Abstract

The medical education community’s conversations about residents’ duty hours have long focused solely on the number of those hours. In July 2011, the Accreditation Council for Graduate Medical Education (ACGME) enacted its most recent iteration of standards regarding duty hours. Those standards, as well as a 2008 Institute of Medicine report, look beyond the quantity of duty hours to address their quality as well. Indeed, the majority of the 2011 ACGME standards specify requirements for the qualitative components of residents’ working and learning environments, including supervision of residents; professionalism, personal responsibility, and patient safety; transitions of care; and clinical responsibilities (including workload). The authors believe that focusing on these qualitative (rather than quantitative) components of the resident’s working and learning environment provides the greatest promise for balancing patient care with resident education, thus optimizing the safety and effectiveness of both. For each of the four qualitative components that the authors discuss (enhancing supervision, nurturing professionalism and personal responsibility, ensuring safe transitions of care, and optimizing workloads and cognitive loads), they offer agendas for faculty development, educational program planning, and research. Thus, the authors call on the medical education community to expand its discussion beyond counting duty hours to focus on these critical issues that ensure quality resident education and patient care and to implement necessary strategies to address them.

In 1984, Libby Zion, an 18-year-old college student, died under the care of resident physicians. Two years later, a grand jury indicted the practice of allowing inexperienced and undersupervised residents to care for patients. It also noted the contribution of residents’ long duty hours. In response, New York State’s Bell Commission worked for 18 months to develop new regulations for New York residents before releasing a final report in October 1987. Although these recommendations focused on the importance of supervision, they also called for capping the number of duty hours at 80 hours per week averaged over 4 weeks and 24 consecutive hours. Following this, New York enacted that state’s, and the nation’s, first regulations limiting residents’ duty hours in 1989. Around the same time, the Accreditation Council for Graduate Medical Education (ACGME) began adopting duty hours requirements, but these were limited in both scope and to specific specialties; by 2003, they restricted duty hours for all specialties to 80 hours per week.

The Imperative for Qualitative Change

Five years after the ACGME’s first widespread limitation of duty hours, the Institute of Medicine (IOM) published Resident Duty Hours: Enhancing Sleep, Safety, and Supervision, which, while calling for further reduction in the quantity of residents’ hours, also addressed their quality, calling for enhanced supervision, improved transitions of care and safety reporting, and optimized workloads and time for reflection.

Shortly after the IOM report’s release, the ACGME formed the Task Force on Quality Care and Professionalism. At a June 2009 national congress, the task force heard testimony from a range of 67 stakeholder organizations, including the American Medical Association, the Association of Pediatric Program Directors, and the Resident and Associate Society of the American College of Surgeons. After an additional year of study, the task force opened their proposed standards to public commentary, finalizing them in September 2010. These standards, effective since July 2011, limit the consecutive duty hours of interns to 16 and those of more senior residents to 24 plus an additional 4 hours for transition of care. Similar to the IOM report, however, they also extensively address components of the resident working and learning environment that affect the quality of hours worked, including standards for supervision; transitions of care; clinical responsibilities (including optimal workload); professionalism, personal responsibility, and patient safety; teamwork; and alertness management and fatigue mitigation.

Emphasizing the focus beyond the quantity of duty hours elaborated by the IOM and the ACGME, we believe that addressing the quality, rather than quantity, of duty hours holds the greatest promise for optimizing the safety and efficacy of both patient care and...
resident education. Indeed, focusing on work conditions is imperative because even well-rested residents can place patients at risk when undersupervised or cognitively overloaded. Furthermore, fragmented duty hours may stifle the cultivation of personal responsibility and professionalism. Despite these considerations, much of the current discussion in graduate medical education continues to focus on the quantity of duty hours. Thus, in this article, we call on the medical education community to shift from counting hours to addressing the critical issue of the quality of those hours worked. After briefly acknowledging the case for duty hours restrictions, we will focus on four aspects of the qualitative changes required to optimize patient and trainee outcomes: supervision, professionalism and personal responsibility, transitions of care, and workload/cognitive load. In each of these areas, we will discuss agendas for faculty development, educational program planning, and research.

