

INCLUSION CRITERIA

- Physical exam and/or history consistent with ACUTE hematogenous osteomyelitis or septic joint
- Less than 14 days of signs and symptoms
- Previously healthy children ages 6 months to 18 years of age

RECOMMENDED INITIAL DIAGNOSTIC EVALUATION

Labs:

CBC w/diff
BMP
CMP
ESR
CRP
Blood Culture

Imaging:

Order plain film of affected region

EXCLUSION CRITERIA

- Evidence of sepsis or hemodynamic instability
- Contiguous osteomyelitis: penetrating trauma or fracture
- Complicated or difficult to treat osteomyelitis
 - Multifocal
 - Chronic
 - Head, face, or orbital involvement
 - Presence of orthopedic device or prosthesis
 - Post-operative wound
- History of the following disease states:
 - Bone or cartilage disorder
 - Congenital or acquired bone disease
 - Congenital or acquired immunodeficiency
 - Type I or II diabetes
 - Sickle cell disease
 - Chronic sinusitis
 - Sacroiliitis
 - Fasciitis
 - Synovitis
 - Arthropathy

Consult Orthopedics to evaluate need for additional imaging and aspiration

High clinical suspicion?

Manage OFF-Pathway

Coordinate w/Anesthesia & Orthopedics

Immediate Aspiration/ I&D
Addendum 3 for specimen requirements

MRI indicated
Addendum 1

START EMPIRIC ANTIBIOTIC THERAPY (See Addendum 2 for antibiotic dosing)

ID Consultation

Age < 4 years
Clindamycin + Ceftriaxone

Age ≥ 4 years
Clindamycin + Cefazolin

"Fast" MRI
Rapid Sequence Protocol

Sedation Osteo
Protocol

Aspiration Consult w/
Anesthesia & Orthopedics
Addendum 3 for specimen requirements

Images consistent with
Acute Osteo/Septic Joint?

Inpatient Care

1. MRSA/MRSA nasal swab
2. CRP every 48 hrs.
3. Focus antibiotic therapy based on CR results (Addendum 2)

Meets Criteria for oral step-down therapy?

- Confirmed diagnosis of acute hematogenous osteomyelitis
- Clinical improvement of signs and symptoms
- Afebrile for at least 24 hrs
- CRP decreased 50% from initial CRP
- Received at least 72 hrs of IV antibiotics

Manage OFF-Pathway

- Shared decision-making: ID/Ortho/PCRS
- develop plan of care for antibiotic selection, route, and duration of therapy
- Treatment plan discussed with family, care team agreement/discussion

Manage OFF-Pathway

DISCHARGE CRITERIA

- Afebrile for 24 hours with clinical improvement in symptoms and physical exam.
- Tolerated one dose of oral antibiotics identical to the planned home regimen in the hospital.
- Scheduled follow-up with the primary pediatrician, infectious disease, and orthopedics.
- Antibiotic prescription is filled and delivered prior to discharge or easily accessible by parents immediately after discharge

ADDENDUM 1: Rapid Osteo Protocol

RAPID SEQUENCE (“FAST”) NON-SEDATED MRI WITHOUT CONTRAST

- “Fast” imaging reduces time in scanner from 45+ min to under 7 min
- When possible, non-sedated MRI's can be attempted the afternoon/ evening of patient presentation (without anesthesia on standby)

Order a MRI with the following information:

- Priority: STAT
- Reason for exam: RAPID OSTEO PROTOCOL
- Order Without Contrast
- Call reporting to: Please list call back name/number
 - 1st Option: Pedi Ortho PA
 - 2nd Option: PCRS attending on-call
- Phone number: MD telephone number

SEDATION OSTEO PROTOCOL

INCLUSION CRITERIA: All Children aged < 3 or Failed Rapid Protocol

Order a MRI with the following information:

- Priority: STAT
- Reason for exam: SEDATION OSTEO PROTOCOL
- MRI/ or block time @07:00AM may be used if approved by Ortho team
- Call reporting to: MD name
- Phone number: MD telephone number

