Implementation of the 80-Hour Work-Week Limitation for Residents Has Improved Patient Care and Education

Sairam Parthasarathy, M.D.

Section of Pulmonary and Critical Care Medicine, Southern Arizona Veterans, Administrative Health Care System, University of Arizona, Tucson, AZ

In order to better understand the implications of changes to the residency system in the United States, or the answers to any difficult question for that matter, one needs a historical perspective. Historically, the concept of internship was imported into the United States from the French system of medical training. In 17th century France, the medical student first became a Praktikant (equivalent to the Anglo-American clerkship for undergraduate students) and then became an internat, or intern (equivalent to the Anglo-American house officer of 20th century medicine) after passing an arduous examination termed the concours. After a year of training, the intern graduated into a practicing physician. In the United States, by the year 1890, the experience of spending a year or more in a hospital as a house officer after graduation from medical school to acquire practical bedside training—so often lacking in medical school—had become quite common. Three of 4 graduating medical students were enrolling into internships. By 1923, all hospitals were offering internships; and “advanced” internships that lasted 3 years were offered in 1950. Therefore, the concept of residency was born and evolved from being nonexistent to the current 3 to 5 years. In contrast to the dramatic metamorphosis that has taken place over the past century, the recent work-hour restrictions imposed by the Accreditation Council on Graduate Medical Education (ACGME) are miniscule. Besides providing us the vantage point of such perspective, history serves yet another purpose. History prepares us to expect more change in the near future.

Change is difficult. Change is disconcerting. Such circumstance prompts the question, where is the evidence of the adverse impact of excessive resident work hours on both patient and physician safety? First, the work by Lockley and colleagues was performed in a small number of interns during their rotation in the intensive care unit. The investigators measured attentional failures—measured by means of continuous electrooculography and defined as intrusion of slow-rolling eye movements into polysomographically confirmed episodes of wakefulness during work hours. The interns were subjected to an intervention that consisted of restricting work hours to 16 or fewer consecutive hours—a measure that is even more restrictive of work hours than are the current ACGME-mandated work hours. The conventional arm consisted of interns who worked in the traditional manner—85 work hours per week. The investigators demonstrated that the interns worked fewer hours per week during the intervention: an average of 85 and 65 hours in the traditional and intervention groups, respectively. More importantly, the interns in the intervention group slept 6 hours more per week, slept more in the 24 hours preceding each working hour, and developed fewer episodes of electrooculographically documented attentional failures.

In the accompanying study, Landrigan and colleagues demonstrated that interns committed more serious medical errors when working in the traditional schedule, as compared with the intervention schedule. The total rate of serious medical errors was 22% more during the traditional schedule than during the intervention schedule. Also, interns made 6 times as many seri-

Disclosure Statement
This was not an industry supported study. Dr. Parthasarathy has indicated no financial conflict of interest.

Address correspondence to: Sairam Parthasarathy, M.D., Section of Pulmonary and Critical Care Medicine, Southern Arizona VA Health Care System, 3601, South 6th Avenue, Tucson, AZ 85723; Tel: (520) 629-4649; Fax: (520) 629-1861; E-mail: sparth@arc.arizona.edu

Journal of Clinical Sleep Medicine, Vol. 2, No. 1, 2006
ous diagnostic errors during the traditional schedule as during the intervention schedule. In this elaborate and well-designed study, qualified observers constantly shadowed the research participants for the purposes of data collection, data verification, and interception of medical errors. The authors concluded that eliminating extended work-hour shifts, and reducing them to 16 hours, would reduce serious medical errors in the intensive care unit. However, the investigators had compared the system that existed prior to the ACGME 80-hour work-rule system to a novel 65-hour-per-week intervention system.

The third landmark study from the same investigators reported the effect of the extended-duration work hours on driving safety in interns. In the 2737 participants who completed 17,003 monthly reports, the odds of encountering a traffic accident or a near-miss incident after an extended work shift were 2- and 6-fold greater than the odds following a regular work shift. The investigators demonstrated a dose-effect relationship between the number of extended work-hour rotations in a month and the risk for having a motor vehicle crash during the same month. The authors concluded by stating that the current ACGME regulations allow residents to work 30 consecutive hours during a shift and that further restriction of work hours are sorely needed.

Collectively, these studies would favor restricting the work hours of resident physicians down to 65 hours per week! Imposing a 16-hour limit for continuous work-hour duration and decreasing work hours down to 65 hours per week may be an attractive means for improving physician and patient safety, but such recommendations are mitigated by excess cost, availability of manpower, and concerns regarding continuity of care and excess hand-offs. Nevertheless, the extra cost in hiring more resident physicians would probably be offset by the savings that would ostensibly be incurred in preventing adverse patient events attributable to sleepy physicians. But, indeed, most institutions have not recruited additional physician trainees for unclear reasons. Besides upfront costs, ACGME caps for residency slots, lack of Medicare compensation for additional resident training, and the higher cost of recruiting physician replacements such as hospitalists or nurse practitioners may mitigate some systems from recruiting extra manpower. Other solutions to improving resident safety have included a night float system, free cab rides for post-call resident physicians, scheduling postcall “power naps,” educating residents of the adverse effects of sleep loss, and encouraging good sleep hygiene. The night float system, in a single-center study, has been shown to improve compliance with the ACGME work-hour limitations and, at the same time, improve resident fatigue, sleep duration, and patient-satisfaction surveys.

