & unjust differences in health status between groups, populations or individuals that arise from the unequal distribution of social, environmental & economic conditions within societies)		✓	✓	The guideline takes health inequalities in to account. The guideline is for all medical staff / practitioners who have been trained appropriately to undertake native knee aspiration. We would endeavour to bring back patients to clinic to discuss results if discharged pending culture.

Section 4

What actions will you take to mitigate any potential negative impacts?	Risk identified	Actions required to reduce / eliminate negative impact	Who will lead on the action?	Timeframe
	Being unable to contact individuals from disadvantaged groups to discuss results	Arrange outpatient appointment to discuss results	Practitioner undertaking aspiration	Ongoing
How will you monitor these actions?	Reflective audit of all patients who require native knee aspiration			
When will you review this EIA? (e.g in a service redesign, this EIA should be revisited regularly throughout the design & implementation)	At next review of guideline July 2026			

Section 5 - Please read and agree to the following Equality Statement

1. Equality Statement

1.1. All public bodies have a statutory duty under the Equality Act 2010 to set out arrangements to assess and consult on how their policies and functions impact on the 9 protected characteristics: Age; Disability; Gender Reassignment; Marriage & Civil Partnership; Pregnancy & Maternity; Race; Religion & Belief; Sex; Sexual Orientation

1.2. Our Organisations will challenge discrimination, promote equality, respect human rights, and aims to design and implement services, policies and measures that meet the diverse needs of our service, and population, ensuring that none are placed at a disadvantage over others.

1.3. All staff are expected to deliver services and provide services and care in a manner which respects the individuality of service users, patients, carer's etc., and as such treat them and members of the workforce respectfully, paying due regard to the 9 protected characteristics.

Signature of person completing EIA	Corinna Winkworth
Date signed	7/07/2023
Comments:	
Signature of person the Leader Person for this activity	
Date signed	
Comments:	

Supporting Document 2 – Financial Impact Assessment

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

	Title of document:	Yes/No
1.	Does the implementation of this document require any additional Capital resources	No
2.	Does the implementation of this document require additional revenue	No
3.	Does the implementation of this document require	No

	Title of document:	Yes/No
	additional manpower	
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 programmes or allocated training times for staff	No
	Other comments:	N/A

If the response to any of the above is yes, please complete a business case and which is signed by your Finance Manager and Directorate Manager for consideration by the Accountable Director before progressing to the relevant committee for approval