Research

Impact of the ACGME Work Hour Requirements

A neurology resident and program director survey

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The Accreditation Council for Graduate Medical Education (ACGME) approved new residency program duty hour standards for all medical specialties in June 2002. The rationales for the guidelines were threefold: increased acuity of hospitalized patients resulting in greater demands of residents, growing public opinion that long resident duty hours compromise patient safety, and growing evidence of the negative effects of sleep deprivation on performance.[1-3] The ACGME resident work hour requirements were implemented in July 2003, and can be summarized by the following standards: 1) an 80-hour weekly work limit, averaged over 4 weeks; 2) a 24-hour limit of continuous duty with up to 6 additional hours for transfer of care and education; 3) one day off per week, averaged over 4 weeks; 4) in-house call limited to no more than once every three nights, averaged over 4 weeks; 5) a 10-hour rest period between duties.

The ACGME resident work hour requirements forced major system changes for some neurology programs in the way that patient care is delivered and residents are educated. Although potential issues such as continuity of care, patient safety, resident education, and shifting responsibilities onto academic staff were identified and justified prior to implementation,[2] the impact remains to be seen. This survey was undertaken to identify neurology resident and program director opinions as to the early impact of the standards, as well as to identify strategies used to institute and monitor the guidelines in neurology and to promote discussion of these issues.

Methods

A total of 24 adult neurology residency programs were selected based on publicly available program director contact information. These programs were evenly distributed in terms of geographic region (East, West, South, Midwest) and program size within each region. All correspondence was via e-mail.

The initial contact was through the program director. It included the following statement of intent: "As part of the editorial team preparing for the launch of a new resident/fellow section of the AAN's journal *Neurology* in early 2004, I am doing a short resident and program director survey regarding the recently implemented ACGME resident work hour requirements . . . I am interested in how these changes have been implemented and perceived." The letter included attachments of both the program director and resident surveys with directions for completing them electronically and returning directly to the author via e-mail. Both surveys were expected to take less than 5 minutes to complete and included directed questions regarding respondents' opinions and experience. Open-ended questions were included at the end of both the resident and program director surveys to capture implementation strategies and opinions not addressed with the closed question types.

Whether the resident survey was distributed at a particular program was solely at the program director's discretion. It was made clear that there was to be no direct feedback from the author to program directors regarding their residents' responses or use of identifying information in any resulting publication.

Surveys were sent in mid-October 2003, several months after the implementation of the ACGME resident work hour requirements. A follow-up e-mail to program directors was sent 2 to 3 weeks following the first contact. All responses were collected by December 2003.

Results

Thirteen program directors responded (54%); however, one survey was lost as an e-mail attachment and was not resent by the program director. The results of 12 program director responses are therefore reported. Two of the responding program directors declined to forward the resident survey to their residents, stating it would be an exces-

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Table 1 *Resident and program director opinions regarding the impact of the ACGME resident work hour requirements*

	Strongly or somewhat agree, %	No opinion, %	Strongly or somewhat disagree, %
Resident work hour restrictions have improved the continuity of patient care.			
Residents	22.4	13.8	63.8
Program directors	—	8.3	91.7
Resident work hour restrictions have improved the safety of patient care.			
Residents	60.4	15.5	24.1
Program directors	25.0	33.3	41.7
Resident work hour restrictions have improved the overall quality of patient care.			
Residents	50.0	20.7	29.3
Program directors	16.7	8.3	75.0
Resident work hour restrictions have improved resident education.			
Residents	53.5	17.2	29.3
Program directors	16.7	25.0	58.3
Resident work hour restrictions have improved resident happiness and satisfaction.			
Residents	84.5	5.2	10.3
Program directors	66.6	16.7	16.7
Resident work hour restrictions have decreased resident fatigue.			
Residents	89.6	3.5	6.9
Program directors	75.0	8.3	16.7
Resident work hour restrictions have/will encourage greater resident participation in research.			
Residents	25.8	43.1	31.1
Program directors	8.3	41.7	50.0
The residency work hour requirements are an accurate reflection of what residents should expect of post-training (post-residency and post-fellowship) work hours as a practicing neurologist.			
Residents	51.7	12.1	36.2
Program directors	8.3	—	91.7

Will residency work hour requirements impact (positively or negatively) the overall training of a resident and their competence to practice independently?	YES	NO
Residents	41.4*	58.6
Program directors	41.7†	58.3

Residents (n = 58) and program directors (n = 12) were asked, "To what degree do you agree with each of the following statements based on your opinion."

