Musculoskeletal (MSK) Infection Clinical Practice Guideline
Emergency Department Management

Inclusion Criteria
- 6 months to 21 years
- Suspicion of acute musculoskeletal infection (Symptoms less than 2 weeks): osteomyelitis, septic arthritis, pyomyositis

Exclusion Criteria
- Infants (less than 6 months)
- Chronic and subacute musculoskeletal infection (Symptoms greater than 2 weeks)
- Postoperative infection
- Penetrating trauma
- Patient with hardware
- Myelomeningocele
- Chronic recurrent multifocal osteomyelitis (CRMO)
- Immunocompromised

1 Suspicion of MSK Infection

Obtain the following:
- History
  - Pain, fever, inability to bear weight, gait disturbance/limp, limited use or immobility of extremity or spine, travel to endemic Lyme areas
- Physical Exam
  - Limited range of motion, swelling, tenderness, warmth at site, fever, erythema, psoas sign

2 Aspiration Results

For reference only
- >50,000 WBC: Proceed to OR
- 25,000-50,000 WBC: Consider OR, close observation
- <25,000 WBC: Close observation and consider auto-immune and/or post-infectious diagnoses

3 Specimen Collection

Lab Order Prioritization of Joint Fluid
Depends on Volume Obtained (4.5 mL)
1. Culture Fluid (Code: CUFBD)
2. Cell Count (Code: FLCT)
3. For patients ≤ 4 months old, use Kingella PCR from synovial fluid, tissue or bone (Code: KINPCR)
4. Lyme testing if clinically indicated. Order Lyme serology from blood (Code: BBPESPA) and Lyme PCR from synovial fluid (Code: LYMPFR).

How to submit specimens: For all tests, use a needleless capped syringe or sterile container. For Lyme serology, use a serum separator (red top).
See the "PED IP MSK Infection Specimen Collection" order set for specific order information.
## Musculoskeletal (MSK) Infection Clinical Practice Guideline

### Inpatient Management

#### High Risk for MSK Infection

- **Continue Antibiotics**
- **MRI imaging**
  - Inpatient team to place MRI order for with and without contrast of affected area
  - Contact Radiology MD AND Sedation MD (or Anesthesiologist by 0900 if Sunday at Egleston 5-6625) if same day MRI needed
  - Ortho to reassess prior to MRI
- **Consult ID**
- **Drainable abscess or septic joint?**
  - **Yes**
    - **Stop antibiotics**
    - **Continue alternative mgmt**
  - **No**
    - **Continue antibiotics** (See table, page 3)
    - **Provide medical management**
    - **Consider transition to PO antibiotics**
- **Blood culture results after 24H?**
  - **Positive**
    - **Consult PT**
    - **Continue antibiotics** (See table, page 3)
    - **Consider transition to PO antibiotics**
  - **Negative**
    - **Consult IR for bone biopsy**
    - **Make patient NPO before desired procedure**
    - **Clears:** 2 hours
      - Breastmilk: 4 hours
      - Formula: 6 hours
      - Solids: 8 hours

#### Low Risk for MSK Infection

- **Scheduled Toradol Observation**
- **NPO overnight**
- **Improved after 12-24H?**
  - **Yes**
    - **Repeat labs:**
      - CRP or WBC?
      - **Yes**
        - **Consult managing as high risk**
      - **No**
        - **Continue observation**
  - **No**
    - **Clinical improvement after 24H scheduled Toradol?**
      - **Yes**
        - **D/C home**
      - **No**
        - **PCP follow-up within 48H**

### Medical Management

1. **Aggressive hydration** (given risk of bacteremia/potentially nephrotoxic drugs)
2. **CBC and CRP 36-48H from surgical procedure or admission labs**
3. **Additional labs every 48H PRN and on planned discharge day**
4. **PICC lines not routinely recommended**
5. **If MSSA or MRSA, there is increased DVT risk. Consider imaging with a Doppler Ultrasound if prolonged swelling or pain out of proportion to infection or exam.**

### Criteria to Transition to PO Antibiotics

Must meet ALL of the following criteria:

- No fever >24H
- Blood cultures negative for 36H
- CRP decreased by >50% of initial value

### Continued Medical Management Criteria

- Fever >72H
- Persistent bacteremia (≥ 3 cultures)
- Worsening pain
- CRP not improving

### Discharge Criteria

- Pain controlled by PO meds
- Tolerating PO antibiotics

### Specimen Collection

Lab Order Prioritization of Joint Fluid Depends on Volume Obtained (4-5 mL)

1. Culture Fluid (Code: CUFLD)
2. Cell Count (Code: FLCT)
3. For patients ≤ 48 months order Kingella PCR from synovial fluid, tissue, or bone (Code: KINPCR)
4. Lyme testing if clinically indicated. Order Lyme serology from blood (Code: BBPEPA) and Lyme PCR from synovial fluid only (Code: LYMPCR).

