Status of neurology medical school education

Results of 2005 and 2012 clerkship director survey

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ABSTRACT

Objective: To survey all US medical school clerkship directors (CDs) in neurology and to compare results from a similar survey in 2005.

Methods: A survey was developed by a work group of the American Academy of Neurology Undergraduate Education Subcommittee, and sent to all neurology CDs listed in the American Academy of Neurology database. Comparisons were made to a similar 2005 survey.

Results: Survey response rate was 73%. Neurology was required in 93% of responding schools. Duration of clerkships was 4 weeks in 74% and 3 weeks in 11%. Clerkships were taken in the third year in 56%, third or fourth year in 19%, and fourth year in 12%. Clerkship duration in 2012 was slightly shorter than in 2005 (fewer clerkships of ≥ 4 weeks, $p = 0.125$), but more clerkships have moved into the third year (fewer neurology clerkships during the fourth year, $p = 0.051$). Simulation training in lumbar punctures was available at 44% of schools, but only 2% of students attempted lumbar punctures on patients. CDs averaged 20% protected time, but reported that they needed at least 32%. Secretarial full-time equivalent was 0.50 or less in 71% of clerkships. Eighty-five percent of CDs were “very satisfied” or “somewhat satisfied,” but more than half experienced “burnout” and 35% had considered relinquishing their role.

Conclusion: Trends in neurology undergraduate education since 2005 include shorter clerkships, migration into the third year, and increasing use of technology. CDs are generally satisfied, but report stressors, including inadequate protected time and departmental support. **Neurology® 2014;83:1761-1766**

GLOSSARY

AAN = American Academy of Neurology; **CD** = clerkship director; **CNCD** = Consortium of Neurology Clerkship Directors; **FTE** = full-time equivalent; **UES** = Undergraduate Education Subcommittee.

Clerkship directors (CDs) have a crucial role in the successful transition of medical students from their preclinical studies to the world of clinical medicine. The importance of CDs in medical education is underscored by the existence of organizations such as the Alliance for Clinical Education, which serves as a scholarly body of medical educators across multiple specialties with the primary focus of supporting clinical education. This group and others have published manuscripts that outline the recommended resources and qualifications of CDs and have surveyed across multiple specialties to determine how well CDs are supported in their roles.^{1,2}

Neurology CDs are charged with introducing the subtleties and complexities of clinical neurology to medical students. Neurology has been identified in earlier surveys as a clerkship perceived by medical students to be demanding and overly complex, and the term “neurophobia” has been coined to describe the fear of neurology generated by this perception.³ To better understand the needs and challenges that neurology CDs experience and the resources provided to meet these, the Undergraduate Education Subcommittee (UES) of the American Academy of Neurology (AAN) and the Consortium of Neurology Clerkship Directors (CNCD) conducted a survey of neurology CDs at all US medical schools in 2005.⁴ At the time of that survey, there

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were 109 neurology clerkships that formed the survey population, and the response rate was 75%. While the results were posted on the AAN CD Web site, they were never published. In the years since the 2005 survey, a number of changes have occurred in postgraduate medical education and neurology education in particular. There have been significant changes in specialty choices of US medical students. While there has been a slight increase in US medical students entering neurology between 2007 and 2011 (63 students),⁵ there are significant concerns about whether the future neurology workforce will be adequate to care for an aging population with increasing prevalence of neurologic disease.⁶ In addition, there have been significant advances in education technology that were not available at the time of the 2005 survey. To better understand the current forces affecting neurology CDs since the last survey, the CNCD and UES of the AAN conducted a new survey of all US medical school CDs in 2012.

Because of the similar design of the 2005 and 2012 surveys and because the 2005 survey has not been previously published, this article will serve as a final comparative report of both surveys.

METHODS This survey project was deemed to be institutional review board–exempt by the Mayo Clinic institutional review board because of the nature of the survey. The 2012 survey was revised from the 2005 version by members of a work group of the AAN, with the intention of maintaining as many questions in the same format as possible to maximize comparability of the surveys. Additional questions were added concerning use of education technology and CD satisfaction and “burnout.” The survey contained a total of 65 questions, with the ability to add free text responses for selected questions. The survey was supported by the AAN, and the Member Research Subcommittee vetted the survey instrument and made suggestions for improvement. The survey was finalized in February 2012. The survey was sent simultaneously by e-mail and postal mail in early March 2012 with a cover letter signed by the Chair of the UES to all 142 CDs in the AAN database. Reminder letters and e-mails were sent out in late March and in April 2012, and the database was closed in May 2012. Telephone follow-up was done for CDs who had not participated in the survey and these were encouraged to respond. Eight individuals contacted the survey team indicating that they did not have a neurology clerkship, so the final survey population size was 134 programs.

