

HEALTH POLICY

Health-care implications of resident duty-hour restrictions

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Since 2003, duty hours for US resident physicians have been restricted to 80 h per week. For the first time, a study in a surgical population now demonstrates a reduction in mortality and morbidity associated with the working-hour reform.

In 2003, the Accreditation Council for Graduate Medical Education introduced mandatory limits on duty hours for resident physicians in the USA. The duty limit was set at 80 h per week, averaged over a 4-week period. This mandate was created on the basis of the belief that fatigue from excessive duty hours would lead to decreased cognitive and mechanical skills, potentially resulting in increases in provider error and negatively affecting patient safety.¹ A report from the Institute of Medicine that recommended further restrictions on resident working hours has reignited debate on this topic.² Although previous studies in various medical specialties have demonstrated a decrease in physician errors since implementation of the working-hour restrictions, no study had empirically detected a reform-associated improvement in patient morbidity or mortality in surgical specialties.^{3,4} Now, in 2009, the first study to reveal an improvement in morbidity and mortality among surgical patients in the era after the working-hour reform has been published.⁵

Having analyzed a retrospective cohort of 14,610 general, trauma, and vascular surgical patients, Privette *et al.*⁵ demonstrated a significant decrease in "provider-related" complications and overall mortality after introduction of the 80 h working week. The 30-day mortality rate decreased from 1.96% in a period before the working-hour changes (July 2001 to June 2003) to 1.10% ($P=0.0002$) during a time period after the working-hour restrictions (July 2005 to June 2007). The proportion of complications deemed provider-related decreased from 48.3% to 38.6% ($P<0.0001$), although the overall complication rate remained unchanged. The investigators observed a



decrease in major complications, with an offsetting rise in minor complications.

Several changes in the local health-care system occurred during the study period. Resident duty hours decreased (by an average of 23%), as did the average number of cases logged by graduating chief residents (the latter change was not statistically significant). Involvement of attending physicians in patient care increased dramatically: the number of attending physicians increased by 40%, and time spent in direct patient care increased by over 100%. The authors also estimate that an 18.2% increase in personnel costs was incurred by the treating institution to hire additional mid-level and faculty providers to compensate for decreases in resident working hours.

The key limitation of the study is that it is difficult to attribute the observed changes in surgical morbidity and mortality specifically to the decrease in resident working

hours. The observed changes occurred not only in the context of a reduction in resident working hours, but also in a setting of greater involvement of attending physicians in patient care. In addition, the Centers for Medicare and Medicaid Services introduced the Surgical Care Improvement Project during this time frame. Thus, the degree to which the superior clinical outcomes can be attributed to any of these changes is unknown.

The possibility that the observed quality improvement might be a consequence of care being facilitated by more-experienced surgeons has important implications. A potential trade-off exists between short-term improvement of patient safety through working-hour restrictions and longer-term outcomes once surgeons who have been trained in an environment with strict working-hour limits enter practice in a field that is already stressed by labor force issues. Recent studies suggest that the duty-hour reform has not had a negative impact on resident surgical training. Two investigations have demonstrated no significant change in resident operative volume since the introduction of the working-hour limits.^{6,7} In addition, scores on American Board of Surgery In-Training Examinations have increased since the imposition of working-hour restrictions.⁸ However, the ultimate outcome of surgical training in the era after the working-hour reform is unknown; surgeons who completed all of their training in the years since 2003 have just begun to enter the surgical workforce. Any deficiencies in training will be exacerbated by the aging demographics of the population and the decreasing number of surgeons in the USA. The effect of this surgeon shortage will probably be compounded by both

a projected 15–30% increase in surgical demand by 2020 and by any future efforts to restrict the working hours of attending physicians.⁹ Thus, current improvements in morbidity and mortality for surgical patients, if secondary to greater involvement by experienced surgeons, may not be attainable in the future when demand outweighs surgeon supply.

The other key finding of this study was the increase in personnel costs necessary to compensate for the restructuring of care in the era after the introduction of the 80 h week. In the context of our already fragile health-care system, this finding has grave implications. To achieve cost-neutral reforms in duty hours, a substantial reduction in adverse events would need to occur. For example, studies suggest that a decline in adverse events in teaching institutions of up to 30.9% would need to occur to neutralize the expenses related to working-hour restrictions for residents.¹⁰ Privette *et al.*⁵ noted that the reduction in adverse events that occurred in the study institution was well below that needed to realize a cost-neutral state. With the predicted future shortage of surgeons and increases in surgical demand, the overall increases in cost needed for system restructuring in order to maintain quality improvement could be substantial and ultimately not affordable in the current health-care environment.

In summary, Privette *et al.*⁵ demonstrated a reduction in mortality and morbidity associated with resident working-hour restrictions in a surgical population. However, these outcomes also occurred in the context of parallel increases in the involvement of attending physicians in patient care, increases in health-care expenditures and likely overall improvements in the processes of care in the health-care system concerned. Whether the authors' findings are generalizable to other surgical subspecialties, such as urology, remains unclear. Given the uncertainty regarding a causal relationship between improved outcomes and several changes in local health-care delivery, including duty-hour restrictions, it is not clear how current practice should be altered on the basis of these findings. Increased involvement of attending physicians in patient care and rises in health-care expenditures may not be achievable end points at all institutions. Further study is warranted to validate these outcomes and identify specific interventions

that will lead to improved patient safety in a complex health-care delivery system.

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Competing interests

C. D. Scales Jr declares an association with the following organization: the Accreditation Council for General Medical Education. See the article online for full details of the relationship. The other authors declare no competing interests.

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HEALTH POLICY

The UK 'postcode lottery' in renal cell carcinoma

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In the UK, a patient's residential address can determine whether they have access to certain treatments. An audit of the effect of this 'postcode lottery' on the survival of patients with advanced renal cell carcinoma suitable for treatment with sorafenib or sunitinib highlights the iniquities that can plague such allocation systems.

Renal cell carcinoma (RCC) accounts for approximately 3% of malignancies in the UK.¹ Advanced RCC generally is refractory to cytotoxic chemotherapy and historically has been treated with immunotherapy. The results of randomized trials reported since 2005 support the efficacy and safety of vascular endothelial growth factor receptor kinase inhibitors such as sorafenib and sunitinib.^{2,3} These drugs have, as a consequence, replaced immunotherapy as standards of care throughout the world for the

systemic treatment of advanced RCC. Both were licensed in 2006.

The UK National Institute for Health and Clinical Excellence (NICE) is a special authority that advises the National Health Service (NHS) on prioritization of health services. NICE is tasked with assessing the cost-effectiveness of treatments. Sunitinib was approved by NICE in 2009 for the treatment of advanced RCC. This drug can now be prescribed to appropriate patients on the NHS. Sorafenib has