Defining the Role of the Academic Neurohospitalist in Residency Education

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Abstract

Objective: We sought to better understand the potential impact of the burgeoning neurohospitalist model of inpatient care on education of neurology residents and to better define possible roles for “neurohospitalists” in residency education. **Method:** We designed a brief qualitative open-ended survey directed toward academic leaders in neurology and distributed it by e-mail to every academic neurology department in the United States and Canada. **Results:** Of 83 respondents, 36 (43%) had an active neurohospitalist program and only 10% felt certain they would not have 1 within the next 5 years. All respondents expected to have residents continue to be involved with inpatient care. The main perceived advantage for resident education associated with neurohospitalists was inpatient care expertise, and the main expected disadvantage was decreased exposure to subspecialty attendings. The majority anticipated positive impact on all Accreditation Council for Graduate Medical Education core competencies predominantly based on neurohospitalists’ expertise in the inpatient setting. **Conclusion:** The majority of academic neurology departments are expected to have a neurohospitalist program within the next 5 years. There are several perceived advantages and disadvantages to such a program for education of neurology residents. In general, the impact of these programs is expected to improve resident education. Regardless of expectations, neurohospitalists will likely play a prominent role in the education of the next generation of neurologists.

Keywords

education, techniques, neurohospitalist, clinical specialty, quality

Introduction

The escalating economic pressures and complex regulatory environment of the US healthcare system pose numerous challenges to academic neurology departments in training future neurologists. For many, these challenges particularly impact the care of hospitalized patients, as teaching faculty confront a widening knowledge gap between increasingly focused subspecialty interests and the demands of inpatient care for acute complicated neurological diseases. In addition to an ever-expanding scientific knowledge base, expectations for decreased patient lengths of stay, increased focus on care quality and cost-effectiveness, mandates for computer-driven documentation and care, and more stringent resident work hour restrictions are threatening to make traditional academic models for teaching and patient care in the hospital untenable.

Similar to medical hospitalists nearly 20 years ago, “neurohospitalists” are an emerging group of inpatient subspecialists who have evolved rapidly in response to this complex inpatient environment.¹⁻⁸ Neurohospitalists represent a group of faculty situated to effectively educate residents on inpatient service and provide them with structured opportunities to demonstrate their proficiency, but the ways to effectively integrate neurohospitalist and residency programs are not entirely clear.

We sought to better understand the potential effects of the burgeoning neurohospitalist model of inpatient care on education for neurology residents and to better define roles for neurohospitalists in residency education. To that end, we surveyed leaders in academic neurology about their expectations moving forward concerning the impact of neurohospitalists on the education and training of neurology residents.

Methods

Survey Design

The survey was developed and refined by the study investigators based on prior literature and personal experience to assess the current and anticipated state of neurology departments with regard to neurohospitalist programs and their potential

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Table 1. Summary of Survey Questions and Response Rate (232 Recipients).

Question	Answer Choice	Responses
Does your department currently employ any neurohospitalists	Yes/no	83
If no, does your department anticipate employing any neurohospitalists within the next 5 years	Yes/no/don't know	83
Please describe the design of your inpatient services BEFORE and AFTER employing neurohospitalists	Narrative	26
What do you see as the main ADVANTAGES and DISADVANTAGES of neurohospitalists for residency education as compared to a more "traditional" model	Narrative	25
Please describe the impact, positive or negative, of neurohospitalists with regard to PATIENT CARE and MEDICAL KNOWLEDGE	Narrative	23
PROFESSIONALISM and INTERPERSONAL AND COMMUNICATION SKILLS	Narrative	24
PRACTICE-BASED LEARNING and SYSTEMS-BASED PRACTICE	Narrative	22

impact on resident education (see Table 1 for summary and Supplementary Table S1 for complete survey). Questions were designed to be open ended so as not to limit or bias responses to certain predefined expectations and addressed the 6 areas of core competency defined by the Accreditation Council for Graduate Medical Education (ACGME) for resident education (patient care, medical knowledge, professionalism, interpersonal and communication skills, practice-based learning and improvement, and systems-based practice).

The survey was distributed by the Association of University Professors of Neurology (AUPN). The AUPN has 121 member organizations in the United States and Canada. A link to the online survey was sent by e-mail to a total of 232 recipients, 121 department chairs, and 111 residency program directors, in January 2013. The initial e-mail requested a response within 2 weeks. A second reminder e-mail containing the link was sent approximately 3 weeks later. Data were collected online using Survey Monkey.