Statistical analysis was performed by comparing the proportion of CDs choosing a particular response in 2005 vs in 2012. Two proportion *t* tests (2-tailed) were used to compare proportions and determine *p* values. Statistical significance was set at *p* < 0.05.

RESULTS The response rate of the 2012 survey was 73.1%, which was very similar to the response rate of the 2005 survey (75%).

Structure of the required neurology clerkship. Neurology was a required clerkship at 93% of the responding institutions in both 2012 and 2005. The duration of the clerkship was 4 weeks at 75% of schools and 3 weeks at 11% of schools, reflecting a decrease in clerkship duration compared with 2005 (table 1). A larger percentage of schools in 2012 had the neurology clerkship in the third year vs 2005 (table 1). Neurology was part of a combined clerkship block in approximately 25% of schools in both surveys, most frequently with pediatric neurology, psychiatry, or neurosurgery. Approximately 22% of schools in 2012 offered a longitudinally integrated clerkship, often planned in conjunction with basic science faculty, and integrated

Table 1 Clerkship details and support

	2012	2005
Clerkship duration, wk		
2	9.2	4.9
3	11.2	7.3
4	74.5	85.4
≥5	3.1	2.4
Timing of clerkship		
3rd year	56.1	45.0
4th year	12.2	22.5
Either 3rd or 4th year	19.4	31.3
Other	12.2	1.3
No. of students entering neurology		
0–3	49.0	64.6
4–6	39.6	25.3
7–9	10.4	8.9
>10	1.0	1.3
Clerkship director protected time		
0%–5%	14.6	37.7
6%–10%	12.5	13.0
11%–15%	14.6	11.7
16%–25%	38.5	29.9
26%–50%	18.8	6.5
>50%	1.0	1.3
Secretarial support FTE		
0–0.25	46.9	51.9
0.26–0.50	24.0	36.4
0.51–0.75	14.6	3.9
0.76–1.0	14.6	7.9

Abbreviation: FTE = full-time equivalent.
Data are percentages.

with other third-year clinical clerkships in 42%. This question was not asked in the 2005 survey. The majority had between 6 and 20 students rotating in the neurology clerkship at any given time, which was a decrease from 2005. Students were most frequently assigned to academic inpatient neurology services, although a sizable number also had outpatient experiences in academic institutions, VA or county hospital settings, or private neurology offices. Students evaluated an average of 5 patients per week in both the inpatient and outpatient settings. Only 2% of students on average attempted at least one lumbar puncture during their clerkship. Simulation training for lumbar punctures was available in 44% of clerkships.

A syllabus was provided in most clerkships (81% 2012, 85% 2005). A specific textbook was recommended by 73% in 2012 and 57% in 2005 ($p = 0.046$). A variety of online curricula, virtual cases, or smart phone applications were offered in 64% of clerkships in 2012. Case logs were required by 66% of clerkships and were optional in 12%. CDs used a number of different strategies to meet the Liaison Committee on Medical Education directive that students be exposed to certain key types of patients. These included having students see a mandated number of patients from certain diagnostic clusters (72%), seeing simulated patients for certain disorders (22%), viewing videos of patients with certain disorders (33%), or other (38%).

Structure of neurology elective experiences. A variety of neurology elective experiences were offered at most schools, most frequently a neurology subinternship (71%), subspecialty rotations (63%), neurology research (63%), ambulatory neurology electives (52%), and neuro-intensive care (39%). In most schools, the core neurology clerkship was a prerequisite for these electives. The majority (74%) had between 0 and 10 students who participated in these neurology elective experiences per year. The number of medical students who entered neurology residencies as reported by the responding CDs increased between 2005 and 2012, with 49% reporting 0 to 3 students per year, 40% 4 to 6 students per year, and 10% 7 to 9 students per year in 2012 (table 1).

Faculty teaching in the neurology clerkship. Nearly all clerkships were taught by full-time university faculty (97%) and residents or fellows (98%). Part-time or adjunct faculty participated in 68% of clerkships, and private practitioners in 29% of clerkships. Off-campus community clinical sites were utilized by 44% of clerkships, and compensation for community faculty was provided by 12% of schools, through direct salary support and/or access to neurology education opportunities. Salary support for academic

faculty who teach medical students was provided by 41% of the schools.

