

# Neurologic Education in Emergency Medicine Training Programs

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## Abstract

**Objectives:** Neurologic complaints are a frequent cause of emergency department visits. The morbidity and mortality of neurologic complaints such as headache and stroke can be extensive. Thus, emergency medicine residency programs should ensure adequate training in such neurologic emergencies. The authors sought to determine what methods are being used to educate residents on neurologic emergencies. **Methods:** A two-page survey was mailed to directors of all 126 accredited emergency medicine residency programs in the United States. The number and types of lectures to residents, required rotations, and electives offered were assessed. Means, standard deviations (SDs), and proportions are used to describe the data. Ninety-five percent confidence intervals of proportions (95% CIs) were calculated. **Results:** The response rate was 78% (98 of 126). Programs had a mean ( $\pm$ SD) of 5.4 ( $\pm$ 1.0) hours of didactic lectures per week, with a mean of 12.0 ( $\pm$ 5.9) lecture hours devoted to neurologic emergencies annually. A neurology rotation was required for 16 of the 92 programs providing these data (17.4%; 95% CI = 10.6% to 27.0%), and a neurosurgery rotation was required for 14 of these 92 programs

(15.2%; 95% CI = 8.9% to 24.6%). One program (1.1%; 95% CI = 0.1% to 6.8%) required both a neurology and a neurosurgery rotation, and one program (1.1%; 95% CI = 0.1% to 6.8%) required either a neurology or a neurosurgery rotation. On 15 of the 32 required neurologic rotations (46.9%; 95% CI = 29.5% to 65.0%), time was spent only in the intensive care unit. The remaining 17 rotations used outpatient clinic and general floor neurology settings. Electives in neurology, neurosurgery, or neuroradiology were available for 32 programs (32.7%; 95% CI = 24.2% to 42.4%) but were seldom used. **Conclusions:** Currently, the primary method of educating residents to treat neurologic emergencies is through didactic lectures, as opposed to clinical rotations in neurology or neurosurgery. Improving resident education in neurologic emergencies within the current educational format must focus on improving didactic lectures in neurologic topics. Expanding clinical rotations or electives to enhance education in neurologic emergencies also warrants future attention. **Key words:** neurology; education; emergency medicine training. *ACADEMIC EMERGENCY MEDICINE* 2005; 12:909-911.

Neurologic complaints such as headache, seizure, and stroke account for more than 5% of all emergency department (ED) visits in the United States.<sup>1</sup> Diagnostic and therapeutic approaches to neurologic emergencies, including stroke, traumatic brain injury, and intracerebral hemorrhage, continue to evolve at a rapid pace. Residents being trained in emergency medicine (EM) need appropriate skills in the evaluation and treatment of neurologic emergencies to provide the best possible patient care. A lack of training in this area may result in suboptimal patient outcomes and contribute to the morbidity and mortality of

neurologic emergencies. We hypothesized that EM residency training programs do not currently provide extensive training outside of the ED in the evaluation and treatment of neurologic emergencies.

## METHODS

**Study Design and Population.** This was a survey study that was granted exemption from surveillance by the institutional review board. The residency directors of all 126 accredited allopathic EM residency programs in the United States were invited to participate.

**Survey Content and Administration.** Participants were solicited by a postal survey mailed during February 2003. After six weeks, a second mailing was conducted for all nonresponders to the initial mailing. A third and final mailing was performed after an additional six weeks, with e-mail requests for completion of the survey sent concurrently. Each mailing included a cover letter requesting participation and expressing anonymity of responses, a copy of the survey, and a stamped, addressed envelope for returning the completed survey.

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The two-page survey was designed to provide information about training in neurologic emergencies. The survey requested information about the size of the program and the number of years of training. Detailed questions asked about the total number and type of didactic lectures provided to residents, regardless of whether the lecturer was a resident or attending physician, and the number of lectures pertaining to a list of neurologic topics.<sup>2</sup> Survey items also inquired about required rotations in neurology or neurosurgery and whether time was spent in the intensive care unit, floor, and/or outpatient clinics during these rotations. Information about electives offered and how often these electives were used was requested. Residency directors were also queried as to how confident they were in the residents' ability to deal with neurologic emergencies using a three-point rating scale: "very confident," "somewhat confident," or "not confident."

**Data Analysis.** Means, standard deviations (SD), and proportions are used to describe the data. Results were analyzed in the aggregate to preserve the anonymity of individual programs. For the purpose of analysis of three-year and four-year EM programs, program-year (PGY) 2–4 programs were grouped as three-year programs because we had no information on training in the intern year. Ninety-five percent confidence intervals of proportions (95% CIs) were calculated using the score method. Analyses used SPSS version 11.0 (SPSS Inc., Chicago, IL) and Microsoft Excel (Microsoft Corp., Redmond, WA).

## RESULTS

Ninety-eight of 126 surveys were returned, yielding a response rate of 78% (95% CI = 69.3% to 84.5%). Seventy-seven percent (95% CI = 67% to 85%) of PGY 1–3 residencies returned surveys, as compared with 75% (95% CI = 47% to 92%) of PGY 2–4 programs and 87% (95% CI = 60% to 98%) of PGY 1–4 programs.