* Positive impact 50%, negative impact 50%.
† Positive impact 20%, negative impact 80%.

ACGME = Accreditation Council for Graduate Medical Education.

sive burden to add an additional survey to their residents at a time of already high internal institutional surveillance. Based on resident responses, two program directors who did not return the program director survey did forward the resident survey to their residents.

A total of 58 resident responses were received from 12 programs with an estimated 118 neurology residents (assuming all available residency positions in these programs were filled). This represents a response rate of 49%.

Based on program size, 58% of program director and 29.5% of resident responses came from small programs of less than three residents per year. A total of 25% of program director and 41% of resident responses came from medium sized programs (four to six residents per year). A total of 17% of program director and 29.5% of resident responses came from large programs (greater than seven residents per year).

Prior to the implementation of the ACGME work hour requirements, for their typical rotations over the course of their residencies, 50% of senior residents (postgraduate year 3 or 4) reported working less than 80 hours per week, on average; 32.5% reported 80 to 89 hours per week; and 17.5% reported working greater than 90 hours per week. For their busiest rotations, 20% of senior residents reported working less than 80 hours per week, 30% reported working 80 to 89 hours per week, and 50% reported working greater than 90 hours per week. All program directors estimated their residents worked less than 80 hours per week on a typical rotation and two-thirds estimated their residents worked less than 80 hours per week on their busiest rotations prior to duty hour restrictions. Subsequent to the implementation of the work hour requirements, 10% of residents reported that some rotations still required greater than 80 hours per week, on average over 4 weeks.

Table 2 *Strategies utilized to meet ACGME resident work hour requirements*

	Yes, %	No, %
Adding more neurology residents to rotations	25	75
Adding more non-neurology (rotating) residents to rotations	8	92
Adding physician extenders (physician assistants or nurse practitioners)	17	83
Eliminating some resident elective time	25	75
Eliminating previously established resident rotations	25	75
Reforming hospital team structures	75	25
Increasing staff/attending/consultant responsibility and/or coverage	42	58
Implementing a night float system	17	83
Rescheduling educational activities (rescheduling when morning or afternoon lectures, meetings, and grand-rounds take place)	42	58
Other	42*	58

Program directors (n = 12) were asked "To meet the ACGME resident work hour requirements, your program utilized which of the following (please answer yes or no to each category; mark yes to as many categories as apply)."

* Other responses included redefining resident cross-cover responsibilities, eliminating or limiting some educational activities (including teaching rounds), and careful planning of clinics with relation to the call schedule.

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When on in-house call 7.5% of senior residents estimated that they had worked, on average, less than 30 hours consecutively, 30% worked 31 to 33 hours, and 62.5% estimated they worked greater than 34 hours consecutively prior to the implementation of the ACGME requirements. A total of 72% of program directors reported their residents worked greater than 30 hours consecutively prior to the ACGME requirements. A total of 22% of residents reported still working greater than 30 hours consecutively following implementation of the ACGME requirements, although several responses contained qualifier comments such as "rare" or "occasionally."

Resident and program director opinions regarding the impact of resident work hour requirements are reported in table 1. Strategies for meeting and monitoring the ACGME resident work hour requirements are reported in tables 2 and 3. The most common strategies for implementing the work hour restrictions were restructuring of hospital services and resident education. Only larger programs were able to add residents to rotations or implement a night float system. Few programs utilized physician extenders.