Faculty teaching efforts were rated as “somewhat important” for academic promotion by 62.5% and “very important” by 25% of the CDs. The majority (mean 84%, median 90%) of full-time clinical faculty in the neurology departments serve as medical student preceptors. Most clerkships had a variety of faculty development activities available, although 23.7% of CDs reported no formal faculty development at their institution.

Assessment methods for the neurology clerkship. The largest percentage (mean 49%) of the final clerkship grade was derived by direct observation of student performance by faculty and residents. The National Board of Medical Examiners “shelf” exam comprised a mean of 20% of the grade. Other components included Objective Structured Clinical Examinations, structured oral examinations, other multiple choice examinations, or written essays or case discussions. Almost 70% of CDs used the shelf exam for student assessment. Of those who did not use the shelf exam, the major factor was cost of the exam (66%). The majority (55%) used the “honors, high-pass, pass, fail” grading system. The next most frequently used scale (19%) was the “honors, pass, fail” system. A number of methods were used to obtain student feedback about the neurology clerkship, most frequently online evaluations (83%), written objective evaluations (33%), and individual interviews with students (29%). In contrast, only 24% of clerkships obtained online or written evaluations of the clerkship by the faculty and residents. The most common form of feedback from this group was informal discussions about the clerkship (72%).

Departmental and institutional support for the neurology clerkship. The mean and median institutional budgets for the neurology clerkship were \$49,211 and \$30,000, respectively. However, 76% of the CDs indicated that they did not know what their institutional budget for the clerkship was, up from approximately 50% in 2005. Secretarial support for most clerkships was 0.5 or less full-time equivalent (FTE) (table 1). CDs received approximately 20% protected time on average for their administrative duties (table 1), but thought that they should receive an average of 32% protected time to perform these duties.

CD profile. CDs were full-time academic faculty 94% of the time, and part-time academic faculty 5% of the time. Faculty rank was 33% assistant professor, 38% associate professor, and 27% professor (table 2). CDs were in the clinician educator track in 48% and were

Table 2 CD demographics and satisfaction

	2012	2005
CD rank		
Instructor	0	2.5
Assistant professor	33.3	32.1
Associate professor	37.5	39.5
Professor	27.1	24.7
CD years in role		
0–3	35.4	41.5
4–6	21.9	25.6
7–9	13.5	15.9
10–12	13.5	8.5
>12	15.6	8.5
CD satisfaction		
Very satisfied	34.4	NA
Somewhat satisfied	51.0	NA
Neither satisfied nor dissatisfied	3.1	NA
Somewhat dissatisfied	10.4	NA
Very dissatisfied	1.0	NA
CD burnout?		
Yes, frequently	11.5	NA
Yes, but infrequently	45.8	NA
No	42.7	NA
Causes of CD burnout		
“Hassle factor” of being CD	40.6	NA
Insufficient support from Chair	18.8	NA
Insufficient administrative support	37.5	NA
Insufficient CD protected time	53.1	NA
Competing obligations	84.4	NA

Abbreviations: CD = clerkship director; NA = not available. Data are percentages.

tenured or in the tenure track in 36% of schools. They had served as CDs for a mean of 7.1 years (table 2). More than half also served on the clinical curriculum committee and/or department education committee at their institutions. Most (76%) were members of the CNCD and had read the CNCD neurology clerkship core curriculum.⁷ Ten percent used *Continuum* as part of the didactic materials for their clerkship, and 44% were involved in education research. Simulation centers or clinical skills laboratories were present at 96% of the medical schools that responded in 2012. These were used most frequently for teaching lumbar puncture technique (73%), assessing neurologic history-taking and examination (61%), and teaching the neurologic examination (56%).

Overall satisfaction of CDs was high, with 85% reporting being “very satisfied” or “somewhat satisfied”

(table 2). However, 12% reported experiencing burn-out in their role as CD “frequently,” and 46% reported it “infrequently.” About 35% had considered relinquishing their role as CD within the last year, most frequently because of the “hassle factor” of being CD (41%), lack of sufficient protected time (53%), too many competing research or clinical obligations (84%), or lack of sufficient administrative support (38%) (table 2).

