Musculoskeletal (MSK) Infection Clinical Practice Guideline

Emergency Department Management

Final
11/2/18

Suspicion of MSK Infection [1]

| High Suspicion for MSK Infection |
Fever AND refusal to bear weight, focal pain, limited use and/or immobility of extremity

Initial Diagnostic Management
- Make patient NPO
- Imaging: Radiograph of affected region
- Labs: CBC with diff, CRP, ESR, blood culture *
  Consider BMP given potential for nephrotoxic drugs

Obtain maximum allowable blood culture volume, See **Policy 4.26*

Refusal to bear weight and fever present. Is radiograph consistent with infectious process OR does patient have at least one of the following predictors?
- WBC > 12,000
- CRP > 2mg/dl
- ESR > 40

Yes → **| High Risk for MSK infection |**
Consult Ortho on all patients

Concern for joint effusion?

Yes → **Hip** → **Proceed to *Hip Aspiration Procedural Algorithm*** or **Proceed to OR after approval by Ortho Attending**

Yes → **Other Joints** → **Consider US**
Especially for shoulder or if radiographically equivocal
→ **Effusion amenable to aspiration?**
- Yes → **Aspirate in the ED** [2,3] → Admit to Hospitalist
- No → Admit to Hospitalist

No → **Admit to Hospitalist**
Start antibiotics
(See table, page 3)
NPO
If at Scottish Rite, ask Sedation MD to assess Sedation vs. Anesthesia for MRI

→ **Proceed to Inpatient Guideline**
(Continue to page 2)

No → **| Low Risk for MSK infection |**

→ **Trial NSAIDs**

→ **Does patient meet the following criteria?**
- **Clinical improvement (Afebrile, able to ambulate)**
  AND
- **Patient has reliable follow-up**

Yes → **Discharge home with PCP follow-up within 48 hours**

No → **Consult Ortho Admit to Hospitalist Scheduled NSAIDs** → **Proceed to Inpatient Guideline**
(Continue to page 2)

| Low Suspicion for MSK Infection |
Afebrile, history of trauma < 24 hours

→ **Continue usual ED 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: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).

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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Inpatient Management

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| 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

MSK Infection?

- Yes → **Consult ID**
  - **Drainable abscess or septic joint?**
    - Yes →
      - **Go to OR or IR**
      - **Send specimen** [5]
      - → **Consult PT / Continue antibiotics / Provide medical management / Consider transition to PO antibiotics**
    - No →
      - **Continue antibiotics** (See table, page 3)
      - **Provide medical management** [1]
      - **Blood culture results after 24H?**
        - Positive →
          - **Consult PT**
          - **Continue antibiotics** (See table, page 3)
          - **Provide medical management** [1]
          - **Consider transition to PO antibiotics** [2]
        - Negative →
          - **Consult IR for bone biopsy**
          - **Make patient NPO before desired procedure**
            - Clears: 2 hours
            - Breastmilk: 4 hours
            - Formula: 6 hours
            - Solids: 8 hours
          - then:
            - **Consult PT**
            - **Continue antibiotics** (See table, page 3)
            - **Consider transition to PO antibiotics** [2]
        - → **Meets discharge criteria?** [4]
          - Yes →
            - **Discharge home**
            - **Follow-up with Ortho in 2-4 weeks if surgical intervention required. Otherwise per Ortho discretion.**
            - **Follow-up with ID in 2-4 weeks**
          - No → **If patient requires continued medical management,** [3] **then consider the following:**
            - **Reimaging**
            - **Echo**
- No →
  - **Stop antibiotics**
  - **Continue alternative mgmt**

| Low Risk for MSK Infection |

Scheduled Toradol
Observation
NPO overnight

Improved after 12-24H?

- Yes →
  - **D/C home**
  - **PCP follow-up within 48H**
- No → **Repeat labs: ↑ CRP or WBC?**
  - Yes → **Consider managing as high risk**
  - No → **Continue observation**
    - **Clinical improvement after 24H scheduled Toradol?**
      - Yes → **D/C home / PCP follow-up within 48H**
      - No → **Consider managing as high risk**

[1] Medical Management

- Aggressive hydration (given risk of bacteremia/potentially nephrotoxic drugs)
- CBC and CRP 36-48H from surgical procedure or admission labs
- Additional labs every 48H PRN and on planned discharge day
- PICC lines not routinely recommended
- 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.

[2] Criteria to Transition to PO Antibiotics

Must meet ALL of the following criteria:

- No fever >24H
- Minimal pain
- CRP decreased by >50% of initial value
- Blood cultures negative for 36H
- No signs of endocarditis, pneumonia, or DVT

[3] Continued Medical Management Criteria

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

[4] Discharge Criteria

- Pain controlled by PO meds
- Tolerating PO antibiotics

[5] 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).

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IV Antibiotic Table

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

[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

Bacterial Targets	Drug	Dose	Max Single Dose
MSSA or *K. kingae*	Cephalexin	40mg/kg/dose q8h	1000mg
MRSA	Clindamycin	13mg/kg/dose q8h	600mg
S. pyogenes (GAS)	Amoxicillin	30mg/kg/dose q8h	1000mg

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