Ashford and St. Peter's Hospitals
NHS Foundation Trust

Guideline for the management of osteomyelitis and septic arthritis in Paediatric patients

Author: Dr Erin Dawson Associate Specialist Emergency Paediatrics

Supervisor: Dr Claire Mitchell Paediatric Consultant and lead for guidelines

Contact details: erin.dawson@nhs.net

Guideline History		
Date	**Comments**	**Approved By**
15/06/2021	Guideline written 2014, reformatted 2018 Reviewed and updated June 2021	

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Introduction

This guideline has been written to ensure that the signs of osteomyelitis and septic arthritis are identified early, as delay in treatment can lead to serious sequelae.

Guideline for the management of osteomyelitis and septic arthritis in Paediatric patients

Osteomyelitis is an infection of the bone, a rare but serious condition. Bones can become infected in a number of ways: Infection in one part of the body may spread through the bloodstream into the bone, or an open fracture or surgery may expose the bone to infection.

Septic arthritis is usually caused by bacteria, but can also be caused by a virus or fungus. The condition is an inflammation of a joint that is caused by infection. Typically, septic arthritis affects one large joint in the body, such as the knee or hip. Less frequently, septic arthritis can affect multiple joints.

Occasionally osteomyelitis and septic arthritis can co-exist. This occurs when the metaphysis is intra-articular with a thin periosteum (such as the hip, shoulder, ankle and wrist). Vascular connections between the metaphysis & epiphysis make infants with osteomyelitis particularly prone to arthritis of the adjacent joint.

Children may present insidiously, hence careful history and clinical examination with a high index of suspicion are required. A delay in diagnosis may cause growth disturbance, deformity, or even death

Clinical History and Examination

Septic Arthritis

- <24hrs unwell, fever, pain in affected joint
- unable to weight bear/limping
- pseudoparalysis/asymmetric movement of limb (early signs in infants & neonates)
- hot/swollen & tender joint
- reduced joint movement

Acute Osteomyelitis

- similar to septic arthritis but up to 40% may be afebrile
- swelling overlying the bone & tenderness

Chronic Osteomyelitis

- less unwell
- +/- fever
- local signs less obvious
- draining sinus/bony deformity may be present

Differential diagnosis

- Cellulitis, subcutaneous abscess
- Fractures
- Bone tumours (ALL, AML, neuroblastoma, Ewing's sarcoma, osteosarcoma)
- Chronic Recurrent Multifocal Osteomyelitis.
- In new-borns and infants in whom osteomyelitis may present as a pseudoparalysis, also consider NAI, CNS disease, cerebral haemorrhage and trauma.
- Juvenile Idiopathic Arthritis, Henoch-Schonlein Purpura and reactive arthritis can be mistaken for septic arthritis.

Aetiology

Staph aureus is the most common pathogen (75%), followed by Strep pneumoniae and pyogenes. Gram-negative bacteria, Neisseria gonorrhoeae, and group B streptococci are seen in the neonatal period. Pseudomonas aeruginosa is often associated with penetrating wounds. Salmonella is an important cause of osteomyelitis in children with sickle cell disease. Kingella kingae, a fastidious gram negative rod, is increasingly recognized as causing osteoarticular infections. HIV and some other immunodeficiencies predispose to atypical mycobacterial and fungal osteomyelitis (often multifocal). Methicillin resistant *Staphylococcus aureus* osteomyelitis in particular is on the increase

Investigations

FBC, CRP, ESR, Blood cultures, Urine for Pneumococcal/Group B strep antigen, Sickle status

- CRP & ESR together are useful for monitoring response to treatment
- Blood culture. Positive in 40% of septic arthritis and 50% of osteomyelitis.
- Bone **cultures** from biopsy or aspiration have a diagnostic yield of approximately 77% across all studies.

Imaging

Xrays

Useful in detecting bone tumours, fractures, & healing fractures. Osteopenia, lytic lesions, & periosteal changes are late radiographic signs. Absence does not exclude acute osteomyelitis.