**Acknowledging the Case for Duty Hours Restrictions**

There is evidence that the number of consecutive hours that residents work impacts patients’ safety as well as residents’ own safety and education. Residents working more than 24 hours have been shown (when compared, in most of these references, with those working 16 hours or less) to be more likely to commit serious medical errors,6–8 make diagnostic errors,9 experience failures in attention,6,7 sustain sharps injuries,6,9 and crash while driving home from work.6,10 Longer shifts have also been related to burnout.11,12 They may also be inversely related to knowledge acquisition. Indeed, on-call shifts of 30 hours every fourth night have been associated with worse working memory capacity scores and commission of more math errors.13 Furthermore, this working memory capacity, as well as sleepiness, may be affected for three to four days after an overnight call.13,14

However, the literature has not been uniform. For example, Hanlon et al15 found essentially equal daytime sleepiness whether residents worked 12 to 16 hours or 24 hours, and Reimann and colleagues16 found no cognitive performance deficits in sleep-deprived neurology residents. Furthermore, Friesen et al17 found that increased fatigue among interns correlated not with hours worked but, rather, with perceived stress.

Because the literature is mixed, limiting residents’ hours must be carefully balanced with other requirements in their working and learning environment to achieve the primary goals of residency education: safe and effective patient care now and in the future and safe and effective resident education.18 Supervision, professionalism and personal responsibility, transitions of care, and workload/cognitive load become critical considerations in achieving this balance.

**Enhancing Supervision**

As early as the Bell Commission Report, supervision was prioritized over duty hours limits as a way to improve patient outcomes.19 Research has repeatedly demonstrated the benefits of attending supervision of residents’ patient care.20–24 For example, emergency medicine attending physicians’ supervision of nonemergency medicine second- and third-year residents resulted in frequent, clinically significant changes in patients’ care.21 Attending physicians in an internal medicine continuity clinic made essential changes in residents’ management plans for 27.4% of the patients they evaluated and at least some change for an additional 57.6% of these patients.22 Most recently, Baldwin and colleagues23 showed that residents’ reports of inadequate supervision are directly related to reports of medical errors, sleep deprivation, stress, depression, interpersonal conflicts at work, working while impaired, and observing others falsifying records and are inversely related to learning, overall satisfaction with residency, and quality time spent with attendings.

Given the relationship between supervision and both patient care outcomes and residents’ education and well-being, the IOM called for greater focus on supervision in their report.3 The 2011 ACGME standards, too, include explicit and expansive language on supervision,3,5 setting down numerous supervision requirements, including that (1) first-year residents must work under direct supervision (faculty present with resident) or indirect supervision (faculty available for immediate consultation), with direct supervision immediately available if needed, (2) faculty must receive supervision assignments that ensure their ability to assess residents, (3) programs must set guidelines for when residents are required to communicate with supervising faculty, and (4) supervising faculty must appropriately delegate patient care to residents on the basis of their abilities.

A recent national survey of residents revealed that only 25.3% felt that the 2011 ACGME standards would increase faculty supervision.25 Indeed, recent duty hours reductions in Canada resulted in decreased supervision.26 This underscores the need for a better understanding and actualization of effective supervision. The work of Kennedy and colleagues27,28 provides the foundation of current understanding in this area and informs the following agendas for faculty development, educational program planning, and research.

**Faculty development**

In addition to classifying supervision levels,22 Kennedy and colleagues have demonstrated that physicians dynamically gauge the supervision trainees need by assessing their trustworthiness, which comprises four observable components: skill and knowledge, truthfulness, discernment, and conscientiousness.28 Training faculty to assess trustworthiness by, for example, double-checking work and triangulating the information learners present with other data sources adds depth to their supervisory capabilities and should be pursued.

