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Survey of current neurohospitalist practice

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Summary

Neurohospitalists represent a new approach to inpatient neurologic care. In order to characterize this practice, we surveyed both a general neurology sample as well as a sample of pertinent American Academy of Neurology sections. Of the section sample, 42% defined themselves as neurohospitalists, compared to 16% of the general sample. The majority of neurohospitalists are in an academic setting and share call responsibilities with non-neurohospitalists. Many are concerned about the possibility of burnout in their current practice setting. This representative sample of neurohospitalists reveals a diverse group facing a number of unanswered questions and challenges, including concerns for burnout, ideal practice setting, and defining the core curriculum for a neurohospitalist.

The neurohospitalist movement has emerged as a potential solution to the confluence of declining reimbursement, increasing overhead, and emergent therapies for a wide range of neurologic disorders. This practice mirrors in many respects the ascension of the "traditional" internal medicine hospitalists since the mid-1990s.[1,2] A survey of those practicing in 2008 identified a small number (52) of neurohospitalists.[3] The development of many programs has been, at least in part, a response to local pressures, ranging from the need to cover stroke programs to community neurologists abandoning hospital practice. In order to better understand the nature of neurohospitalist practice, we sought to survey these neurologists.

METHODS

The Executive Committee of the Neurohospitalist Section of the American Academy of Neurology (AAN) refined the 2008 survey instrument. The AAN Member Research Subcommittee

University of California (SAJ), San Francisco; American Academy of Neurology (MC), Minneapolis, MN; Mayo Clinic Jacksonville (WDF), Jacksonville, FL; Loyola University Chicago Stritch School of Medicine (JB), Maywood, IL; University of Washington (DJL), Seattle; EvergreenHealth (DJL), Kirkland, WA.
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and AAN staff edited the survey and determined the target audience. In order to ascertain the percentage of US neurologists who consider themselves neurohospitalists, a random sample of 1,300 US neurologists in practices of 2 or more providers was selected. As per AAN policy, members who had received 3 surveys in the past 3 years were excluded.

As there were too few who indicated they were neurohospitalists for a scientific data analysis, another sample (n = 500) targeted members more specifically. These were drawn from the following AAN sections: Critical Care and Emergency Neurology, Endovascular and Interventional, Neurohospitalist, Neuro-infectious Disease, and Stroke and Vascular Neurology.

The survey was distributed by fax, mail, and e-mail. During data collection, 9 members were removed due to invalid contact information, resulting in a final sample size of 1,791 (1,293 random sample, 498 section sample). The survey instrument may be find online at neurology.org/cp.

Supplemental Data
neurology.org/cp

RESULTS

The random sample response rate was 41.6% (538/1,293) with a margin of error at a 95% confidence level of ±4.2%. A response rate of 55.8% (278/498) was achieved for the section sample, resulting in a margin of error of ±5.9% at a 95% confidence level.

Several questions were asked of the random sample who were on staff at a hospital, prior to eliminating non-neurohospitalists. A total of 14.7% (79) of the random sample are self-described neurohospitalists. A total of 91.4% are on staff at a hospital, with 76.8% taking call. A total of 23.7% of non-neurohospitalists and 26.8% of neurohospitalists are paid for call, although some neurohospitalists may have call "bundled" into their compensation and not separately delineated (table).

About one-fourth (25.9% [49]) of neurohospitalists reported practicing for less than 2 years, whereas 37.6% (71) reported doing so for more than 10 years. A total of 56.8% (104) of the neurohospitalists work in an academic setting, whereas 36.1% (66) work in private practice. Of the 191 neurohospitalists, 129 reported certification beyond general neurology, most commonly vascular neurology (73.6% [95]), neurocritical care (26.4% [34]), and internal medicine (11.6% [15]). Fewer than half of the neurohospitalists (41.5% [78]) reported being able to cover hospital call without sharing this responsibility with non-neurohospitalists.