Data Analysis

Responses were collected online and analyzed 4 weeks after the second e-mail request for participation. For yes/no and categorical questions, responses were tabulated and reported as percentage of respondents. For open-ended qualitative questions, narrative responses were reviewed for content and coded. Based on the review, major common themes were identified; individual responses frequently highlighted multiple themes. The frequency of responses discussing a particular theme was tabulated, and data are reported as the percentage of responses that mentioned a specific theme. In addition, representative individual narrative comments are reported in quotations. Both majority and minority comments are reported so as to be as inclusive as possible.

Results

Eighty-three responses were received (36% response rate). The number of responses to specific questions is reported in Table 1. As anticipated, yes/no and categorical questions had

Table 2. Anticipated Impact of NH on Design of Inpatient Services.

Response	%
Will continue to have residents on inpatient service in some capacity	100
Will have NH serve as teaching attendings for resident services	92
Will use exclusively NH for inpatient coverage	19
Will use a "nonteaching" service to decrease resident workload	12

Abbreviation: NH, Neurohospitalists.

the highest response rate. Open-ended narrative questions received 22 to 26 responses each. Coding of narrative responses was confirmed by multiple investigators and was straightforward to organize into recurring themes. Only rare sporadic answers did not fit into any theme listed in Tables 2 to 5. The latest any recurring theme initially occurred in the order of responses was at response 12, suggesting the results reached saturation and no major themes were missed.

Thirty-six respondents (43%) indicated they had an active neurohospitalist program. Of the 47 (56%) that did not, 16 (19%) indicated they would have a program within 5 years and 23 (27%) were not sure. Only 8 (10%) were not planning to employ a neurohospitalist within the next 5 years.

All respondents who answered at least 1 narrative question expected continued resident involvement with inpatient care in their departments (Table 2). The vast majority (92%) anticipated neurohospitalists functioning as inpatient teaching attendings for resident inpatient services. A small minority anticipated exclusive use of neurohospitalists for inpatient care or using a "nonteaching" service.

Of the respondents, 96% highlighted at least 1 advantage to the neurohospitalist model for resident education as compared to a more "traditional" approach (Table 3). The main perceived advantages for resident education associated with neurohospitalists were inpatient expertise, improved efficiency, and better availability. Representative narrative advantages are listed in Table 4.

Of the respondents, 92% highlighted at least 1 disadvantage to the neurohospitalist model for resident education as

Table 3. Frequency of Anticipated Advantages and Disadvantages of Neurohospitalists Compared to “Traditional” Model of Inpatient Services.

Advantages	96%
Expertise in inpatient care	60%
Improved efficiency	20%
Increased availability	20%
Improved inpatient teaching	16%
Increased familiarity with residents	16%
Decreased resident workload	16%
Liberate specialists for better outpatient teaching	12%
Disadvantages	92%
Decreased exposure to subspecialty attendings	48%
Loss of resident autonomy and learning opportunities	16%
Poor continuity	12%

Table 4. Representative Narrative Comments Regarding Perceived Advantages and Disadvantages of Neurohospitalists for Resident Education.^a

Advantages
“Dedicated time for teaching, subspecialty accrued inpatient knowledge, team-based knowledge” (<i>expertise, availability</i>)
“Focused understanding of hospital specific care which improves throughput, patient care and education. Variable quality of care provided by subspecialists” (<i>expertise, efficiency</i>)
“Experience leads to better teaching in inpatient setting” (<i>expertise, improved teaching</i>)
“Improved availability of attendings given decreased non-inpatient responsibilities. Closer guidance for residents in regards to management of inpatient issues” (<i>availability</i>)
“Consistency and better organization, timely rounds” (<i>efficiency, familiarity</i>)
“Reduce the total number of inpatient months required of the residents” (<i>decreased resident workload</i>)
Disadvantages
“Some of our infrequent attending staff are excellent teachers in their specialty areas of clinical practice and research. Reducing their inpatient teaching interactions is a real loss” (<i>decreased exposure to subspecialty attendings</i>)
“Residents get less interaction with specialty faculty” (<i>decreased exposure to subspecialty attendings</i>)
“Limited resident autonomy” (<i>loss of resident autonomy</i>)
“Outside of Stroke & Neurointensive care, this is BAD for resident education. It skews the impression residents get of the broad spectrum of neurologic disease and its management.” (<i>poor continuity</i>)

^a Quotes are verbatim with spelling corrected when appropriate. Coded theme in parentheses.

compared to a more traditional approach (Table 3). The main disadvantage was thought to be decreased exposure to subspecialty attendings. Representative narrative disadvantages are listed in Table 4.

Of respondents, 96% anticipated at least 1 positive impact of neurohospitalists on ACGME core competencies for residents. In general, the frequency of comments reflecting positive expectations markedly outweighed the frequency of

comments reflecting negative expectations (Table 5). The basis for the majority of positive expectations was neurohospitalists’ expertise in the inpatient setting.