The Pediatrics Milestone Project29–31 provides another consideration for faculty development. The larger Milestone Project, a partnership of the ACGME and the member boards of the American Board of Medical Specialties, seeks to further define and refine the six ACGME competencies in the context of each specialty and will lead to the ACGME’s Next Accreditation System.32,33 To achieve this for pediatrics, the Pediatrics Milestone Project elaborates brief, narrative descriptions of behaviors expected of physicians as they progress from medical school through clinical practice as attendings.30 These clearly defined milestones serve as a roadmap.
for both faculty and learners, letting both groups see where learners stand along the developmental continuum and identify the next steps to be taken. The narrative descriptions of behaviors for each milestone also make it possible to develop video vignettes that can then be used to train faculty evaluators. This shared model of what learners look like at given stages in their professional development should not only enhance the ability of supervisors to accurately and reliably assess learners using direct observation but also equip them to provide appropriate supervision levels based on their learners’ developmental levels and the resultant needs for patient safety and optimal resident education.

**Educational program planning**

As noted in the 2011 ACGME standards, it is important that faculty receive assignments that make it possible for them to assess residents, appropriately delegate patient care based on those assessments, and know when to entrust residents with less supervision. This necessitates educational programs that emphasize continuity between resident, supervising physician, and the working and learning environment. Currently, assignments are often too short for faculty to adequately assess the developmental levels of a resident. This makes it hard to determine an appropriate level of supervision that ensures both patients’ safety and the resident’s professional development. In the future, faculty supervisors must receive assignments that are long enough to avoid these common problems.

**Research**

The connection between supervision, trustworthiness, and the work of ten Cate and Scheele on entrustable professional activities provides a research agenda that translates theory into practice. Entrustable professional activities are the routine activities of physicians that define their specialty, such as a general pediatrician caring for a well newborn. In essence, they require the integration of competencies within a clinical context. “Entrustable” describes a professional activity that a supervisor judges a supervisee capable of performing without direct supervision. Thus, supervision becomes a meaningful way of assessing clinical competence, with level of supervision decreasing as level of competence increases. By studying specialty-specific milestones and the behaviors expected at each stage of physician development, one can paint a descriptive picture of entrustable behaviors along the continuum. Furthermore, studying the rate of progression of most learners through the milestones should enable early screening and identification of outliers who need remediation. Thus, this type of research provides great promise for informing and advancing the abilities of both supervisors and learners.

**Nurturing Professionalism and Personal Responsibility**

The 2011 ACGME standards that focus on professionalism and personal responsibility mandate that residents and faculty learn about being appropriately rested and fit for duty, putting patients’ needs above self-interests, and taking responsibility for their role in patient care. Meeting these standards requires professional identity formation, a developmental process that begins with aspirations and imitation of role models, then moves to seeing oneself as a member of the profession, further advances to developing one’s own professional identity, and culminates in seeing oneself as a professional. This progression of professionalization is marked by an ever-increasing sense of responsibility that catalyzes a tendency toward behaviors that exemplify professionalism and personal responsibility for patient care.

This process of professional identity formation that cultivates professionalism and personal responsibility in patient care almost certainly requires developing meaningful relationships with patients. Many have ascribed a potential loss of professionalism to duty hours restrictions, blaming them for fragmenting relationships and getting in the way of patient care “ownership.” However, patient care experiences had been fragmented even before duty hours restrictions by block, rather than longitudinal, training structures. As evidence against this typical block rotation design, Ogur and Hirsh demonstrated that students in a longitudinal clerkship were able to develop relationships with patients that inspired learning and led to a sense of providing superior care, a feeling of empowerment as a care provider, and a view of providing care as a privilege. Residents would likely experience the same benefits of greater continuity.

**Faculty development**

We know from the formation of professional identity that learners early in their development cannot be expected to immediately internalize the behaviors and personal responsibility of the profession—This comes with further development. It is important not to leave this maturation to chance but, instead, to explicitly help learners weave these characteristics into the fabric of their professional being. Explicitness is especially critical to move learners from simple imitation to true understanding and internalization of behaviors. Faculty who are trained to recognize the stages of professional identity formation can help learners further develop through feedback. They can also serve as role models, describing the rationale for their own behaviors, with an emphasis on important components of professionalism and personal responsibility, such as teamwork. Faculty should also engage learners in reflective dialogue to facilitate their internalization of professional identity.