How to submit specimens: For all tests listed above except Lyme serology, use a needleless capped syringe or sterile container. For Lyme serology, use a serum separator (red top).

If tissue and/or bone is collected in the OR, submit in a sterile container and place orders for tissue culture (Code:CUTISS) and bone culture (Code:CUBONE).

See the “PED IP MSK Infection Specimen Collection” order set for specific order information.
Developed through the efforts of Children's Healthcare of Atlanta and physicians on Children's medical staff in the interest of advancing pediatric healthcare.

This is a general guideline and does not represent a professional care standard governing providers' obligation to patients. Ultimately the patient's physician must determine the most appropriate care.

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### IV Antibiotic Table

<table>
<thead>
<tr>
<th>Patient Demographic</th>
<th>Bacterial Targets</th>
<th>Drug</th>
<th>Dose</th>
<th>Max Single Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months - ≤ 4 years</td>
<td>S. aureus, S. pyogenes (GAS), K. kingae</td>
<td>Clindamycin AND</td>
<td>13mg/kg IV q8h</td>
<td>900mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cefazolin</td>
<td>40mg/kg IV q8h</td>
<td>2000mg</td>
</tr>
<tr>
<td>6 months - ≤ 4 years and not fully immunized against H. influenzae or S. pneumoniae</td>
<td>S. aureus, S. pyogenes (GAS), K. kingae, H. influenzae, S. pneumoniae</td>
<td>Clindamycin AND</td>
<td>13mg/kg IV q8h</td>
<td>900mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ceftriaxone</td>
<td>75mg/kg IV q24h</td>
<td>2000mg</td>
</tr>
<tr>
<td>&gt; 6 months and ill appearing (Hemodynamic instability OR anticipated/existing need for intensive care)</td>
<td>S. aureus, S. pyogenes (GAS), K. kingae, H. influenzae, S. pneumoniae</td>
<td>Vancomycin ¹ AND</td>
<td>15mg/kg IV q6h</td>
<td>1000 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ceftriaxone</td>
<td>75mg/kg IV q24h</td>
<td>2000mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consider Clindamycin ²</td>
<td>13mg/kg IV q8h</td>
<td>900mg</td>
</tr>
<tr>
<td>&gt; 4 years old</td>
<td>S. aureus, S. pyogenes (GAS)</td>
<td>Clindamycin</td>
<td>13mg/kg IV q8h</td>
<td>900mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consider Ceftriaxone ³</td>
<td>75mg/kg IV q24h</td>
<td>2000mg</td>
</tr>
</tbody>
</table>

¹ Recommended vancomycin starting dose. Goal trough 10-15µg/mL. Pharmokinetic service will monitor trough levels and adjust accordingly.

² Consider adding clindamycin empirically in critically ill patients while waiting for confirmation of therapeutic vancomycin level.

³ If not fully immunized against H. influenzae or S. pneumoniae OR concern for Lyme disease or Gonorrhea, add ceftriaxone.

### Suggested Antibiotics for PO Transition

<table>
<thead>
<tr>
<th>Bacterial Targets</th>
<th>Drug</th>
<th>Dose</th>
<th>Max Single Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSSA or K. kingae</td>
<td>Cephalexin</td>
<td>40mg/kg/dose q8h</td>
<td>1000mg</td>
</tr>
<tr>
<td>MRSA</td>
<td>Clindamycin</td>
<td>13mg/kg/dose q8h</td>
<td>600mg</td>
</tr>
<tr>
<td>S. pyogenes (GAS)</td>
<td>Amoxicillin</td>
<td>30mg/kg/dose q8h</td>
<td>1000mg</td>
</tr>
</tbody>
</table>