SCIENTIFIC ARTICLE

Hand Education for Emergency Medicine Residents: Results of a Pilot Program

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Purpose Multiple studies have demonstrated the lack of knowledge of hand anatomy and pathology among those who first see patients with hand disorders. The goal of this study was to determine whether a hand surgery rotation for emergency medicine residents would improve this group's knowledge of the hand and its disorders as assessed at the end of their residency training.

Methods Seven postgraduate year (PGY) 2 emergency medicine residents completed a 4-week hand surgery rotation. Hand knowledge was assessed at the start, at the end, and 1 year after this rotation (end of PGY 3). Knowledge of a control group of 7 PGY 3 emergency medicine residents who did not have this rotation was also assessed.

Results Hand knowledge in the residents who completed the rotation was significantly improved. This was true for overall test performance (88% vs 70% correct responses), as well as for each of the anatomy and function (89% vs 57%), diagnosis (96% vs 86%), and treatment (79% vs 51%) categories. Overall test performance (78% vs 66%) and anatomy and function category performance (75% vs 43%) were significantly better at the end of PGY 3 for the residents who completed the rotation as compared to the control residents.

Conclusions A hand surgery rotation during an emergency medicine residency program improved the knowledge of hand anatomy and disorders. This knowledge was retained 1 year later and was greater than the knowledge of matched emergency medicine residents who did not have this rotation. Better knowledge of hand anatomy and disorders among emergency physicians might improve their ability to initially evaluate and treat patients with these conditions. Such knowledge might allow emergency department physicians to play a more important role in the management of hand emergencies. A hand surgery rotation has been incorporated into the PGY 2 curriculum for all emergency medicine residents at my institution. *(J Hand Surg 2012;37A:1245–1248.*

Key words Hand education, hand emergency, hand fracture, hand infection, hand trauma.

Additional material is available online.

MULTIPLE OBSERVERS HAVE reported the difficulties emergency department (ED) are experiencing in obtaining sufficient specialty coverage for hand surgery emergencies. Some have focused on the limited availability of hand surgery specialists for ED patients.[1] Others have focused on the burden sustained by level I trauma centers when patients with isolated and often non-emergent hand conditions are transferred from outside institutions.[2–3]

Several studies have shown a high incidence of hand trauma among the general population. More than 10% of ED visits in the United States due to injury are for problems of the wrist, hand, and finger.[4] In 2006, nearly 4.5 million patients presented to an ED for these disor-

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ders. Anakwe and colleagues identified the incidence of metacarpal fractures at 3.7 per 1000 per year for men and 1.3 per 1000 per year for women in the population served by their trauma center.[5] Both of these studies likely under-represent the need of an ED for hand surgery services because infections and other non-traumatic urgent hand issues were not included in the data reported.

Availability of a hand surgeon is only part of the equation. In most circumstances, patients are referred to the hand surgeon by another provider. Wolf and Boyer (poster presented at the 63rd Annual Meeting of the American Society for Surgery of the Hand, Chicago, IL, September 18–20, 2008) reported a dearth of knowledge of common hand conditions and initial treatment thereof among internal medicine residents.

For traumatic conditions, referral to a hand surgeon often comes from an emergency medicine physician. Previous studies have identified a lack of knowledge of hand anatomy among emergency medicine trainees.[6–7] Anzarut and colleagues[8] retrospectively reviewed more than 1000 referrals to plastic surgeons at a tertiary care center from an outside ED. From this, they developed a list of educational topics to address the knowledge deficiencies that necessitated the referral. Included in the list were the management of hand infections, small finger metacarpal neck fractures, other metacarpal fractures, minor burns, frostbite, and scaphoid fractures.

Emergency department physicians referring patients for hand surgical care often lack sufficient basic knowledge about hand conditions. I created a hand surgery rotation for emergency medicine residents to address what I perceived as a deficit in their residency education. The purpose of this study was to determine whether this rotation imparted critical knowledge about hand conditions to the emergency medicine rotators, compared to those who did not have this rotation, and whether this knowledge was retained at the end of their residency education.

METHODS

PGY 2 emergency medicine residents rotated on the hand surgery service. Rotation participation was assigned by the emergency medicine program director. Each rotating resident spent 4 consecutive weeks with the hand surgery team. Residents were not allowed to take vacation during this time. During the 4-week rotation, residents spent one day a week attending their program-wide educational activities and took one shift in the ED the same night. Five days per week were spent with the hand surgery service.

While on service, these residents learned in multiple educational formats. They took daytime calls for inpatient and ED consultations every day. The residents spent 2 days per week in the operating room and 1.5 days per week in clinic. They attended small-group teaching conferences for 1.5 hours per week. These conferences emphasized hand anatomy, fractures, infections, and emergencies such as amputations and compartment syndrome.

I created a hand surgery question bank to assess knowledge of the hand rotators. Questions were selected from topics in the hand sections of the plastic surgery and orthopedic in-training examinations. I pilot tested candidate questions with a panel of board certified hand surgeons to confirm the accuracy of the keyed response and assess that the question fell within the expected scope of emergency medicine practice. Only questions that had greater than 80% agreement on the keyed response and appropriateness for emergency medicine physicians were selected for the test pool.

Questions were then categorized as anatomy and function, diagnosis, and treatment. Questions from each group were randomized into a pre-test and a post-test, each of which contained 20 questions. There was no overlap of questions between the pre-test and the post-test. The entire question pool is presented as Appendix A (available on the *Journal's* Web site at www.jhandsurg.org).

All rotators completed the pre-test on the first day of the rotation, before participating in any patient care. Faculty reviewed correct and incorrect responses with the rotator. At the end of the last day of the rotation, rotators completed the post-test. Correct and incorrect responses were reviewed with the rotator. One year after the rotation (range, 9–18 mo), the same group of emergency medicine residents took the final test at the end of the final year of residency training. Final test content was identical to the post-test content. Geving et al[9] demonstrated that repeating test content does not correlate with increased frequency of correct responses when the interval between test completions is greater than 25 days. The PGY 3 emergency medicine residents who did not have a hand surgery rotation during training took the final test at the end of the final year of training and served as a control group. The final test was given with no advanced warning, so no takers had any opportunity to review hand surgery to prepare for the final test.

Resident performance was compared between time points using a paired *t*-test. Performance on the anatomy, diagnosis, and treatment sections was also compared with a paired *t*-test. Test performance 1 year after