The number of didactic lectures per week ranged between 4 and 11, with a mean ( $\pm$ SD) of 5.4 ( $\pm$ 1.0) hours. There were between one and 30 hours of didactic lectures devoted to neurologic emergencies annually, with a mean ( $\pm$ SD) of 12.0 ( $\pm$ 5.9) hours.

A neurology rotation was required for 16 of the 92 programs reporting these data (17.4%; 95% CI = 10.6% to 27.0%), and a neurosurgery rotation was required for 14 of 92 programs (15.2%; 95% CI = 8.9% to 24.6%). One program (1.1%; 95% CI = 0.1% to 6.8%) required both a neurology and a neurosurgery rotation, and one program (1.1%; 95% CI = 0.1% to 6.8%) required either a neurology or a neurosurgery rotation. In total, 32 of 92 programs (34.8%; 95% CI = 25.8% to 44.9%) required a clinical neurologic rotation (neurology or neurosurgery). On 15 of the 32 required neurologic rotations (46.9%; 95% CI = 29.5% to 65.0%), time was

spent only in the intensive care unit. The remaining 17 rotations used outpatient clinic and general floor neurology settings. Neurology and neurosurgery rotations were more common in four-year programs (69.2%; 95% CI = 42.4% to 87.3%) than three-year programs (29.1%; 95% CI = 20.2% to 39.9%; Fisher's exact test,  $p = 0.01$ ).

Electives in neurology, neurosurgery, or neuroradiology were available for 32 programs (32.7%; 95% CI = 24.2% to 42.4%). These electives were seldom used, although exact data for the number of residents completing these rotations were not available in most programs. Every responding residency director was at least "somewhat confident" that his or her graduates were competent in evaluating and treating neurologic emergencies.

## DISCUSSION

To the best of our knowledge, this is the first report addressing the quantity of neurologic education within EM training programs. The findings of this survey document that only a minority of programs require structured clinical training in neurology beyond that received in the ED, and that there are disparities between three-year and four-year programs in the neurologic training required. Furthermore, electives in neurologic topics are only available in one third of programs, and very few residents complete these electives to supplement their education in this area.

Currently, the primary method of educating EM residents about neurology and neurologic emergencies outside of the ED is through didactic lectures, supplemented by required reading. The didactic lectures on neurologic topics, on average, make up about 5% of the Accreditation Council for Graduate Medical Education requirement for 260 hours per year of educational experiences extraneous to clinical work.<sup>3</sup> Although this percentage reflects the proportion of ED visits with a neurologic chief complaint,<sup>1</sup> the complexity of neurologic presentations and morbidity associated with conditions such as stroke and head injury suggest that a larger emphasis would be worthwhile.

There is some evidence that clinical, hands-on experience is better than didactics alone in training residents, further suggesting that more direct clinical education in neurology may benefit EM residents.<sup>4,5</sup> The information available in textbooks typically lags temporally behind that found in the most current literature discussed on clinical rotations. In the past year, relevant articles on imaging and treatment of intracerebral hemorrhage, disposition of pediatric traumatic seizure patients, and guidelines for acute stroke management have been published that would not yet be included in most texts.<sup>6–9</sup> The recent public debate over the benefits of emergent thrombolytic

therapy for acute ischemic stroke requires EM residents to be well versed in the National Institute of Neurologic Disorders and Stroke literature and the issues surrounding that controversy, further highlighting the need for relevant, up-to-date neurologic education.<sup>10,11</sup> Within the current framework of EM training programs, maximizing the quality of both the didactic lectures presented and the bedside teaching in the ED will help provide the best possible training to residents.

## LIMITATIONS

The primary limitation of this study is possible response bias. Because of a lack of program descriptives, it is not possible for us to compare responders with nonresponders. Four-year programs did tend to respond more than three-year programs, suggesting an overrepresentation of four-year programs. A second limitation is that we did not assess informal educational methods such as off-site journal clubs or reading groups. Also, we did not gauge the quality of the provided education, which is a focus for future work.

Future questions also include whether residents graduating from those programs that have clinical rotations in neurology or neurosurgery have improved knowledge in the area of neurologic emergencies, which may be assessed using data related to neurologic topics from the EM in-service examination or other examination tools. Additional questions include whether establishing a standardized lecture series in neurologic topics might improve the assessment and treatment of neurologic emergencies.

## CONCLUSIONS

Emergency medicine residency training programs do not provide extensive training in neurologic emergencies outside of the ED. The most common method of educating EM residents in the treatment of neurologic emergencies is through didactic lectures, but this amounts to only one hour per month of training on average. Only 35% of programs require clinical rotations in neurology or neurosurgery. Given the volume of neurologic complaints seen in EDs and the rapidly

evolving treatment options in these areas, improving resident education in neurologic emergencies is both timely and important. To accomplish this goal, training programs must focus on continual improvement in didactic lectures in neurologic topics and consideration of expansion of clinical rotations or electives that enhance training in managing neurologic emergencies.

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