Neurohospitalists reported spending a median of 70% (minimum 5, maximum 100) of their time with inpatients, whereas the remainder of their time (minimum 0, median 10%, maximum 95) was spent in the outpatient realm or other activities such as research or administrative. The majority practice at one hospital (64.2% or 122) and 25.3% (48) practice at 2. Cerebrovascular disease was the most common diagnosis treated (83.1%), followed by delirium/encephalopathy (9%). Only 39.2% (74) of neurohospitalists serve as primary attending more than half the time; the majority are consultants. Clinical workload varied, with a median of 22 new inpatients seen weekly (minimum = 0, maximum = 400), and median of 37.5 follow-up inpatients weekly. While the minority (28.8% [51]) reported experiencing burnout, nearly 46% (81) are concerned about the possibility. This is similar to the rate of burnout experienced as reported in a survey of 816 hospitalists (29.9%).[4]

Table Neurohospitalist status vs receiving financial compensation for call duties cross-tabulation

		Yes, financial		
		No	Yes	Total
Are hospitalized patients your predominant professional focus?	Yes	73.2% (134)	26.8% (49)	100.0% (183)
	No	76.3% (384)	23.7% (119)	100.0% (503)
Total		75.5% (518)	24.5% (168)	100.0% (686)

A significant portion of respondents identify as neurocritical care subspecialists. In the early years of the internal medicine hospitalist movement, pulmonary/critical care physicians frequently functioned as hospitalists.

DISCUSSION

These data show a diverse practice profile with respect to years in practice, number of partners, call responsibility, and training. Given the amount of cerebrovascular disease seen, it is not surprising that the majority of neurohospitalists are board certified in vascular neurology. However, the neurohospitalist field is young and now that the American Board of Psychiatry and Neurology vascular neurology boards require completion of an Accreditation Council for Graduate Medical Education–accredited fellowship, this may change. The core curriculum for a neurohospitalist fellowship and whether training beyond a neurology residency is necessary remains to be determined.

A significant portion of respondents identify as neurocritical care subspecialists. In the early years of the internal medicine hospitalist movement, pulmonary/critical care physicians frequently functioned as hospitalists. At present, this is uncommon.[5] Given a smaller workforce and smaller number of patients, the evolution of neurologic care both in and out of the intensive care unit may not mirror the internal medicine model. Clearly the nature of inpatient neurology care is a dynamic one at present.

Respondents were asked to comment on the advantages and disadvantages of the neurohospitalist model. Among the most common advantages cited were timely and high-quality care, improved continuity during the hospital stay, familiarity with hospital systems, and defined work schedules. Disadvantages mentioned frequently were differing levels of responsiveness in call groups that include non-neurohospitalists, transitions between the hospital and clinic settings, long work hours, and poor reimbursement. Moving forward, studies determining the impact of the neurohospitalist model on health care cost and patient outcomes will be paramount.

An interesting finding is the small percent of respondents (including non-neurohospitalists) receiving reimbursement for on-call services. While neurohospitalists are more likely to be paid for call, these numbers are more difficult to determine given that this may be a "core" element of their practice. While the neurohospitalist model has its genesis, in part, in the move of many neurologists out of hospital work, there is a relative paucity of these physicians to cover all inpatient care. Lack of this reimbursement may be playing into this dynamic.

The definition of a neurohospitalist has been taken as one whose practice focus is predominantly in the inpatient setting. For this article, respondents who self-defined as neurohospitalists were included in data analysis (appendix, question 4). A small number of respondents (16) spent more than 50% of their time seeing outpatients, which would seem at odds with the definition of a neurohospitalist, although many may be in transition and have follow-up clinics. Only 43 of the 189 respondents spend less than 50% of their time as a neurohospitalist; however, it could still be the majority of their clinical time if they have 3+ practice settings; e.g., 30% spent as a neurohospitalist, 25% in research, 25% in administration, and 20% teaching. The nature of the survey and self definition as a neurohospitalist is recognized as an inherent limitation.

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This survey has a number of additional limitations. We achieved a representative sample as opposed to a comprehensive and inclusive survey of all neurohospitalists. However, the sample size is robust given the small number of neurohospitalists. There may be regional, subspecialty, or generational differences that were not further delineated. At present, the differentiation between the roles of neurohospitalist and other inpatient physicians including those in neurocritical care is not entirely clear. The results should therefore be interpreted in this context. As a whole, the survey is representative of those who describe themselves as neurohospitalists.