**Educational program planning**

As previously noted, continuity of care and longitudinal relationships are paramount when planning educational programs that promote the development of professionalism and personal responsibility. Greater continuity might be achieved by, among other things, moving from monthlong rotations to longer educational experiences, ensuring that primary care residents assume primary responsibility for a panel of patients over time, and letting surgical residents follow patients from clinic through surgery and into postoperative management and follow-up.

**Research**

While professionalism and personal responsibility are aspects of residency training that are challenging to measure, we have much to gain from the development of valid and reliable metrics. The Milestone Project holds promise for guiding this work. Through defining and studying the developmental continuum of physician behaviors in
areas of professionalism and personal responsibility, such as professional identity development and demonstrating a “responsiveness to patient needs that supersedes self-interest,” it will be possible to identify normative ranges for achieving each developmental milestone in these areas. As we described in the section on supervision, this will then help faculty and institutions to identify when learners’ development is delayed, prompting a structured intervention informed by the relevant research.

Ensuring Safe Transitions of Care

Recent years have seen an increased focus on transitions of care and ensuring patient safety when handoffs occur, as highlighted by the inclusion of handoffs as a Joint Commission National Patient Safety Goal. Likewise, the 2011 ACGME standards require minimizing transitions when designing care structures, ensuring and monitoring structured handoff processes, ensuring that residents are competent in handoff communication, and guaranteeing that all caregivers can identify the attending physicians and residents primarily responsible for patients.

The interest in improving handover quality is deeply rooted in patient safety. Ineffective handovers, often the result of communication failures, lead to adverse events for patients. Studying internal medicine residents, Arora and colleagues found that communication failures during handovers were most often omissions of content pertinent to caring for the patient (such as active problems or current medications and treatments) or failure-prone communication strategies (such as not performing handovers face-to-face or a “double sign-out” within a few hours). Indeed, a recent survey of pediatric residents found that almost 73% of the respondents had experienced uncertainty regarding a patient care plan because of an incomplete verbal handoff, and only 19% reported that written sign-outs were up-to-date when their shifts began. Demonstrating that communication failures are likely magnified when learners perform handovers, Petersen et al found that patients suffering potentially preventable adverse events were much more likely to be cared for by cross-covering residents, especially interns. Escalating this concern is the report that interns at some programs are left to do handovers alone.

Faculty development

Ensuring successful transitions of care through faculty development is elusive straightforward. Faculty themselves must learn how to perform handovers successfully and systematically so that they can model the necessary communication skills and assess them in their learners and peers. Although this agenda is clear, the best structure and setting for successful and systematic handovers remain unclear, necessitating further research.

Educational program planning

The 2011 ACGME standards provide an excellent foundation for an educational program planning agenda, including requirements to minimize transitions when designing care structures, monitor structured handover processes, and ensure that residents are competent in handover communication. There are myriad considerations for achieving these goals. For example, inpatient transitions can be minimized through work schedules that avoid “short call” shifts where residents care for patients for only a few hours. When transitions must occur, it is important to not only train residents in structured handovers but also train senior residents and faculty to observe and refine others’ skills. In addition, schedules should be structured so that interns and senior residents transition at the same time, improving the likelihood of both role modeling and oversight.

Research

The literature presents many models for teaching and assessing handovers, but few studies have evaluated the quality of handovers. Thus, the primary research agenda for handovers must include (1) elucidating the critical components to safe handover communication, (2) understanding the ideal conditions (e.g., time, location, optimal members of the health care team), and (3) identifying the key knowledge, skills, and attitudes that learners must gain before being entrusted to perform handovers without direct supervision. Fortunately, national efforts are currently under way to address the first two agenda items, and the Milestone Project and concept of entrustable professional activities hold promise for addressing the third item.

Optimizing Workloads and Cognitive Loads

The 2011 ACGME standard for clinical responsibility states that “responsibilities for each resident must be based on [post-graduate year]-level, patient safety, resident education, severity and complexity of patient illness/condition and available support services.” Inherent to this standard is the consideration of both workload and cognitive load.

