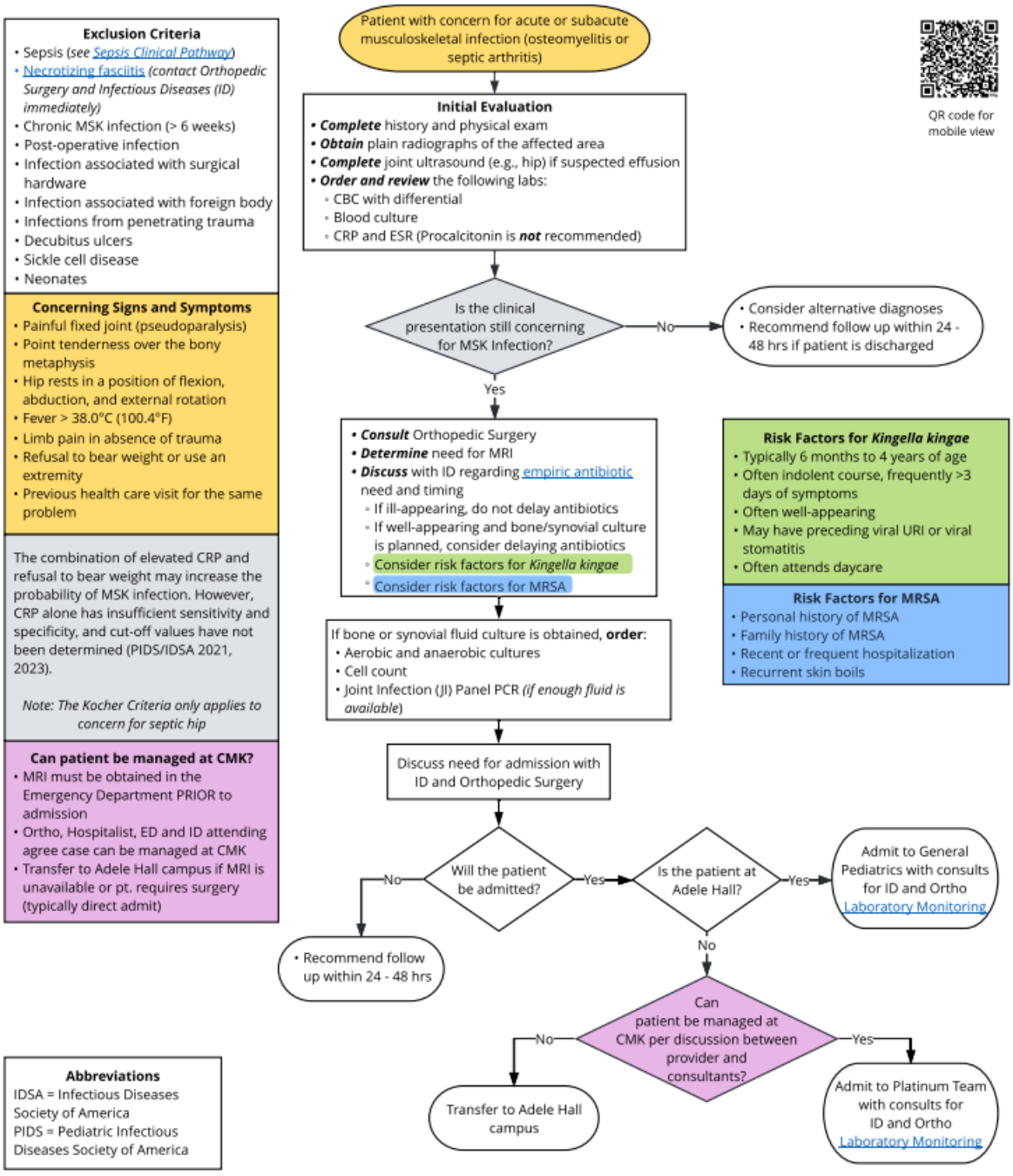
Musculoskeletal Infection
Clinical Pathway Synopsis

Musculoskeletal Infection Algorithm



These clinical pathways do not establish a standard of care to be followed in every case. It is recognized that each case is different, and those individuals involved in providing health care are expected to use their judgment in determining what is in the best interests of the patient based on the circumstances existing at the time. It is impossible to anticipate all possible situations that may exist and to prepare a clinical pathway for each. Accordingly, these clinical pathways should guide care with the understanding that departures from them may be required at times.

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Objective of Clinical Pathway

This pathway aims to provide care standards for patients with suspected musculoskeletal infection. It provides guidance for initial evaluation and management, including recommended labs, imaging, and empiric antibiotic selection when warranted.

Background

Musculoskeletal infections include infections of the bone (osteomyelitis) and/or joints (acute bacterial arthritis) and are often characterized by local pain, swelling, fever, restricted motion, and/or refusal to bear weight (Hannon & Lyons, 2023). Without proper treatment, serious complications such as abnormal bone growth, bacteremia or sepsis, septic thrombophlebitis, periosteal abscess, pyomyositis, or pathological fractures, which may be life- or limb-threatening, can occur (Autore et al., 2020; Yi et al., 2021). This pathway seeks to promote early recognition of musculoskeletal infections and reduce variation in care to improve outcomes and resource utilization.