CONCLUSION

Neurohospitalists are a potential solution to a number of the pressures on traditional neurologist practice. The form of this solution is quite varied at present, with a diversity of training, experience, and practice. A number of challenges remain to be resolved, not the least of which are potentially problematic transitions of care and burnout concerns given a small workforce. As the model matures, further study will be worthwhile, of both neurohospitalists and their impact on the inpatient care of patients with neurologic disorders.

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DISCLOSURES

The authors report no disclosures relevant to the manuscript. Go to Neurology.org/cp for full disclosures.

APPENDIX

Survey results

The following responses are from the random sample only

1. Are you currently on staff at a hospital? (n = 535)
   91.4% Yes
   8.6% No—This completes the survey for you.
2. Do you participate in a hospital/emergency department call schedule? (n = 468)
   76.8% Yes—go to question 3
   23.2% No—skip to question 4

3. Are you reimbursed specifically for taking call?[1] (n = 370)
   74.9% No
   4.6% Yes, nonclinical protected time
   21.6% Yes, financial
   [1]Due to some respondents choosing more than one response, total may not add up to 100%.
4. Are hospitalized patients your predominant professional focus? In other words, are you a neurohospitalist, defined as a neurologist whose predominant focus is the care of inpatients as either a consultant or primary attending? (A neurohospitalist may have other additional specialization, such as neurocritical care or vascular neurology) (n = 483)
   16.4% Yes
   83.6% No—This completes the survey for you.

The following responses are from the section sample only

1. Are you currently on staff at a hospital? (n = 277)
   97.5% Yes
   2.5% No—This completes the survey for you.
2. Do you participate in a hospital/emergency department call schedule? (n = 268)
   88.8% Yes—go to question 3
   11.2% No—skip to question 4
3. Are you reimbursed specifically for taking call?[1] (n = 238)
   60.5% No
   3.8% Yes, nonclinical protected time
   36.6% Yes, financial
   [1]Due to some respondents choosing more than one response, total may not add up to 100%.
4. Are hospitalized patients your predominant professional focus? In other words, are you a neurohospitalist, defined as a neurologist whose predominant focus is the care of inpatients as either a consultant or primary attending? (A neurohospitalist may have other additional specialization, such as neurocritical care or vascular neurology) (n = 270)
   41.5% Yes
   58.5% No—This completes the survey for you.

The following frequencies are from the combined responses from both survey samples for those who indicated they are a neurohospitalist (those who answered "Yes" to question 4; n = 191)

Neurohospitalist characteristics

5. How many years postresidency or fellowship training have you been a neurohospitalist? (n = 189)
   25.9% 0–2
   20.1% 3–5
   16.4% 6–10
   37.6% >10
6. On average, what percent of your clinical time is spent as a neurohospitalist? (n = 189)

Minimum (%)	Maximum (%)	Mean (%)	Median (%)
5	100	67.6	70.0

7. On average, what percent of your time is spent seeing outpatients? (n = 189)

Minimum (%)	Maximum (%)	Mean (%)	Median (%)
0	95	19.2	10.0

8. At how many hospitals do you regularly care for patients? (n = 190)
   64.2% 1
   25.3% 2
   6.3% 3
   4.2% >3

9. The salary for your clinical work is best described as: (n = 189)

42.9%	Straight salary
21.7%	Salary plus production bonus
16.9%	Salary plus performance or quality bonus
12.7%	Production-based income
5.8%	Other (please specify)

10. Indicate the percentage of your professional time devoted to each of the following activities (total should equal 100%) (n = 177)

	Minimum (%)	Maximum (%)	Mean (%)	Median (%)
Clinical practice inpatient	4	100	53.4	50.0
Clinical practice outpatient	0	85	15.7	10.0
Research	0	85	13.1	5.0
Teaching	0	50	7.4	5.0
Administration	0	50	9.7	10.0
Other	0	40	0.7	0.0

11. Are you compensated specifically for nonclinical work? (n = 187)
47.6% Yes
47.1% No
5.3% N/A—I do not have nonclinical work

12. For what percent of your patients are you the primary attending (as opposed to consultant)? (n = 189)
47.6% 0%–25%
13.2% 26%–50%
16.4% 51%–75%
22.8% 76%–100%

Other medical providers

13. Do you care for patients in conjunction with internal medicine hospitalists on a regular basis? (n = 179)

10.1%	No
35.8%	Yes, for 1%-25% of inpatients
14.5%	Yes, for 26%-50% of inpatients
13.4%	Yes, for 51%-75% of inpatients
26.3%	Yes, for 76%-100% of inpatients

