

## Abstract

**Background and Objectives:** There is limited guidance for whether repeat magnetic resonance imaging (MRI) studies are clinically impactful among children with acute hematogenous osteomyelitis (AHO) who fail to improve as expected. This study aimed to determine whether repeat MRIs changed management among children with AHO and identify clinical characteristics predictive of which patients benefit from repeat MRIs.

**Methods:** Children admitted to a quaternary care pediatric hospital with AHO were identified during a 9-year period. Patients with chronic symptoms, non-hematogenous infections, or significant contributing comorbidities were excluded. Medical records were retrospectively reviewed for all MRIs performed 3 weeks prior to admission to 24 months after discharge. An MRI was considered clinically impactful if it identified a new infectious process (e.g., abscess not seen on initial MRI) or if it resulted in surgical intervention within 24 hours. Bivariable comparisons of categorical variables were performed, and multivariable logistic regression was used to assess the clinical factors of impactful repeat MRIs.

**Results:** Among 239 included patients, 41 (17%) had more than 1 MRI performed during their clinical course, the majority of whom (53.7%) had a repeat MRI that impacted care. Patients who underwent repeat MRIs had longer hospitalizations (7 vs 5 days,  $P<0.01$ ), were more likely to have C-reactive protein (CRP) levels  $>20\text{mg/dL}$  (41% vs 10%,  $P<0.01$ ), and were more likely to have delayed transition to oral antimicrobials (8.4 vs 3.3 days,  $P<0.01$ ). Peak CRP  $> 20\text{mg/dL}$  and prolonged bacteremia were found to be associated with increased odds of having an impactful repeat MRI with adjusted odds ratios of 3.9 ( $P=0.007$ ) and 3.4 ( $P=0.03$ ) respectively.

**Conclusions:** When used judiciously among ill children with complicated AHO, repeat MRI can be clinically impactful. Prospective studies are needed to better define which children with AHO benefit from repeat MRI.

**Level of Evidence:** This is a retrospective cohort study interested in determining the clinical utility of repeat magnetic resonance imaging studies for children with osteomyelitis. This study meets criteria for Level II evidence.