Discussion

Concerns over the impact of the program changes necessary to meet the ACGME resident work hour requirements have been discussed formally and informally by neurologists at all levels of training and responsibility. At the time of this writing, however, little has been reported regarding the impact of these changes on neurology programs.[3-5] The ACGME has published its 12-month progress report[6] and the implementation of the guidelines, in terms of compliance, appears to have been a success. At the 1-year mark, 29 neurology programs (out of a total of 301) had been reviewed. Two had been cited for a total of six violations (both for not adhering to the 10-hour rest period and the call frequency standards, one program for not adhering to the average 80-hour work week, and another for not having an average of one day off per week). In all medical specialties 2,019 programs had been reviewed with only 99 (4.9%) having received one or more citations, most commonly for failure to meet the 80-hour per week standard.[6]

The results of this study also suggest successful implementation within neurology programs. A total of 80% of residents reported working greater than 80 hours per week on their busiest rotations prior to ACGME requirement implementation. These numbers were at odds with those reported by program directors for work hour estimates pre-ACGME requirements. Several program directors noted that given the wide variability between rotations, estimating resident work hours over 3 years of education is prone to inaccuracies. Nonetheless, there was a surprising disconnect between what residents and program directors perceived as the work hour issues pre-ACGME requirements. Regardless, post-ACGME guideline implementation, relatively few neurology residents still reported working beyond the weekly duty hour standard.

Similarly, prior to the ACGME requirement implementation, 92.5% of residents (and 72% of program directors) reported neurology residents worked greater than 30 hours consecutively when on in house-call. Again, these numbers have improved, although 22% reported still occasionally working beyond 30 hours. This standard was cited by several program directors as being the most difficult to meet and being the most threatening to patient continuity of care and safety. Despite this, and recognizing that only 10% of all neurology programs were reviewed by the ACGME in the guideline's first year, there is a discrepancy between what respondents to this survey reported and the ACGME has thus far found. No neurology program was cited for violation of this standard in the guidelines' first year.[6]

This survey has several limitations. The relatively low response rate is a function of methodology where program directors were the sole point of contact and determined the potential participation of their residents. It was impossible to assure follow-up notices were for-

Table 3 *Strategies utilized to monitor ACGME resident work hour requirements*

	Yes, %	No, %
Time card system (electronic or paper, but residents must "punch" in daily)	33	67
End of rotation resident generated report of hours worked	25	75
Monitoring by senior residents	50	50
Monitoring by staff/attending/consultant supervising residents on rotation	58	42
Other	33*	67

Program directors (n = 12) were asked, "To monitor work hour requirements, your program has instituted which of the following (Please mark yes or no to all categories; Mark yes to as many categories as apply)."

* Other responses included weekly resident time sheets and online and pager check-in systems.

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warded to residents who had received initial surveys. The short interval between guideline implementation and this survey assured that residents were able to compare pre and post-guidelines. However, it also likely limited participation of programs and residents within participating programs given an already high burden from internal institutional surveillance. The timing also likely contributed to a response bias with those having a negative impression of the changes being more motivated to respond. Recall bias is problematic, with the natural tendency probably being to overestimate one's workload and responsibility. On the other hand, program directors made the ultimate decision whether to include their residents in this survey and programs with more duty hour growing pains may have been less likely to participate. The response rate may limit how generalizable the results are, but the survey does include relatively proportional responses from small (less than three residents per year) and larger programs and there was no regional predilection toward participation or non-participation. Future studies utilizing a national database of neurology residents in order to contact them directly outside of their programs and performed under the auspices of a respected national organization could overcome these limitations.

This study's goal was to get a sampling of the neurology resident work hour problem, define whether the implementation of the guidelines had been successful, and most importantly to identify issues of concern and success in the eyes of neurology residents and program directors in order to facilitate future discussions and more formal surveillance tools. Residents and program directors agreed overwhelmingly that the requirements were a success in improving resident happiness and satisfaction and decreasing resident fatigue. There was also consensus that the requirements have had a negative impact on the continuity of patient care. Despite this, there was a wide range of opinion as to whether patient safety was improved by the changes and a disparity between residents and program directors as to whether the overall quality of patient care had improved (residents were more likely to believe it had and two-thirds of program directors believed it had not).