Discussion

Consistent with the apparent rapid growth in the field, most academic neurologists responding to this survey expect to have a neurohospitalist program in their department within the next 5 years.⁹ These current academic leaders perceive both advantages and disadvantages to such a program with regard to educating neurology residents. Regardless of expectations, neurohospitalists appear likely to play an increasingly prominent role in neurology residency training.

Neurology departments appear to be integrating or planning to integrate neurohospitalist programs and residency education in multiple ways. Interestingly, the vast majority expects to maintain a model of inpatient care delivery with neurohospitalists serving as supervising attendings, rather than providing clinical care without a resident team. This is somewhat unexpected, given some of the clinical and financial reasons why the neurohospitalist model is growing rapidly, including increased inpatient complexity, time-sensitive therapies such as tissue plasminogen activator for acute stroke, decreased patient lengths of stay, focus on quality metrics and cost-effectiveness, and computer-driven documentation and care.^{5,7} In conjunction with ACGME mandates directly affecting resident participation in inpatient care (duty hour restrictions, increased supervisory requirements, and increased formal and didactic education requirements),¹⁰ one might have expected a greater number of plans to implement nonteaching inpatient services on which clinical neurohospitalists and mid-level providers with minimal academic responsibilities replace residents in patient care. In fact, although multiple responses implied an ability of neurohospitalists to provide a “pressure-relief valve” for residents to more easily participate in required educational activities and maintain duty hour compliance, most academic programs envision a high level of involvement in resident teaching.

Almost every respondent noted both advantages and disadvantages to the neurohospitalist model for education. This reflects a certain level of equipoise in the field as to the value of hospital-focused neurology care upon which debate is ongoing.^{2-5,7,8,11,12} Despite this apparent ambivalence, departments are moving forward with implementation, which is supported by the finding that the overall tenor of nearly every respondent to this survey was positive.

Anticipated Advantages and Disadvantages of Neurohospitalists for Resident Education

The main advantages cited were expertise in inpatient neurological care, better inpatient teaching, higher efficiency, and greater availability. Similar to hospitalists in internal medicine, pediatrics, and obstetrics gynecology, neurohospitalists’

Table 5. Frequency of Anticipated Impact of Neurohospitalists on ACGME Core Competencies.

Patient Care and Medical Knowledge	Percentage
Positive	96
Expertise in inpatient care	78
Improved efficiency	13
Decreased resident workload	13
Increased familiarity with residents	13
Negative	13
None	4
Professionalism and interpersonal and communication skills	
Positive	58
Expertise in inpatient care/Role model for behavior	42
Increased familiarity with residents	21
Negative	21
Poor continuity	13
None	33
Practice-based learning and systems-based practice	
Positive	82
Expertise in inpatient care	59
Negative	9
None	14

Abbreviation: ACGME, Accreditation Council for Graduate Medical Education.

expertise is maintained by continuous exposure to the acute care setting which is expected to improve localization and diagnosis, clinical and cost-effectiveness of diagnostic testing, development and implementation of efficacious treatment protocols, and leadership of the neurology care team. This advantage may be even more pronounced in neurology than internal medicine due to the highly specialized nature of academic neurologists. The expected benefits of expertise and efficiency are reflected in data from 2 recent studies indicating neurohospitalists decrease length of stay and cost of care for neurologic inpatients when compared to other neurologists.^{13,14} This early experience is similar to that of medicine hospitalists who have been shown to increase value by lowering the cost of care while maintaining its quality.¹⁵⁻¹⁸ In addition, medicine hospitalists have exceeded expectations in translating this experience into improved education of trainees.¹⁹⁻²²

Availability of neurohospitalists to residents without the added pressures of outpatient clinics or research laboratories is expected to enhance direct resident supervision and improve patient care. Several studies have demonstrated that increased attending availability improves resident satisfaction with education and patient care in the hospital.²³⁻²⁷ In particular, more frequent direct supervision after hours may take advantage of a rich and usually untapped educational opportunity, and presence of attending physician in the hospital has been shown to improve both resident and attending perceptions of the educational value of night rotations in both medicine and neurology.^{23,25-27} In addition, residents' presence on inpatient service is often fragmented by obligations to continuity clinics and didactic teaching sessions; an available neurohospitalist can help to ameliorate the stress that

comes with these conflicting responsibilities. It is relevant to note that increased attending availability improved resident satisfaction whether or not attending physicians defined themselves as "hospitalists" per se.²⁴

