

Point of Care Ultrasonography by Novice Medical Students for Detecting Fractures in Pediatric Patients with Traumatic Extremity Pain

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Background

Point of care ultrasound (POCUS) is an important assessment tool to make rapid critical diagnoses in the Emergency Department (ED), including in the evaluation of post-traumatic extremity pain.^{1,2,3} While several studies have demonstrated the accuracy of medical students performing POCUS examinations after limited training,⁴ none have assessed their ability to detect fractures in patients with post-traumatic extremity pain.

Objective

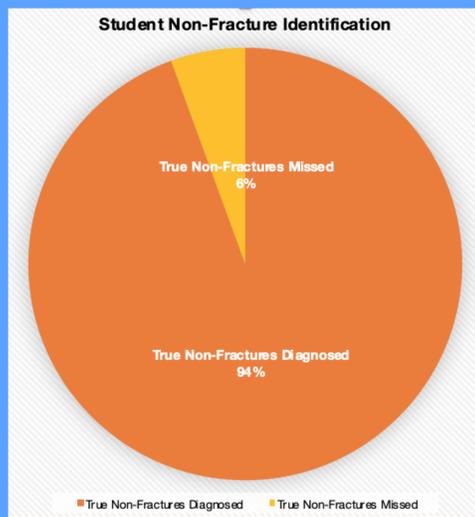
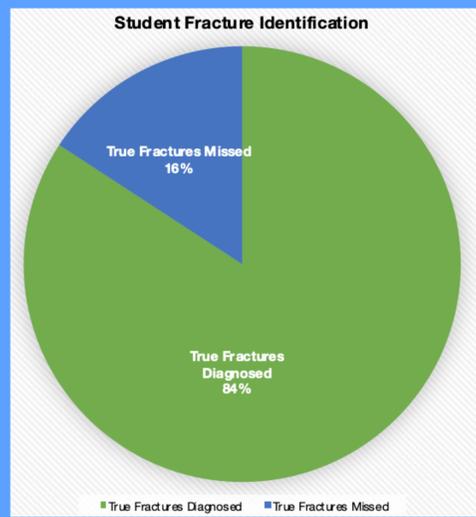
We aimed to assess the ability of medical students with minimal training in emergency ultrasound to accurately identify bone fractures in patients presenting with traumatic extremity pain.

Methods

Five novice medical students completed a 2-week ultrasound training period consisting of lectures with ultrasound fellowship trained faculty, hands-on practice with bone models, pediatric volunteers, and medical student volunteers (~ 3 hr total training with each student completing an average of 9.4 practice ultrasounds). Following training, medical students continuously (24 hr / day) recruited pediatric patients presenting to the ED at Children's Medical Center with traumatic extremity pain over 5 weeks. After each ultrasound scan, at least one fellowship trained ultrasound faculty assessed the student's accuracy based on a 1-5 scale established by the American College of Emergency Physicians (ACEP)⁵.

Results

39 total patients were enrolled in this imaging study, with a mean age of 8.5 years (SD 4.85). From the student conducted ultrasound scans, 37 were reviewed by Ultrasound fellowship trained faculty. **Faculty review revealed that fractures were accurately diagnosed on x-ray at the same location as ultrasound in 16/19 scans (84%, 95% CI, 60-97%), while non-fractures were accurately identified in 17/18 scans (94%, 95% CI, 73-99%).** Overall, the students perceived their own diagnostic success in 92% of ultrasound scans, with faculty assessing the students' diagnostic success rate at 89%.



Extremity Pain Location	Number Scans (%)
Forearm	13 (33.3%)
Lower leg	13 (33.3%)
Upper leg	8 (20.5%)
Upper arm	5 (12.8%)

Limitations

- This study involved a small sample size and was conducted at a single site.
- Patients with fractures may have been in more discomfort and thus, may have been less likely to consent to the study than patients without fractures.
- This study was limited to identifying fractures in long bones only.

Conclusions

Medical students with minimal training can perform ultrasound examinations to accurately identify extremity fractures in pediatric patients.

Given the success of teaching novice medical students ultrasound imaging skills, future studies might consider the timeframe and / or number of standardized scans required for students to obtain accurate scans using ACEP criteria.

References

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