A small majority of residents also believed that resident education has been improved by the work hour restrictions, while a majority of program directors (and almost one-third of residents) believed it had not. This raises a more fundamental question as to what the most important facets of resident education are. Traditionally, supervised patient care with an appropriate gradation of responsibility has been the backbone of resident education. Didactics and teaching conferences are increasingly important in the face of decreasing patient care experience. All have been affected by the residency work hour requirements. One half of the responding programs reported having had to eliminate or limit resident teaching conferences, elective time, or previously established resident rotations. The potential effect on education ultimately brings into question the finished product at the end of a residency program. Residents and program directors were evenly split as to whether the guidelines would ultimately affect the competence of graduates in either a positive or a negative way. This demonstrates the uncertainty of the guidelines' ultimate impact on neurology training. A survey of the impact in surgery programs of New York's resident work hour limitations, in place since 1989 and similar to the recently implemented ACGME standards, suggested that they may have had a negative impact on patient care and resident education.[7] Conversely, two recent prospective, randomized studies comparing traditional medical ICU schedules (24+ hours of consecutive duty and every third night on call) with reduced duty hour schedules that would conform to the ACGME guidelines found that with reduced duty hours interns' sleep increased, attentional failures decreased, and serious medical errors decreased by 36%.[8,9] Impact on resident education was not assessed in these two studies. Future impact studies should include an assessment of graduates of the new system and how well they feel it prepared them for their real-world neurology practice in terms of clinical acumen and work-hour expectations.

Interestingly, most residents feel that the current limited work hours are an accurate reflection of their expectations for neurology practice after they complete their training. Almost all responding program directors, conversely, thought that the work hour limitations did

not accurately reflect the true time responsibilities of a practicing neurologist. This may be a function of changing expectations of the young physician work force, where controllable lifestyle factors, including the amount of call and weekly work requirements, have been shown to have had an increasing impact on medical students' choice of medical specialty and, presumably, post-training job expectations.[10,11]

This study highlighted a common write-in theme: one size does not fit all. There was a consensus between residents and program directors that prior to the ACGME requirements neurology residents routinely worked greater than 30 hours consecutively when on-call. Averaged over a month, the 80-hour weekly limit may have been less of a problem. Regardless, post-implementation it appears that it is still the 30-hour consecutive duty standard that remains most problematic in neurology programs in terms of compliance. Pre-ACGME guideline implementation, discussions were loudest in the surgical literature where it was questioned whether residents could get an adequate education with an 80-hour weekly limit.[12,13] In fact, almost all current requests to the ACGME for the 10% extension of this limit (to an 88-hour weekly limit) have been filed and granted for surgical specialties. The Neurology RRC will not consider requests for this extension.[6] The problems in meeting the requirements are therefore not the same between specialties and the solutions have differed also. Physician extenders (nurse practitioners and physician assistants), common in surgical practices, were uncommonly used by the responding neurology programs to meet resident duty hour restrictions. This is not surprising giving the disparate medical economics and resources between surgical and nonsurgical specialties. Implementation strategies highlighted that even within neurology, one fix did not fit all. Most implementation changes involved restructuring of hospital services. However one half of the responding programs (more commonly smaller programs) had to eliminate resident rotations or limit or eliminate some teaching conferences. Only larger programs were able to shift more residents into rotations.

The ACGME has been proactive to this point in following up on the implementation of its guidelines, which are emerging as having been done successfully. Reports on the impact of the guidelines on resident education, patient care, and patient safety will lag behind, but are the most important considerations. These issues will need to be followed closely, including with post-residency surveillance. The issues involved and impact of changes in resident education are not identical between medical specialties. While the ACGME appears to have, rightfully, taken the lead in following this among all specialties, neurology needs to take the responsibility of identifying and rectifying training issues that may potentially affect its own future. Surveillance within our field needs to be done on a national level with direct access to residents able to speak in a forum without consequences. If given such an opportunity, residents must take the responsibility to speak up for themselves and their education. Appropriate patient care and safety outcome measures need to be identified and compared pre and post-work hour limitations. It is the impact, not the implementation, of the ACGME work hour requirements that will serve as their true test of success and where our efforts must now lie.

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