The main disadvantage of neurohospitalists noted was decreased exposure to neurology subspecialty expertise. A common thought was that the traditional attending system provides benefits in terms of diversity of teaching content and style as well as more comprehensive understanding of the longitudinal nature of many neurological illnesses. In contrast, several respondents noted the flexibility afforded by a neurohospitalist program would allow new or additional subspecialty rotations the opportunity to flourish and that variety of subspecialty-focused activities, such as morning reports, journal clubs, didactic conferences, and subspecialty rotations, could be expanded to compensate.²⁸

Unexpectedly, concerns about eroding resident autonomy and critical decision-making ability were rarely mentioned.²⁹ The majority of respondents viewed neurohospitalists as team leaders rather than replacements for house staff and did not expect them to micro manage the resident.³⁰ This is consistent with the current literature. One study performed to compare medicine hospitalists to subspecialty and general medicine faculty demonstrated that concerns about house staff autonomy were rare and not increased among residents on services run by hospitalist faculty.²⁰ Increased "ward time" for faculty members has not been associated with any perceived loss of autonomy in medicine or neurology.^{23,24} Concerns regarding the hospitalist model have been shown to diminish with experience on the service, and resident opinion that a hospitalist service limits autonomy inappropriately has been rare.¹⁹ There is a theoretical risk to future patients by not providing trainees the chance to make independent decisions in the relatively protected environment of a residency program.²⁹ A more complete discussion of this topic is beyond the scope of this article; however, if medicine hospitalist programs serve as a guide, concerns about resident autonomy will mitigate as the neurohospitalist model matures.

There is some evidence that house staff learn more effectively when on teams lead by hospitalists. In a study performed at University of California San Francisco, internal medicine hospitalists were rated more highly for teaching effectiveness, knowledge of relevant subject matter, discussion of pathophysiology, emphasis on cost-effectiveness, and provision of appropriate and effective feedback.^{22,31} These findings were confirmed by a systematic review of available data on the effect of internal medicine hospitalist attending physicians on trainees educational experiences performed more than a decade after the introduction of the model.²¹ Pediatric hospitalists are also proven to be effective educators.³² The present study provided a small amount of anecdotal data for neurohospitalists. Three respondents indicated that resident evaluations of inpatient teaching were higher for neurohospitalist attendings, and 2 indicated that neurohospitalists had been selected for recent resident teaching awards.

Even including other disciplines, data are limited in scope, with trainee satisfaction being the major variable measured to date. One small study in family medicine revealed that although weekly direct observation of patient encounters and immediate feedback improved comfort level of house staff, it did not increase competency as measured by videotaped encounters before and after the intervention.³³ Even if one were to assume that improved trainee satisfaction generalizes to neurohospitalists, it will be important to evaluate the model's direct impact on clinical skill and medical knowledge.

Limitations

This study has several limitations. The definition of "neurohospitalist" is somewhat in flux and may have been interpreted differently by individual respondents.⁶ We did not ask directly why departments have decided or not to implement programs, which might have provided additional insight into their plans and expectations. We also did not solicit comments from residents as to their opinion about neurohospitalists. Furthermore, the results are primarily related to motivation for making the decision to implement neurohospitalists, not data as to whether or not the model is actually effective. Regardless of that point, they provide insight into the reasons why this change is occurring rapidly.

The overall response rate to the survey was low. Although not atypical for a study of this type, the low response rate is a significant limitation for statistical analysis and generalization of the results. In particular, the response rate for narrative answers was low. Despite the low rate, there were no new themes that first appeared in later responses, suggesting we were unlikely to have failed to detect any prominent common themes. Of course, the study is not immune from response bias in that departments already considering neurohospitalist programs would be interested in the results and likely to both respond to the survey and have a positive opinion of neurohospitalists' teaching. In fact, no narrative comments were received from respondents without an active or planned neurohospitalist program. This evidence for "preaching to the choir" does not diminish the validity of the responses that were obtained, but it is a warning that appropriate caution is taken in interpreting the results.

Conclusions

These results provide further evidence indicating a sea change occurring in academic neurology toward a neurohospitalist model of inpatient care.⁹ With the majority of responding academic neurology departments expected to have a neurohospitalist program within the next 5 years, it is highly likely neurohospitalists will play a prominent role as mentors and educators for future neurologists. In general, leaders in academic neurology anticipate this to improve resident education, and better understanding of this new care delivery model should allow neurology departments to take advantage of its strengths and mitigate its weaknesses to benefit resident

education. Proof of tangible positive impact on resident competency and quality measures will be necessary to justify its continued support and implementation.

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Declaration of Conflicting Interests

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Supplemental Material

The online supplementary table is available at <http://nhos.sagepub.com/supplemental>.

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