

## 1.06 BONE AND JOINT INFECTIONS

### Introduction

Osteomyelitis is a pyogenic infection of the bone or periosteum, whereas septic arthritis is an infection of the joint space. In children, these most commonly result from hematogenous spread. Osteomyelitis may also result from extension of contiguous skin or muscle infection. Septic arthritis may also result from either contiguous bone infection or direct inoculation of bacteria into the joint from penetrating trauma, intra-articular injection, or other causes. Either site of infection may represent a medical emergency in children. Bone and joint infections are commonly caused by *Staphylococcus aureus*, *Streptococcus* species, *Kingella kingae*, and *Salmonella* species. They most commonly occur in children <5 years of age. Males are nearly twice as likely to be affected as females. Prompt recognition and appropriate treatment are essential to reduce the risk of significant complications, including permanent bone or cartilage destruction with life-long disability. Pediatric hospitalists should render evidence-based care that minimizes harm, improves outcomes, and avoids use of unnecessary procedures and treatments.

### Knowledge

Pediatric hospitalists should be able to:

- Discuss the differential diagnosis of common presenting signs and symptoms of bone and joint infections, including swollen joint, limp, and pain or limited movement of the affected bone or joint.
- Explain the pathophysiology of bone and joint infections.
- Compare and contrast the different clinical presentations of bone and joint infections between children of varying chronological ages.
- Explain risk factors for bone and joint infections, including sickle cell disease.
- Identify indications for admission to the hospital and goals for therapy while hospitalized for children with suspected osteomyelitis and septic arthritis.
- Classify the most likely pathogens based on age, underlying risk factors, and exposures and list appropriate antimicrobial agents for each.
- State relative local antimicrobial resistance rates for the most common organisms and explain the importance of these in prescribing therapy.
- Describe the relative advantages, disadvantages, and local availability of commonly used laboratory tests (such as C-reactive protein, blood cultures, bone aspirate, and others) and radiologic modalities (such as plain film, computed tomography, bone scan, magnetic resonance imaging, and others) in the evaluation of bone and joint infections.
- Identify risk factors for poor outcomes, including leg length discrepancy or chronic infection.
- Describe a comprehensive approach to pain management in children with bone and joint infections, including the roles of child life, occupational therapy, the pain service, and others according to local context.

- Discuss the relative advantages and disadvantages of intravenous versus oral antibiotic administration at discharge and identify the rare circumstances in which intravenous antibiotic therapy may be preferred.
- Define the role of the orthopedic surgeon and infectious diseases subspecialists in consultation, co-management, and follow-up care.
- Discuss criteria for patient transfer to a referral center in cases requiring pediatric-specific services not available at the local facility.
- Describe criteria, including specific measures of clinical improvement, antimicrobial treatment plan, and post-discharge management plan, which must be met before discharging patients with bone and joint infections.

### Skills

Pediatric hospitalists should be able to:

- Diagnose osteomyelitis or septic arthritis by efficiently performing an accurate history and physical examination.
- Develop a cost-effective approach to diagnostic evaluation for children suspected of having a bone or joint infection, including laboratory and radiographic testing.
- Interpret laboratory and radiographic studies commonly ordered to assess for bone and joint infections.
- Manage pain effectively for children with bone and joint infections.
- Engage consultants (such as orthopedic surgeons, infectious disease specialists, physical therapists, and others) in a timely and effective manner when indicated.
- Access and arrange for pediatric home care services as appropriate.
- Coordinate care with subspecialists and the primary care provider and arrange an appropriate transition plan for hospital discharge.

### Attitudes

Pediatric hospitalists should be able to:

- Acknowledge the need for effective communication with patients, the family/caregivers, and healthcare providers regarding findings and care plans.
- Collaborate with subspecialists and the primary care provider to ensure coordinated, longitudinal care for children with bone and joint infections.

### Systems Organization and Improvement

In order to improve efficiency and quality within their organizations, pediatric hospitalists should:

- Lead, coordinate, or participate in the development and implementation of cost-effective, safe, evidence-based care pathways to standardize the evaluation and management for hospitalized children with bone and joint infections.
- Work with hospital administration to build a multidisciplinary team that can provide high value care to children with bone and joint infections, including nursing, social work, physical therapy, pharmacy, and care coordinators.
- Assist in creating systems to evaluate and improve pain

management for children hospitalized with bone and joint infections.

- Lead, coordinate, or participate in efforts to increase pediatric-specific community health care resources that allow for an efficient transition to outpatient therapy and management after inpatient goals are achieved.

## References

1. Keren R, Shah SS, Srivastava R, et al. Comparative effectiveness of intravenous vs. oral antibiotics for postdischarge treatment of acute osteomyelitis in children. *JAMA Pediatr.* 2015;169(2):120-128. <https://doi.org/10.1001/jama-pediatrics.2014.2822>.