Clinical Utility of Repeat Magnetic Resonance Imaging Studies Among Children with Acute Hematogenous Osteomyelitis
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**Introduction**
- Acute hematogenous osteomyelitis (AHO) is a common and significant cause of hospitalization in children
- Magnetic resonance imaging (MRI) is the modality of choice for AHO
- Limited guidance for whether repeat MRIs are worthwhile when children do not improve as expected

**Study Objectives**
- Determine whether repeat MRIs change clinical management among children with AHO
- Identify clinical markers to predict which patients are most likely to have meaningful findings on repeat MRI

**Methods**
- Retrospective chart review
- Children 6 months to 18 years with discharge diagnosis of AHO
- All MRI reports reviewed from 3 weeks prior to admission through 24 months post discharge
- Multiple MRI studies performed during the same radiology visit were considered a single MRI study
- An MRI was “clinically impactful” if:
  - A new infectious process was identified (e.g., new abscess not previously seen)
  - Surgical intervention occurred within 24 hours of MRI completion
- Bivariable comparisons of clinical and demographic variables were performed
- Multivariable logistic regression performed to identify clinical factors associated with impactful repeat MRIs

**Results**

**Clinical Characteristics based on Number of MRIs Performed**
- 238 patients met inclusion criteria
- Causative pathogen identified in 198 (83%) patients
  - Staphylococcus aureus
  - Among S aureus isolates, 12% MRSA
- No difference in: median age, sex, insurance status, presence of concurrent septic arthritis, or identification of MRSA

**Clinical Characteristics Associated with Impactful Repeat MRI**
- Multivariable logistic regression found:
  - Longer hospitalization (7 days vs 5 days, p=0.01)
  - Prolonged bacteremia (32% vs 10%, p=0.01)
  - Therapeutic failure (27% vs 5%, p=0.01)
  - Peak CRP levels >20mg/dL (45% vs 12%, p=0.01)
- Concurrent septic arthritis (41% vs 16%, p=0.02)

**Clinical Characteristics Associated with Impactful Repeat MRI**
- Multivariable logistic regression found:
  - Peak CRP >20mg/dL (OR 3.9, CI 1.4,10.7)
  - Prolonged bacteremia (OR 3.4, CI 1.1,10.2)
- There was no difference in:
  - Infection location
  - Presence of multifocal infection
  - Rate of ICU admission
  - Presence of venous thromboembolism
  - Causative pathogen identified

**Discussion**
- 1 in 5 children with AHO had multiple MRIs performed through their treatment course
- Repeat MRIs obtained during initial admission were impactful 66% of the time
- Repeat MRIs obtained after discharge were impactful 25% of the time
- Peak CRP > 20mg/dL, and persistent bacteremia were both associated with having an impactful repeat MRI
- Critical illness, location of infection, causative pathogen, and development of a venous thrombus (VTE) were not predictive of having an impactful repeat MRI

**Conclusions**
- Repeat MRI can be clinically impactful for pediatric AHO when used judiciously among ill pediatric patients
- Future prospective studies are needed to better define which children with AHO will benefit from repeat MRI