Target Users

- Physicians (Community clinicians, Urgent Care, Emergency Medicine, Hospital Medicine, Infectious Diseases (ID), Orthopedics, Fellows, Residents)
- Nurse Practitioners
- Nurses
- Pharmacists

Target Population

Inclusion Criteria

- Patients with concern for acute or subacute musculoskeletal (MSK) infection, including:
  - Osteomyelitis
  - Septic arthritis

Exclusion Criteria

- Chronic MSK infection (> 6 weeks)
- Sepsis (see Sepsis Clinical Pathway)
- Necrotizing fasciitis (contact orthopedic surgery and ID immediately)
- Post-operative infection
- Surgical hardware
- Infection associated with foreign body
- Infections from penetrating trauma
- Decubitus ulcers
- Sickle Cell Disease
- Neonates

AGREE II

The joint Pediatric Infectious Diseases Society (PIDS) and Infectious Diseases Society of America (IDSA) Clinical Practice Guidelines on Acute Hematogenous Osteomyelitis (Woods et al., 2021) and Acute Bacterial Arthritis (Woods et al., 2023) provided guidance to the Musculoskeletal Infection Clinical Pathway Committee. See Tables 1 and 2 for AGREE II appraisals.

Table 1
AGREE II Summary for the PIDS/IDSA Guideline on Acute Bacterial Arthritis (Woods et al., 2023)

Domain	Percent Agreement	Percent Justification^
Scope and purpose	99%	The aim of the guideline, the clinical questions posed and target populations **were** identified.
Stakeholder involvement	74%	The guideline **was developed** by the appropriate stakeholders and represents the views of its intended users. It was unclear, however, how the views and preferences of patients were sought.

Rigor of development	95%	The process used to gather and synthesize the evidence, the methods to formulate the recommendations and to update the guidelines **were** explicitly stated.
Clarity and presentation	99%	The guideline recommendations **are** clear, unambiguous, and easily identified; in addition, different management options are presented.
Applicability	63%	The guideline **did not** address implementation barriers and facilitators, utilization strategies, nor audit criteria. Resource costs associated implementation were discussed.
Editorial independence	85%	The recommendations probably **were not** biased with competing interests. There was no statement regarding the influence of the funding body; however, conflicts of interest were appropriately disclosed and managed.
Overall guideline assessment	85%	
See Practice Recommendations		

Note: Four EBP Scholars completed the AGREE II on this guideline.
^Percentage justification is an interpretation based on the Children's Mercy EBP Department standards.

Table 2
AGREE II Summary for the PIDS/IDSA Guideline on Acute Hematogenous Osteomyelitis (Woods et al., 2021)

Domain	Percent Agreement	Percent Justification^
Scope and purpose	94%	The aim of the guideline, the clinical questions posed and target populations **were** identified.
Stakeholder involvement	74%	The guideline **was developed** by the appropriate stakeholders and represents the views of its intended users. It was unclear, however, how the views and preferences of patients were sought.
Rigor of development	84%	The process used to gather and synthesize the evidence, the methods to formulate the recommendations and to update the guidelines **were** explicitly stated.
Clarity and presentation	92%	The guideline recommendations **are** clear, unambiguous, and easily identified; in addition, different management options are presented.
Applicability	39%	The guideline **did not** address implementation barriers and facilitators, utilization strategies, nor audit criteria. Resource costs associated implementation were discussed.
Editorial independence	81%	The recommendations probably **were not** biased with competing interests. There was no statement regarding the influence of the funding body; however, conflicts of interest were appropriately disclosed and managed.
Overall guideline assessment	77%	
See Practice Recommendations		

Note: Four EBP Scholars completed the AGREE II on this guideline.
^Percentage justification is an interpretation based on the Children's Mercy EBP Department standards.

Practice Recommendations

Please refer to the PIDS/IDSA Clinical Practice Guidelines (Woods et al., 2021; Woods et al., 2023) for full practice recommendations.

Additional Questions Posed by the Clinical Pathway Committee

No additional clinical questions were posed for this review.

Updates from Previous Versions of the Clinical Pathway

- Modified inclusion criteria to only include acute and subacute osteomyelitis or acute bacterial arthritis (removed pyomyositis)
- Added exclusion criteria for conditions that may require unique management
- Added antibiotic dosing table
- Added risk factors for MRSA infections

Recommendation Specific for Children's Mercy

No deviations were made from the practice recommendations made by the PIDS/IDSA Clinical Practice Guidelines, but logistical processes related to Children's Mercy were added.

- Admit and transfer processes specific to patient location
- Laboratory stewardship recommendations

Measures

- Utilization of the Musculoskeletal Infection Clinical Pathway
- Utilization of Musculoskeletal Infection power plans/order sets (ED and inpatient)

Value Implications

The following improvements may increase value by reducing healthcare costs and non-monetary costs (e.g., missed school/work, loss of wages, stress) for patients and families and reducing costs and resource utilization for healthcare facilities.