Place NPO orders per anesthesia guidelines

ADDENDUM 2

DCMC ACUTE HEMATOGENOUS OSTEO MYELITIS ANTIBIOTIC DOSING AND RECOMMENDATIONS

EMPIRIC ANTIBIOTIC THERAPY		
<p align="center"><i>Age < 4 years</i></p> <p>Potential pathogens: <i>S. aureus</i> <i>S. pyogenes</i> <i>S. pneumoniae</i> <i>Kingella kingae</i></p>	<p>Clindamycin 40 mg/kg/day IV divided every 6 hours</p>	<p>Maximum dose: 600 mg/dose, 2400 mg/day</p> <p>May consider every 8 hour dosing for home therapy only</p> <p>Recommended monitoring: CBC</p>
	<p>Ceftriaxone 100 mg/kg/day IV every 24 hours</p>	<p>Maximum dose: 2000 mg/dose, 4000 mg/day</p> <p>May consider 100 mg/kg/day IV divided every 12 hours for patients > 20 kg or those requiring >2000 mg/dose</p> <p>Recommended monitoring: CBC +/- CMP</p>
<p align="center"><i>Age ≥ 4 years</i></p> <p>Potential pathogens: <i>S. aureus</i> <i>S. pyogenes</i></p>	<p>Clindamycin 40 mg/kg/day IV divided every 6 hours</p> <p>Cefazolin 150 mg/kg/day IV divided every 8 hours</p>	<p>See above</p> <p>900 mg/dose, 2700 mg/day reserved for patients with severe disease and/or patients that are obese</p>
FOCUSED ANTIBIOTIC THERAPY		
<p align="center"><i>MSSA</i> <i>Intravenous Therapy</i></p>	<p>Oxacillin 200 mg/kg/day IV divided every 4 to 6 hours</p> <p align="center"><i>(consider continuous infusion)</i></p>	<p>Maximum dose: 2000 mg/dose, 12 gram/day</p> <p>May consider continuous infusion for home therapy</p> <p>Recommended monitoring: CBC & CMP</p>
<p align="center"><i>MSSA</i> <i>Oral Therapy</i></p>	<p>Cephalexin 150 mg/kg/day PO divided every 6 hours</p>	<p>Maximum dose: 1000 mg/dose, 4000 mg/day</p> <p>Renal dosage adjustment if CrCl < 10 mL/min</p> <p>May consider every 8 hour dosing for home therapy only</p> <p>Recommended monitoring: CBC +/- CMP</p>
<p align="center"><i>Kingella kingae</i> <i>Intravenous Therapy</i></p>	<p>Ceftriaxone 100 mg/kg/day IV every 24 hours</p>	<p>See above</p>
<p align="center"><i>Kingella kingae</i> <i>Oral Therapy</i></p>	<p>Amoxicillin/clavulanate 90 mg/kg/day PO divided every 12 hours</p> <p align="center"><i>(dosed based on amoxicillin component)</i></p>	<p>Maximum dose: 4000 mg amoxicillin component/day</p> <p>Renal dosage adjustment if CrCl < 30 mL/min</p> <p>Recommend monitoring: CBC & CMP</p>

Additional Antimicrobial Therapy Options which Require Infectious Diseases Approval for Use	
Clindamycin 30 mg/kg/day PO divided every 6 hours	Maximum dose: 600 mg/dose, 1800 mg/day May consider every 8 hours dosing for home therapy only Recommended monitoring: CBC
Sulfamethoxazole-trimethoprim 15-20 mg/kg/day PO divided every 6 to 12 hours <i>(dosed based on trimethoprim component)</i>	Maximum dose: 960 mg trimethoprim component/day Renal dosage adjustment if CrCl < 30 mL/min Recommended monitoring: CBC & CMP
Linezolid (less than 12 years old) 30 mg/kg/day IV/PO divided every 8 hours Linezolid (greater than or equal to 12 years old) 20 mg/kg/day IV/PO divided every 12 hours	Maximum dose: 600 mg/dose, 1200 mg/day Recommended monitoring: CBC & CMP

ADDENDUM 3

DCMC ACUTE HEMATOGENOUS OSTEOMYELITIS DIAGNOSTIC TESTING RECOMMENDATIONS

Fluid Specimens

Order the following labs in Compass:

