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Brief Reports

DEFINITIVE DIAGNOSIS OF CHILDREN PRESENTING TO A PEDIATRIC EMERGENCY DEPARTMENT WITH FEVER AND EXTREMITY PAIN

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☐ **Abstract—Background: Children who present to the emergency department (ED) with complaint of fever and new-onset joint or extremity pain can be a diagnostic dilemma for many emergency and consulting physicians. Objectives: The purpose of our study was to identify the etiologies of pediatric fever and extremity pain presenting to a tertiary care pediatric ED and to define factors that were associated with advanced imaging, admission, and surgical intervention. Methods: The electronic medical records of children presenting to our institution's pediatric ED with fever and extremity pain were retrospectively reviewed. Data collected included demographic characteristics, laboratory studies, diagnostic imaging, need for admission, and surgical procedures. Results: The initial ED diagnosis was consistent with the definitive diagnosis 42% of the time. Children with the inability to bear weight on the affected limb were more likely to have a bacterial infection, such as osteomyelitis, septic arthritis, or intramuscular abscess ($p = 0.016$). An erythrocyte sedimentation rate >36 mm/hour and C-reactive protein levels >60 mg/L were found in children with osteomyelitis or septic arthritis ($p = 0.043$ and <0.001, respectively). Magnetic resonance imaging was ordered in 63% of children with multiple visits compared to 34% of children with a single visit ($p = 0.05$). Conclusions: In addition to a thorough history and physical examination, a complete set of laboratory studies and diagnostic imaging is necessary to reach an accurate diagnosis. The inability to bear weight, elevated C-reactive protein levels, and an elevated erythrocyte sedimentation rate are associated with bacterial infection. Magnetic resonance imaging is a useful imaging modality in determining an accurate diagnosis.** © **2017 Elsevier Inc. All rights reserved.**

☐ **Keywords—extremity; fever; osteomyelitis; pain; pediatric; septic arthritis**

INTRODUCTION

Fever is one of the most common presenting symptoms to pediatric emergency departments (EDs). Nearly one-third of children present with a chief complaint of fever, and a smaller portion of those children also present with pain in ≥1 extremity (1–3). Children who present to the ED with a complaint of fever and new-onset joint or extremity pain can be a diagnostic dilemma for many emergency and consulting physicians. Certain conditions, such as osteomyelitis and septic arthritis, warrant admission, whereas other children with more benign conditions can be safely discharged home. Given the limited time and resources and the large differential in diagnoses for a child presenting with fever and extremity pain, the decision to perform additional studies in the ED, admit, or discharge home is a difficult one. Also, the final diagnosis sometimes does not become evident until months or even years later. Despite the high volume of children who present with this complaint, few series exist documenting the difference in laboratory studies, diagnostic imaging, and clinical findings that are seen in this population. The

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purpose of our study was to identify the etiologies of pediatric fever and extremity pain presenting to a tertiary care pediatric ED and to define factors that were associated with advanced imaging, admission, and surgical intervention.

METHODS

After obtaining approval from the institutional review board at our hospital, the electronic medical records of children presenting to our institution's pediatric ED between April 1, 2013 and April 1, 2014 with *International Classification of Diseases, 9th revision* codes 719.4 (pain in joint, arthralgias), 729.5 (pain in limb), and 780.6 (fever and other physiologic disturbances of temperature regulation excludes: effects of reduced environmental temperature (991.0–991.9) effects of heat and light (992.0–992.9) fever, chills, or hypothermia associated with confirmed infection) were retrospectively reviewed. Our search yielded 294 children. Of those children, 48 met our inclusion criteria of age <18 years presenting directly to our ED with a documented parental fever at home or a documented fever in the ED, a complaint of extremity pain, follow-up until definitive diagnosis was made or symptoms resolved, and with a complete chart (Figure 1). Chief complaints and discharge or admission diagnoses were reviewed and were recorded along with demographic data, including age and sex. Individuals underwent a full chart review by a single observer, a senior orthopedic surgery resident, to determine the etiology of the complaint.

The presence of either a measured fever in the ED or documented parental fever and the number of presentations to any outpatient clinic or ED were all recorded. Fever was defined as axillary, rectal, or oral temperature >38°C.

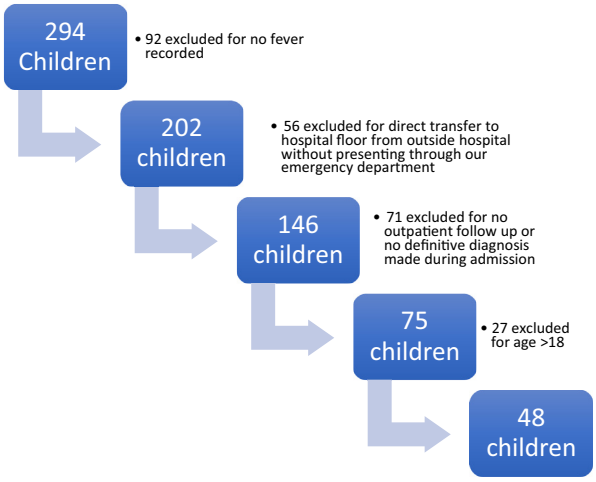

Figure 1. Patients included for final analysis in study.

The ability to bear weight, extremity involved, and if multiple extremities were involved were also documented. Inability to bear weight was defined as refusal to bear any weight on the affected limb. Limping was not defined as an inability to bear weight in our study.

Radiographic and advanced imaging was also recorded when obtained for each child. All imaging was reviewed by a radiologist, and their impression determined whether a study had "positive" findings. The specific type of advanced imaging was also investigated, as was the diagnostic result. Laboratory data were documented for each child, including serum white blood cell count (WBC), erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP) level. Lastly, if a child was admitted to the hospital and whether a surgical procedure was performed in the operating room was recorded. Details of each procedure were also reviewed.

Categorical data were analyzed using the chi-squared test or the alternative Fisher's exact test if the assumptions of the chi-square were violated. Interval data (i.e., CRP, WBC, and ESR) were analyzed using analysis of variance. Interval data were checked for normality and homogeneity of variances before application of parametric statistics. Alpha was set at $p < 0.05$, and SPSS software (version 12; SPSS, Inc., Chicago, IL) was used for all analyses.

RESULTS

The average age of children presenting to the ED with fever and extremity pain was 6.8 years (range 0.3–17 years). There were 21 females and 27 males. Twenty of the 48 children (42%) had a measured fever in the ED.

The initial ED diagnosis was consistent with the definitive diagnosis 42% of the time. The most common diagnoses were osteomyelitis (10 children), oncological/chemotherapy-induced (7 children), rheumatologic (7 children), and septic arthritis (4 children). The complete list of diagnoses is shown in Table 1.

Multiple ED visits (≥2) were seen in 19 of 48 children (40%). Children with multiple visits did not show a statistically significant increase in the number of radiographs, computed tomography, ultrasound, or bone scans ordered ($p = 0.725$, 0.372, 0.074, and 0.512, respectively). Magnetic resonance imaging (MRI), on the other hand, was ordered in 63% of children with multiple visits compared to 34% of children with a single visit ($p = 0.05$).

Documented parental fever versus measured fever in the ED showed no statistical difference in admission rates ($p = 0.342$) or with a diagnosis of bacterial infection ($p = 0.766$).

Children who presented with the inability to bear weight on the affected limb were more likely to have a