14. Do non-neurohospitalists (general neurologists, other subspecialty neurologists) share call responsibilities for your hospital activities? (n = 188)

35.1%	Yes, during the day and night/weekends
1.1%	Yes, during the day only
22.3%	Yes, during the night/weekends only
41.5%	No

15. Does your practice use physician extenders or residents in the inpatient setting? (n = 188)

14.9%	Yes— physician extenders
30.9%	Yes—residents
28.7%	Yes—physician extenders and residents
25.5%	No

16. How many neurologist partners (neurohospitalist or non-neurohospitalist) are involved in inpatient neurology? (n = 183)

Minimum	Maximum	Mean	Median
0	100	9.0	5.0

17. How many neurohospitalists are in your department/practice? (n = 182)

Minimum	Maximum	Mean	Median
0	100	5.6	3.0

Patient matters

18. What is the most common diagnosis you see? Mark only one. (n = 189)

83.1%	Cerebrovascular disease (stroke, TIA)
0.5%	CNS infection
9.0%	Delirium/encephalopathy
0.0%	Headache
0.5%	Multiple sclerosis/demyelinating disease
0.5%	Neoplasm
0.0%	Neuromuscular
2.6%	Seizure
3.7%	Other (please specify)

19. Estimate the number of patient events you have per week:

	Minimum	Maximum	Mean	Median
New evaluation				
(A) Inpatient attending (n = 149)	0	300	12.6	7.0
(B) Inpatient consulting (n = 169)	0	100	18.0	15.0
(C) Outpatient (n = 157)	0	60	6.8	3.0
Follow-up				
(A) Inpatient attending (n = 138)	0	150	27.7	17.5
(B) Inpatient consulting (n = 164)	0	175	30.2	20.0
(C) Outpatient (n = 150)	0	130	13.5	5.0

Practice setting

20. What is your employment model? Mark only one. (If you have 2 or more different models, select the model where you spend the majority of your time) (n = 183)
    14.2% Private practice
    49.2% Hospital employee
    36.6% Other (please specify)
21. Indicate the practice type in which you spend the majority of your clinical time. Mark only one. (n = 183)

51.9%	Academic, hired by neurology department
4.9%	Academic, in a non-neurology department (such as hospitalist department)
16.4%	Private with teaching
19.7%	Private without teaching
7.1%	Other (please specify)

22. Mark all the subspecialties for which you are board certified.[5] (n = 129)

0.0%	Autonomic disorders (UCNS)
0.0%	Behavioral neurology & neuropsychiatry (UCNS)
0.0%	Clinical neuromuscular pathology (UCNS)
9.3%	Clinical neurophysiology (ABPN)
0.8%	Geriatric neurology (UCNS)
1.6%	Headache medicine (UCNS)
11.6%	Internal medicine (ABIM)
0.8%	Hospice and palliative medicine (ABPN)
2.3%	Neural repair and rehabilitation (UCNS)
26.4%	Neurocritical care (UCNS)
0.8%	Neurodevelopment disabilities (ABPN)
7.0%	Neuroimaging (UCNS)
0.0%	Neuromuscular medicine (ABPN)
0.8%	Neuro-oncology (UCNS)
0.0%	Pain medicine (ABPN)
6.2%	Sleep medicine (ABPN)
73.6%	Vascular neurology (ABPN)
10.1%	Other (please specify subspecialty and governing board)

[1]Due to some respondents choosing more than one response, total may not add up to 100%.

Neurohospitalist model

23. What do you see as the major advantages of the neurohospitalist model of care (i.e., neurologists whose primary focus is the care of inpatients)?
24. What do you see as the major disadvantages of the neurohospitalist model of care (i.e., neurologists whose primary focus is the care of inpatients)?

25. Have you experienced "burnout" as a neurohospitalist (found your schedule to be so burdensome as to limit the time you will/could spend as a neurohospitalist)? (n = 177)

28.8%	Yes
45.8%	Concerned about this but have not yet experienced burnout
25.4%	No

26. Please share any neurohospitalist-specific issues which you feel the Neurohospitalist Section or the AAN should address.