

## Research Article

# An orthopaedic elective for pediatric residents

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## Abstract

**Background:** Musculoskeletal complaints account for about 15% of primary care visits. However, orthopaedic education is often lacking in both medical school and pediatric residency. Primary care physicians often report low confidence in evaluation of orthopaedic diagnoses. The literature supports the need for increased musculoskeletal education in both residency and medical school.

**Objective:** The aim of this study is to report the education and confidence outcomes for a structured one orthopaedic elective for pediatric residents.

**Methods:** Twelve male and 25 females (N=37) pediatric residents were enrolled in a prospective study designed to improve musculoskeletal knowledge and confidence when managing orthopaedic problems. A 50-question pre-test and a 50-question confidence questionnaire was taken at the beginning and end of the one month elective.

**Results:** The average pre-test score was 54% correct vs 89% correct on the post-test ( $P < .001$ ). The confidence of residents to perform a physical exam, accurately diagnose and treat common orthopaedic conditions improved from an average of 4/10 to 9/10 ( $P < .001$ ).

**Conclusions:** Pediatric residents can develop a better understanding of the evaluation and treatment of musculoskeletal problems and therefore be more confident in addressing orthopaedic diagnoses in their clinic after participating in a formal one month orthopaedic elective rotation.

## Introduction

Approximately 10% -30% of patients who are seen by a primary care physician are seeking care due to a musculoskeletal complaint [1-4]. De Inocencio reports that >6% of pediatric clinic visits are musculoskeletal pain with nearly 30% attributable to trauma or overuse<sup>4</sup>. Schwend and Geiger reported that approximately one third of medical problems in children are related to the musculoskeletal system [5]. Medical school and primary care residency musculoskeletal curriculum is often minimal [6-11]. Graduating pediatric residents have ranked their level of confidence lowest in evaluating musculoskeletal problems and their management compared with other areas of pediatric medicine. In addition, graduating residents believed residency training should place more emphasis on musculoskeletal medicine [12]. Jandial et al reported that 74% of physicians, whom routinely evaluate pediatric patients, have low confidence in pediatric musculoskeletal assessment [13].

These deficiencies in orthopaedic knowledge and confidence may jeopardize patient care. For example, Reeder et al reported that 42% of referrals to his pediatric orthopaedic clinic did not meet the American Academy of Pediatrics guidelines for referral [14,15]. Similarly, Sielatycki reported in a study examining referrals for children with intoeing that none of 143 referred patients needed orthopaedic care and their diagnoses were all normal variation of development that could be cared for by a pediatrician [16].

Alternatively, some musculoskeletal issues are under-recognized and referred late, such as slipped capital femoral epiphysis (SCFE) which requires urgent treatment. For example, Schur et al reported that of 481 patients diagnosed with slipped capital femoral epiphysis; time to diagnosis was delayed by a mean of 4 weeks if evaluated by

a primary care physician and delayed 6 weeks if evaluated by an emergency department physician [17]. This delay in care for SCFE is similar to the data that Kocher reported in 2004 [18].

Integrated education and musculoskeletal rotations have been shown to increase physician's knowledge and confidence in treating musculoskeletal complaints [6,19,20]. However, there is minimal literature to support this finding in pediatric residents. The aim of this study is to report the education and confidence outcomes for pediatric residents enrolled in a structured one month elective in orthopaedics.

## Methods

The study was approved by the hospital institutional review board (IRB). Thirty-seven pediatric residents were enrolled in a prospective study designed to evaluate pediatric resident's musculoskeletal fund of knowledge and the resident's confidence when managing patients with orthopaedic diagnoses. Each resident spent one month on the orthopaedic service under the supervision of the senior author (WH). On the first day of the service, the resident took a 50-question pre-test and a 50-question confidence questionnaire. The pre-test was graded and reviewed with the resident. The questionnaire rated the resident's confidence with a 10-point scale in physical exam, diagnosis, and treatment of multiple common orthopaedic problems. During

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the month, time was spent in the clinic, casting room, inpatient care, operating room and emergency room. The pediatric resident participating in weekly pediatric orthopaedic conferences and a monthly journal club.

A copy of *Pediatric Orthopaedics in Primary Practices* [21] and *Pediatric Orthopaedics and Sports Injuries* [22] was given to each resident and used as the primary resources for education. On the last day of the rotation, the resident took a similar 50 question post-test and the identical 50 question confidence questionnaire. The questionnaires and tests were then reviewed with the resident during an end of rotation feedback meeting.