Plain radiographs of new-borns often have a lytic area at diagnosis.

MRI

Changes in bone marrow caused by inflammation result in an area of low signal intensity within bright fatty marrow. These abnormalities need to be clinically correlated before a diagnosis is made, as they are not specific for osteomyelitis.

CT Scan

More useful in chronic osteomyelitis when superior to MRI in demonstrating cortical destruction, air and sequestra.

Ultrasound

Simple, sensitive, and inexpensive technique for detecting a hip effusion, though not diagnostic without aspiration.

Treatment

Osteomyelitis and Septic Arthritis are medical emergencies. Patients will be managed jointly by the Paediatric and Orthopaedic teams. The paediatric registrar and attending consultant will coordinate investigations and management. Paediatric and Orthopaedic teams will liaise frequently – daily during the acute phase.

In osteomyelitis in children with sickle cell disease, liaise with Haematology regarding management.

Surgery

Early surgery indicated if pus is present in a joint or sub-periosteally or in the soft tissues; and/or in a severely ill child, or failure to respond to 48 hours of IVABs

If having a general anaesthetic, consider what other procedures may be performed at the same time e.g. line placement.

Send pus/joint fluid in a plain sterile container (without formalin). When sufficient pus is present, an aliquot should also be inoculated into blood culture bottles. If tissue obtained, send some for histology and some for microbiology.

Antibiotics

Please follow the Trust antibiotic guidelines for choice and duration of antibiotics. The Paediatric Infectious Disease team at St George's are also available for advice.

https://viewer.microguide.global/guide/1000000059#content,9bd1ccbc-3d84-4dd5-9efa-2c5338495e04

Change according to sensitivities. Consider changing antibiotics if clinical and laboratory progress suboptimal.

Only switch to oral from IV if:

- Clinically improving
- Afebrile
- ESR/CRP/WCC improving
- Can tolerate oral antibiotics
- Family circumstances suitable.

Follow up in Paediatric clinic

Osteomyelitis: 2/52 after discharge. X-ray at end of treatment (6/52) then clinical review 2/52 later.

Septic Arthritis: 2/52 after discharge (at end treatment). Then review 2 weeks later.

Follow up in Orthopaedic Clinic: 2 months after discharge.

Weekly ESR/CRP& FBCs to monitor response to treatment. Liaise with microbiology if any concerns about efficacy of oral antibiotic therapy.

5-10% of patients may experience recurrence, which may lead to chronic osteomyelitis with discharging sinuses and other systemic sequelae.

2. Supporting References

1. Haematogenous acute and subacute paediatric osteomyelitis. A systematic review of the literature. J Bone Joint Surg Br 2012;94-B: 584-95
2. A.C.Offiah; Review: Acute Osteomyelitis, septic arthritis and discitis: differences between neonates and older children. European J of Radiology 60(2006) 221-232.
3. **https://www.bmj.com/content/348/bmj.g66.full**
4. **https://modernb.akamai.odsp.cdn.office.net/files/fabric-cdn-prod_20210703.001/assets/item-types/32/docx.svg**

3. Supporting relevant trust guidelines

Painful leg and Limping child guideline

2. Guideline Governance

a. Scope

This guideline is relevant to all staff caring for all children from 0-18 years old across the emergency department, inpatient ward and outpatient department.

b. Purpose

i. This guidelines aims to facilitate a common approach to the management of children. At times deviation from the guideline may be necessary, this should be documented and is the responsibility of the attending consultant.

ii. This guideline is subject to regular review to ensure ongoing evidence based practice.

c. Duties and Responsibilities

All healthcare professionals responsible for the care of all children 0-18years should be aware of practice according to this guideline.

d. Approval and Ratification

This guideline will be approved and ratified by the Paediatric Guidelines Group.

e. Dissemination and Implementation

i. This guideline will be uploaded to the trust intranet 'Paediatric Guidelines' page and thus available for common use.
ii. This guideline will be shared as part of ongoing education within the Paediatric Department for both medical and nursing staff.
iii. All members of staff are invited to attend and give comments on the guideline as part of the ratification process.