Despite accumulating evidence regarding sleep-related fatigue and consequent medical errors, currently there is insufficient information regarding the effect of the 80-hour workweek per se on patient care and resident education. Indeed, a recent systematic review of work-hour reduction on residents’ lives included studies that were primarily performed before the ACGME restrictions went into effect. Prior to 2003, studies performed by the ACGME revealed that many residents were averaging more than 100 hours of work per week. A decrease in work hours from more than 100 to less than 65 hours all at once could overburden the healthcare system with regard to a shortage of manpower alone. The present reduction of work hours to 80 hours per week, although seemingly insufficient, may be considered a staged approach in the right direction.

There are some data regarding the impact of an 80-hour work limit on surgery residents. Twenty-one percent of residents in an academic surgery residency who were polled responded that the ACGME rules had had a positive impact on teaching, whereas 35% thought that the rules had had a negative impact. In a cross-sectional survey of 164 surgery residents, fatigue improved; however, few thought that caseload or progression of skills improved, and the residents’ ability to read or study was unchanged or better. In the same study, the residents reported that free time at home and being less tired at home improved, with many reporting that happiness as a person improved. Also, in an annual survey of 193 radiology programs, chief residents reported improved call experience and enhanced educational experience following the ACGME regulation.

In a multicenter questionnaire-based study, medicine residents reported that subjective daytime sleepiness and perception of propensity to commit medical mistakes were less following the 80-hour limit. In another single-center study, following the institution of the 80-hour limits, medicine residents’ quality of life improved, sleepiness while driving decreased, and errors in order entry decreased. These reports, however, were presented in abstract form and are undergoing peer review.

Critics of the 80-hour limitation have justifiably raised concerns regarding the effect of work-hour restrictions on physician learning. In a single-center study, with a before-and-after study design, Malangoni and colleagues evaluated the effect of the ACGME-mandated work-hour limitations on resident physicians in a trauma center. The exposure of the residents to trauma patients and the number of operative procedures did not change, but there was a shift in the operations being performed by more-senior residents. This would mean that junior residents are likely to be exposed to emergency trauma surgery later during the course of their training. The authors concluded that there was no significant change in caseload. In a similar study, Spencer and colleagues evaluated the experiences of residents in pediatric surgery and found that there was no change in the number of surgical procedures, but the residents’ participation in outpatient clinics decreased by 49%. In a questionnaire-based study, Zuckerman and colleagues found that residents and attending physicians in a surgery program reported a negative impact of the work-hour limitations on the operative experience, whereas the residents reported improved quality of life and more time for reading. Long-term studies are needed to address the issue of learning; however, such studies may be extremely difficult, if not impossible, to perform. When weighing physician learning against patient safety, the temporary solution in favor of patient safety is obvious. However, long-term proposals for lengthening residency training and fatigue prevention through mood-alerting medications need careful consideration.

More importantly, the 80-hour limitation is neither a stand-alone program nor a panacea. There are simultaneous criticisms that the 80-hour work limitation does too much and does too little. There is nothing magical about the number 80. It is work in progress. The success of such a program requires more than mere regulations. It requires an action plan for the future and involvement from all participants. The training programs should monitor endpoints other than mere work hours. They should measure the quality of life of their residents, educate residents regarding the importance of sleep, recognize that significant interindividual variability in sleepiness exists, and be proactive in providing cab
vouchers for sleepy residents who need to drive home after call, and share novel scheduling ideas with other programs and the ACGME.

The physician in training, on his or her part, should observe sleep hygiene, use extra time toward sleep, rope in family support during the difficult period of residency training, limit moonlighting, recognize the adverse effects of sleepiness, and realize that acknowledging sleepiness is not a sign of weakness.22

The ACGME needs to campaign for increased funding for academic institutions that operate residency training programs, be more participatory than punitive in regulating programs, help individual programs share and cross-pollinate their ideas, and help programs monitor more endpoints than just work hours. On the other hand, the United States Congress needs to appropriate more money for medical education and resident training and put their money where their mouth is.

In conclusion, improvement of patient care and medical education are lofty goals. Such high aspirations reflect the interpretation of Piero Borello’s painting by the astrophysicist and Nobel laureate Chandrasekhar23 (Figure 1).

“What impressed me about the picture was the extremely striking manner in which you portray one’s inner feeling towards one’s efforts at accomplishments: one is half-way up the ladder, but the few glimmerings of structure which one sees and to which one aspires are totally inaccessible, even if one were to climb to the top of the ladder. The realization of the absolute impossibility of achieving one’s goals is only enhanced by the shadow giving one an even lowlier feeling of one’s position.”

Under the light of such perspective, despite the inherent pitfalls and defects, the 80-hour work-week limitation for resident physicians is the first rung in the ladder—a start. Let us set our sights on the top rung and not the shadows.

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