## Results

Thirty-seven residents participated in the study. Twelve residents were male and 25 were female. The average pre-test score was 54% correct vs 89% correct on the post-test ( $P < .001$ ) (Figure 1). The confidence of residents to perform a physical exam, accurately diagnose and treat common orthopaedic conditions improved from an average of 4/10 to 9/10 ( $P < .001$ ) (Figure 2). Topics evaluated included: musculoskeletal physical examination, interpreting musculoskeletal radiographs, diagnosing a torus and supracondylar fractures, Perthes disease, developmental dysplasia of the hip (DDH), anterior cruciate ligament tear (ACL), SCFE, septic joint, treatment for torus fracture, nursemaids elbow, clavicle fractures, calcaneal apophysitis, Osgood Schlatter's disease, toxic synovitis and application of short arm splints and cast.

## Discussion

The American Academy of Pediatrics report that 63% of pediatric residents will enter primary care [23]. Musculoskeletal pain ranks third as a reason for adolescent medical visits to the primary care physician [5]. In addition, musculoskeletal injuries are one of the most common reasons for acute visits to the emergency department and primary care office [1-4]. Recognition of musculoskeletal diagnoses is very important in a pediatric clinical practice. Primary care physicians must know how to treat basic musculoskeletal problems, when to refer patients, and how to recognize orthopaedic emergencies. The foundation of this knowledge stems from appropriate medical school and residency training.

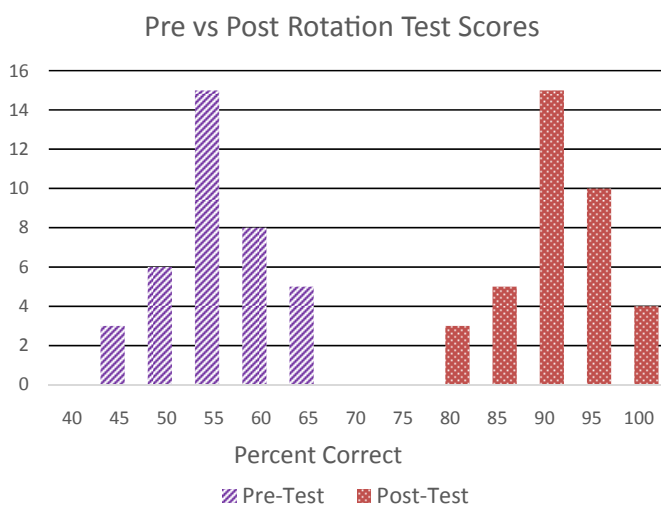


Figure 1. Pre-and post-rotation test scores.

## Pre vs Post Rotation Confidence Scores

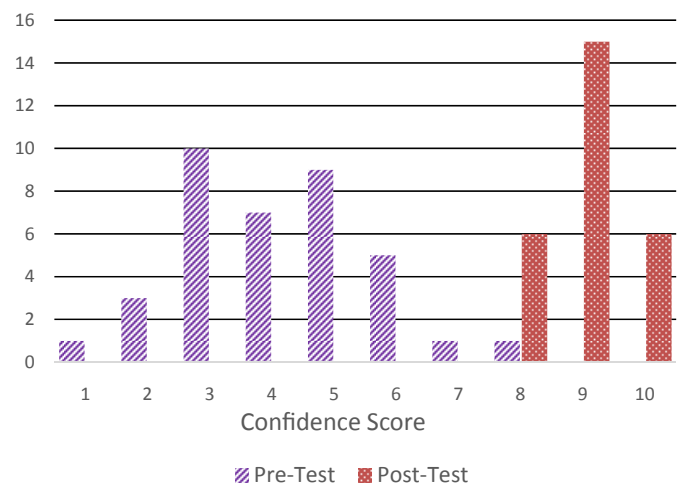


Figure 2. Pre-and post rotation confidence scores.

The literature supports a need for increased musculoskeletal education in medical school and primary care residencies. For example, Matzkin reported that primary care physicians lacked adequate musculoskeletal knowledge, but primary care physicians who had participated in a musculoskeletal rotation scored significantly better on a validated basic cognitive examination than those that did not [24]. The musculoskeletal rotation at our institution is a month long immersion with an educational focus on physical examination, treatment and the need for referral for musculoskeletal problems commonly seen in the primary care practice [15]. At the culmination of the rotation, the thirty-seven pediatric residents exhibited a better understanding of the evaluation and treatment of musculoskeletal problems and were found to be much more confident in addressing these problems.

## Conclusion

The current study illustrates the effectiveness of educating pediatric residents in musculoskeletal medicine through a structured one month orthopaedic elective rotation. We feel this study is applicable to other institutions. A one month orthopaedic rotation for all pediatric residents will help to address this proven deficiency in musculoskeletal medical education. Given the breadth of musculoskeletal problems evaluated by general pediatricians and the lack of education in both medical school and residency we support a required musculoskeletal rotation for pediatricians intending to go into general pediatrics as well as those that may specialize in a musculoskeletal related field.

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