- 1) Routine culture → Select specimen type → Select body site → Select collection method or source
- 2) Miscellaneous lab testing → Enter specimen type: ***other: see description*** and enter sample location → Enter order comment: Hold tissue/fluid in lab for possible PCR testing. Store frozen with no additives
- 3) Cell ct w/ diff joint fluid

**Providers may choose to order additional or alternative tests based on the clinical scenario*

During/after the procedure do the following (order of priority):

- 1) Inoculate x 1 AEROBIC blood culture bottle with a minimum of 0.5 mL fluid
 - a. To be sent for routine culture
- 2) Place remaining fluid in a sterile specimen container
 - a. To be held for possible PCR testing OR sent for additional tests
- 3) Send laboratory test down time form with the following information:
 - a. Miscellaneous lab testing
 - b. Specimen type: ***other: see description*** and enter sample location
 - c. Write in "Hold tissue/fluid in lab for possible PCR testing. Store frozen with no additives"

If < 1.5 mL fluid then,

- 1) Send sterile specimen container to be held for possible PCR testing
 - a. 0.5 mL required for each PCR test (*Kingella kingae*, *S. aureus*)

If ≥ 1.5 mL fluid then,

- 1) Send sterile specimen container for cell count with differential
 - a. 0.5 mL required
- 2) Hold remaining fluid for possible PCR testing
 - a. 0.5 mL required for each PCR test (*Kingella kingae*, *S. aureus*)

Tissue Specimens

Order the following labs in Compass:

- 1) Tissue culture w/ smear → Select specimen type → Select body site → Select collection method or source
- 2) Miscellaneous lab testing → Enter specimen type: tissue → Enter order comment: Hold tissue/fluid in lab for possible PCR testing. Store frozen with no additives

**Providers may choose to order additional or alternative tests based on the clinical scenario*

During/after the procedure do the following (order of priority):

- 1) Place tissue sample in sterile specimen container
- 2) Send laboratory test down time form with the following information:
 - a. Miscellaneous lab testing
 - b. Specimen type: tissue
 - c. Write in "Hold tissue/fluid in lab for possible PCR testing. Store frozen with no additives"

If tissue sample size ≤ 1 x 1 mm

- 1) Send sterile specimen container for tissue culture w/ smear

If tissue sample size > 1 x 1 mm

- 1) Send sterile specimen container for tissue culture w/ smear
- 2) Hold remaining tissue for possible PCR testing

A 1 x 1 mm sized tissue sample required for each PCR test (*Kingella kingae*, *S. aureus*)

DELL CHILDREN'S MEDICAL CENTER EVIDENCE-BASED OUTCOMES CENTER

ADDENDUM 4 DCMC ACUTE HEMATOGENOUS OSTEOMYELITIS SCORECARD

Type of Measure	Domain	Measure Definition	Donabedian Classification	IOM Domain(s)
Care Process Team	Efficiency in Diagnosis	Utilization of MRI block schedule with Ortho Procedures	Process	Effective, Efficient, Equitable, Safe
		Utilization of laboratory tests: Kingella kingae PCR, S. aureus PCR, CRP, Cell count w/ differential, WBC, & ESR	Process	Effective, Efficient, Equitable, Safe
		Time to culture	Process	Effective, Efficient, Equitable, Safe, Timely
		Site of positive culture	Process	Effective, Efficient, Equitable, Safe
	Medications	Length of IV antimicrobial therapy	Outcome	Effective, Efficient, Equitable, Safe
		Length of PO antimicrobial therapy	Outcome	Effective, Efficient, Equitable, Safe
	Patient Experience	Number of times under sedation/received sedation.	Process	Effective, Efficient, Equitable, Safe
Avoidable Events	Hospitalizations	Rate of readmission to hospital within 30 days	Outcome	Effective, Efficient, Safe
	Infection	Rate of PICC line complications	Outcome	Effective, Efficient, Safe
Throughput		Average Length of Stay	Outcome	Care Coordination, Effective, Efficient, Safe, Timely
Financial		Average Total Cost of Care	Outcome	Effective, Efficient