- Decreased risk of underdiagnosis and related complications
- Decreased unwarranted variation in care

Organizational Barriers and Facilitators

Potential Barriers

- Variable level of experience among providers
- Need for effective communication and coordination among multiple specialties
- Challenges with follow-up faced by some families

Potential Facilitators

- Collaborative engagement across care continuum settings during clinical pathway development
- High rate of use of the clinical pathway
- Standardized order sets for Emergency Department and Hospital Medicine

Bias Awareness

Bias awareness is our aim to recognize social determinants of health and minimize healthcare disparities, acknowledging that our unconscious biases can contribute to these inequities.

Power Plans

The following power plan(s) are currently in place, but could not be updated at this time due to Children's Mercy's Electronic Health Record (EHR) transition:

- EDP Musculoskeletal Infection Pathway
- Musculoskeletal Infection Pathway

Clinical Pathway Preparation

This clinical pathway was originally created with representation from Emergency Medicine, Hospital Medicine, Infectious Diseases, Medical Administration, Orthopedic Surgery, and Evidence Based Practice

Clinical Pathway Revision Representation

- Douglas Swanson, MD | Infectious Diseases | Committee Chair
- Lisa Berglund, MD | Orthopedic Surgery | Committee Member

- Jenna Bishop, PharmD | Pharmacy | Committee Member
- Ali Fowler, MD | Pediatrics Resident | Committee Member
- Margaret Hainline, MD | Hospital Medicine | Committee Member
- Neena Kanwar, PhD | Laboratory Medicine | Committee Member
- Viet Le, MD | Radiology | Committee Member
- Lina Patel, MD | Emergency Medicine | Committee Member
- Kedar Tilak, MD, FAAP | Infectious Diseases / Neonatology | Committee Member

EBP Committee Members

- Kathleen Berg, MD, FAAP | Evidence Based Practice
- Kori Hess, PharmD | Evidence Based Practice

Clinical Pathway Development Funding

The development of this clinical pathway was underwritten by the following departments/divisions: Emergency Medicine, Hospital Medicine, Infectious Diseases, Laboratory Medicine, Pharmacy, Orthopedic Surgery, Radiology, Evidence Based Practice

Conflict of Interest

The contributors to the Musculoskeletal Infection Clinical Pathway have no conflicts of interest to disclose related to the subject matter or materials discussed.

Approval Process

- This pathway was reviewed and approved by the Musculoskeletal Infection Committee, content expert departments/divisions, and the EBP Department, after which the Medical Executive Committee approved them.
- Pathways are reviewed and updated as necessary every 3 years within the EBP Department at CMKC. Content expert teams are involved with every review and update.

Review Requested

Department/Unit	Date Obtained
Emergency Medicine	July 2025
Hospital Medicine	July 2025
Infectious Diseases	July 2025
Laboratory Medicine	July 2025
Orthopedic Surgery	July 2025
Pharmacy	July 2025
Radiology	July 2025
Evidence Based Practice	July 2025

Version History

Date	Comments
Jul 2025	Version five – developed synopsis and updated clinical pathway
Jan 2022	Version four – updated clinical pathway
Sep 2020	Version three – updated clinical pathway
Jun 2019	Version two – updated clinical pathway
Nov 2018	Version one – developed clinical pathway

Date for Next Review

- July 2028

Implementation & Follow-Up

These clinical pathways do not establish a standard of care to be followed in every case. It is recognized that each case is different, and those individuals involved in providing health care are expected to use their judgment in determining what is in the best interests of the patient based on the circumstances existing at the time. It is impossible to anticipate all possible situations that may exist and to prepare a clinical pathway for each. Accordingly, these clinical pathways should guide care with the understanding that departures from them may be required at times.

- Once approved, the pathway was presented to appropriate care teams and implemented. Care measurements may be assessed and shared with appropriate care teams to determine if changes need to occur.
- Power plans consistent with recommendations could not be updated at this time due to Children's Mercy's EHR transition, but the new order sets will be reviewed, when possible, for consistency with the pathway.
- Committee members garnered feedback from their respective divisions/departments.
- Announcements were made to each of these divisions/departments via email.
- Additional institution-wide announcements were made via the hospital website and relevant huddles.

Disclaimer

When evidence is lacking or inconclusive, options in care are provided in the supporting documents and the power plan(s) that accompany the clinical pathway.

These clinical pathways do not establish a standard of care to be followed in every case. It is recognized that each case is different, and those individuals involved in providing health care are expected to use their judgment to determine what is in the best interests of the patient based on the circumstances existing at the time.

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References

Autore, G., Bernardi, L., & Esposito, S. (2020). Update on Acute Bone and Joint Infections in Paediatrics: A Narrative Review on the Most Recent Evidence-Based Recommendations and Appropriate Antinfective Therapy. *Antibiotics (Basel)*, *9*(8). https://doi.org/10.3390/antibiotics9080486

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