f. Review and Revision Arrangements

a. This policy will be reviewed on a 3 yearly basis by the appropriate persons.
b. If new information comes to light prior to the review date, an earlier review will be prompted.
c. Amendments to the document shall be clearly marked on the document control sheet and the updated version uploaded to the intranet. Minor amendments will be ratified through the Paediatric Guidelines Group. A minor amendment would consist of no major change in process, and includes but is not limited to, amendments to documents within the appendices.

g. Equality Impact Assessment

Background • Who was involved in the Equality Impact Assessment
Author and the supervising consultants.
Methodology • A brief account of how the likely effects of the policy was assessed (to include race and ethnic origin, disability, gender, culture, religion or belief, sexual orientation, age) • The data sources and any other information used • The consultation that was carried out (who, why and how?)
All groups of staff and patients were taken into consideration and there is no bias towards or against any particular group.
Key Findings • Describe the results of the assessment • Identify if there is adverse or a potentially adverse impacts for any equalities groups
There is no evidence of discrimination.
Conclusion • Provide a summary of the overall conclusions
There is no evidence of discrimination.
Recommendations • State recommended changes to the proposed policy as a result of the impact assessment • Where it has not been possible to amend the policy, provide the detail of any actions that have been identified • Describe the plans for reviewing the assessment
This guideline is appropriate for use.

h. Document Checklist

To be completed (electronically) and attached to any document which guides practice when submitted to the appropriate committee for approval or ratification.

Title of the document: Guideline for the management of osteomyelitis and septic arthritis in Paediatric patients

Policy (document) Author: Dr Erin Dawson

Executive Director: N/A

		Yes/No/ Unsure/NA	Comments
1.	**Title**		
	Is the title clear and unambiguous?	**Yes**	
	Is it clear whether the document is a guideline, policy, protocol or standard?	**Yes**	
2.	**Scope/Purpose**		
	Is the target population clear and unambiguous?	**Yes**	
	Is the purpose of the document clear?	**Yes**	
	Are the intended outcomes described?	**Yes**	
	Are the statements clear and unambiguous?	**Yes**	
3.	**Development Process**		
	Is there evidence of engagement with stakeholders and users?	**Yes**	
	Who was engaged in a review of the document (list committees/ individuals)?		**Paediatric Guideline Group**
	Has the policy template been followed (i.e. is the format correct)?	**Yes**	
4.	**Evidence Base**		
	Is the type of evidence to support the document identified explicitly?	**Yes**	

		Yes/No/ Unsure/NA	Comments
	Are local/organisational supporting documents referenced?	**Yes**	
5.	**Approval**		
	Does the document identify which committee/group will approve/ratify it?	**Yes**	
	If appropriate, have the joint human resources/staff side committee (or equivalent) approved the document?	**Yes**	
6.	**Dissemination and Implementation**		
	Is there an outline/plan to identify how this will be done?	**Yes**	
	Does the plan include the necessary training/support to ensure compliance?	**Yes**	
7.	**Process for Monitoring Compliance**		
	Are there measurable standards or KPIs to support monitoring compliance of the document?	**Yes**	
8.	**Review Date**		
	Is the review date identified and is this acceptable?	**2024**	
9.	**Overall Responsibility for the Document**		
	Is it clear who will be responsible for coordinating the dissemination, implementation and review of the documentation?	**Yes**	
10.	**Equality Impact Assessment (EIA)**		
	Has a suitable EIA been completed?	**Yes**	

Committee Approval (Paediatric Guidelines Group)			
If the committee is happy to approve this document, please complete the section below, date it and return it to the Policy (document) Owner			
Name of Chair	**Dr Claire Mitchell**	**Date**	**01/09/2021**
Ratification by Management Executive (if appropriate)			
If the Management Executive is happy to ratify this document, please complete the date of ratification below and advise the Policy (document) Owner			
Date: n/a			