Fieldston et al suggest that residents’ workloads increase with the number of patients on their census; the acuity and complexity of those patients; the number of patient turnovers through admissions, discharges, and transfers; the nongeographic grouping of patients within the hospital; the number of attending/supervising physicians; the number of handovers; and lower levels of ancillary services or other system inefficiencies. Some of these factors refer to workload and others to cognitive load, which is the amount of mental energy required for the working memory to process information. Compounding a heavy workload with a heavy cognitive load, as often occurs in the resident’s working and learning environment, can incapacitate residents and place both patient care and resident learning at risk.

Cognitive load can be divided into germane load—the mental energy spent processing and developing a framework for thinking about something; intrinsic load—the mental energy required because of the inherent difficulty and complexity of the material; and extraneous load—the mental energy required because of the way the material is presented. All learners can be burdened by intrinsic and extraneous loads, but early learners, because of their limited experience, also face a heavy germane load, making cognitive load especially important when considering this group’s workload.

Haney and colleagues have proposed a theoretical model of how residents...
learn in which the relationship between learning and workload (or patient care load) follows a parabolic curve. Learning increases along with workload until it reaches an optimal point, after which learning begins to decrease as workload continues to increase. Studying this hypothesized model, they found that internal medicine interns reported learning best when they had about three patients on their census and no new admissions. Senior residents felt that optimal learning occurred with six or seven patients on their census and six new admissions.

Although interns cannot optimally learn with zero admissions,\(^5\) the findings of Haney et al underscore the weight that each new patient adds to learners’ cognitive loads and workloads. This consideration is especially important in the context of the 2011 ACGME standards because further limiting duty hours may, by compressing work,\(^2\) unintentionally increase cognitive loads and workloads.

**Faculty development**

Faculty understanding of the complex interplay between cognitive load and workload is critically needed. Although faculty supervisors are often keenly aware of the impact of some elements of workload, such as high census, high acuity, geographic dispersion of patients, and high patient turnover, they may not be as familiar with cognitive load theory. Faculty should be taught to identify situations where learners are at risk for cognitive overload and how to employ mitigating strategies in those situations. One such strategy is explicitly teaching learners how faculty experts mentally organize disease features, a proactive technique that, by enhancing the knowledge content and structure that residents use in their clinical reasoning,\(^3\) can decrease their germane cognitive load (the mental energy spent processing and developing a framework for thinking about something).

**Educational program planning**

The recent 16-hour duty restrictions for interns have been shown to increase work compression,\(^2\) which increases both cognitive load and workload. As institutions adjust to these changes, it will be important to identify mitigating strategies. Although the work of Haney et al\(^3\) could be used to support capping the number of patients and new admissions for learners, focusing only on numbers of patients is an oversimplification. Rather, all the workload components proposed by Fieldston et al\(^4\) (patient numbers and turnovers, acuity/complexity, handover frequency, system inefficiencies, etc.) should be considered when developing and implementing educational programs and resident team structures.

The three types of cognitive load should also be considered when designing the educational environment. For example, extraneous load can be decreased by creating electronic medical records that avoid confusing and overly exhaustive notes in favor of more streamlined and reader-friendly formats. Germane load can be lightened by faculty explicitly modeling the steps in clinical decision making, as noted previously. Finally, balancing the distribution of more complex patients among multiple learners can help address intrinsic load.

**Research**

Measuring workload in the clinical setting is complex, with its many elements that relate to patients (number, complexity, acuity, ebb and flow), the work environment (geographic cohorting, administrative tasks, patient-care-related tasks), the learner (development of clinical reasoning skills, working memory for the clinical context, fatigue and wellness factors), and the supervisor (presence, expertise). Understanding how these elements, as well as their combination and interactions, impact cognitive load and workload provides a rich research agenda.

**Moving Beyond Duty Hours**

Recent recommendations and standards from the IOM and ACGME highlight the need to focus on the qualitative aspects of residents’ working and learning environments rather than solely on the quantity of hours worked. We must follow this lead and expand our conversations to address these critical qualitative components of a resident’s time at work. The challenges are undoubtedly great. However, from challenge comes opportunity. If we focus on these qualitative aspects of residency education and study the impact of the 2011 ACGME standards that address them, there is great promise that we can significantly improve outcomes both for our learners and for their patients.

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