DISCUSSION The results of these 2 surveys taken together provide data on the current status of neurology clinical clerkships from the CD perspective, and also insight into trends over time in undergraduate neurology clinical education. The high response rate on both surveys (approximately 75%), which is a strength of this study, helps ensure the validity of the data. While other surveys² have included neurology CDs as part of a larger population of CDs, this is the first report specific to US neurology CDs and the first to look at these trends over time. The intentional inclusion of similar questions in both surveys allows evaluation of trends over time. While the responses to many of the questions were similar between the 2005 and 2012 surveys, several trends are noteworthy. The first is a slight reduction in clerkship length. In 2005, approximately 85% of neurology clerkships were 4 weeks and only 12% were 3 weeks or less. In 2012, approximately 75% were 4 weeks and 20% were 3 weeks or less. This likely reflects national trends toward shorter clerkship durations in all clerkships as the curricular “density” increases in the third year in particular, but is an area of concern for neurology educators. A positive trend noted is the percentage of neurology clerkships taken in the third year, which has increased from 45% in 2005 to 56% in 2012 ($p = 0.140$). An additional 20% of clerkships in 2012 could be taken in either the third or fourth year. This movement from fourth- to third-year clerkships may be in part attributable to extensive lobbying by organizations such as CNCD and the UES of the AAN, both of which have been advocates for mandatory, early exposure to neurology at all US medical schools.

CDs for the first time reported extensive use of education technology in 2012, reflecting national trends in undergraduate medical education. Simulation was used most frequently to teach lumbar puncture technique, but also to teach aspects of the neurologic examination and to assess neurologic history-taking. However, only about 2% of students attempted lumbar punctures on live patients during their core clerkship. Because this is a procedure that medical students are expected to at least have exposure to by graduation, this low figure is concerning and suggests an area for significant improvement in

neurology clerkships. Teaching activities were rated as “somewhat important” or “very important” for faculty promotion by the vast majority surveyed. CDs were often involved in the preclinical neuroscience course and in education committees and curriculum committees at their respective institutions, and often held other leadership roles at their institutions. These data suggest that teaching and CD activities may be gaining greater perceived value in the academic promotion process.

Use of the National Board of Medical Examiners shelf exam for evaluation increased significantly between 2005 and 2012, despite misgivings about the cost of the exam. However, clinical performance of students still accounts for the largest proportion of the final grade. We were not able to determine from our data whether the increased use of the shelf exam is significantly affecting the final grades. Formal online or written feedback from students was obtained by the majority of clerkships, but feedback about the clerkship from faculty and residents was still largely informal, which may be an area for improvement.

The mean departmental budget for neurology clerkships in 2012 was close to \$50,000, but a surprising number of CDs did not know their budget. Secretarial FTE appears to have increased slightly since 2005, as did CD protected time. However, the mean CD protected time was 20% and CDs indicated that 32% FTE was a more appropriate effort for their clerkship. This discrepancy may help explain the relatively frequent occurrence of CD burnout and the sizable minority of CDs who had considered relinquishing their roles because of competing commitments. Despite these factors, the overwhelming majority of CDs were “very satisfied” or “somewhat satisfied” with their roles, and thought that their educational activities were rewarded in the academic promotion process. Similar results have been seen in other surveys of CDs.^{2,8}

We hope that the data presented in this report will be helpful for CDs, program directors, department chairs, medical school deans, and other educators who have an interest in teaching the next generation of physicians by helping to establish national benchmarks for neurology clerkships. We hope this report will stimulate discussion about the resources and support needed for clinical education in general and neurology education in particular.

We make the following specific recommendations from these survey results:

1. CDs should have adequate protected time (suggested 0.30 FTE for the average clerkship at most large medical schools).
2. CDs should have adequate secretarial support (suggested 0.25–0.30 secretarial FTE for the average clerkship at most large medical schools).

3. CDs should expand the use of technology to enhance content delivery in their clerkships.
4. Opportunities for both simulated and real patient lumbar puncture training should be expanded given the low numbers of students who attempt lumbar punctures during clerkships.
5. Neurology educators should resist the trend toward shortening the duration of neurology clerkships and continue their efforts to make the neurology clerkship required, and delivered preferentially in the third year of medical school.

AUTHOR CONTRIBUTIONS

Jonathan Carter contributed to the design and conceptualization of the study, analysis and interpretation of the data, and drafting and revising the manuscript for intellectual content. Imran Ali contributed to the design and conceptualization of the study, analysis and interpretation of the data, and revising the manuscript for intellectual content. Richard Isaacson contributed to the design and conceptualization of the study. Joseph Safdieh contributed to the design and conceptualization of the study. Glen Finney contributed to the design and conceptualization of the study. Michael Sowell contributed to the design and conceptualization of the study. Maria Sam contributed to the design and conceptualization of the study. Heather Anderson contributed to the design and conceptualization of the study. Robert Shin contributed to the design and conceptualization of the study. Jeff Kraakevik contributed to the design and conceptualization of the study. Mary Coleman contributed to the design and conceptualization of the study, study administration, and analysis and interpretation of the data. Oksana Drogan contributed to the design and conceptualization of the study, study administration, and analysis and interpretation of the data.

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