

Surgical Residents' Perceptions of 2011 Accreditation Council for Graduate Medical Education Duty Hour Regulations

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Importance: In 2010, the Accreditation Council for Graduate Medical Education (ACGME) proposed increased regulation of work hours and supervision for residents. New Common Program requirements that took effect in July 2011 dramatically changed the customary 24-hour in-house call schedule. Surgical residents are more likely to be affected by these duty hour restrictions.

Objective: To examine surgical residents' views of the 2011 ACGME Common Program requirements after implementation in July 2011.

Design: A 20-question electronic survey was administered 6 months after implementation of 2011 ACGME regulations to 123 participating institutions.

Setting: ACGME-accredited teaching hospitals in the United States and US territories.

Participants: The total sample was 1013 voluntarily participating residents in general surgery and surgical specialties at ACGME-accredited institutions.

Main Outcomes and Measures: Residents' perceptions of changes in education, patient care, and quality of life after institution of 2011 ACGME duty hour regulations and their compliance with these rules.

Results: A subset of 1013 residents training in general surgery or a surgical subspecialty was identified from a demographically representative sample of 6202 survey respondents. Most surgical residents indicated that education (55.1%), preparation for senior roles (68.4%), and work schedules (50.7%) are worse after implementation of the 2011 regulations. They reported no change in supervision (80.8%), safety of patient care (53.4%), or amount of rest (57.8%). Although quality of life is perceived as better for interns (61.9%), most residents believe that it is worse for senior residents (54.4%). A majority report increased handoffs (78.2%) and a shift of junior-level responsibilities to senior residents (68.7%). Finally, many residents report noncompliance (67.6%) and duty hour falsification (62.1%).

Conclusions and Relevance: A majority of surgical residents disapprove of 2011 ACGME Common Program requirements (65.9%). The proposed benefits of the increased duty hour restrictions—improved education, patient care, and quality of life—have ostensibly not borne out in surgical training. It may be difficult for residents, particularly in surgical fields, to learn and care for patients under the 2011 ACGME regulations.

JAMA Surg. 2013;148(5):427-433

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IN 2010, THE ACCREDITATION Council for Graduate Medical Education (ACGME) responded to public pressure, the Occupational Safety and Health Administration, and recommendations from the Institute of Medicine by proposing increased regulation of work hours and supervision for residents.¹⁻⁴ In July 2011, new Common Program requirements took effect, dramatically changing the customary 24-hour in-house call schedule. The new regulations have the greatest effects on interns (postgraduate year 1), requiring both direct supervision from a more senior resident or an attending physician at all times and limiting duty periods to a maximum of 16 hours. Other notewor-

thy changes include a more strict 24-hour limitation for senior residents (postgraduate year 2 or later), with 4 additional hours allowed for handoffs or care of critically ill patients.⁵

See Invited Critique at end of article

These changes were proposed to improve not only patient safety but also resident education and well-being.⁶ Since the first regulations in 2003, much debate has been generated from the American public,^{3,7} program directors,^{8,9} and residents.¹⁰⁻¹⁶ In one study, the 2003 ACGME regulations led to measurable improve-

Table 1. Demographic Characteristics of 1013 Respondents and Comparative ACGME Data for All US Residents

Characteristic	Respondents, No. (%)	All US Surgical Residents, % ^a
Sex		
Male	670 (66.2)	67.6
Female	336 (33.2)	27.0
Not reported	7 (0.7)	5.4
Training year		
PGY1	223 (22.0)	24.1
PGY2	189 (18.7)	20.9
PGY3	196 (19.3)	18.8
PGY4	155 (15.3)	17.9
PGY5	153 (15.1)	13.1
PGY6	56 (5.5)	2.6
PGY7	39 (3.8)	2.5
Not reported	2 (0.2)	2.5
Specialty		
General surgery	499 (48.8)	47.7
Surgical subspecialty	514 (50.7)	52.3
Not reported	0	2.3
Program size, No. of residents		
1-10	193 (19.1)	NA
11-20	338 (33.3)	NA
21-30	219 (21.6)	NA
31-50	184 (18.2)	NA
>50	74 (7.3)	NA
Not reported	5 (0.5)	NA

Abbreviations: ACGME, Accreditation Council for Graduate Medical Education; NA, not available; PGY, postgraduate year.

^aData on all residents in ACGME-sponsoring institutions, from *Graduate Medical Education Resource Book*.³²

ments in the quality of life for residents, but there was no difference in the quality of patient care or number of medical errors and sentinel events.¹⁷ Similarly, no significant improvement in mortality was noted in a large study of Medicare patients in the first 2 years after the 2003 ACGME duty hour reforms.¹⁸ Cumulatively, research on the effect of duty hour regulations has not produced conclusive evidence that patient safety or the quality of resident education has improved.¹⁹⁻²⁶

Instead, the professional development of residents and the quality of their education has come into question, particularly with 2011 ACGME duty hour regulations. Criticism of the newest restrictions centers on a paradigm change to “shift work,” with more frequent handoffs and less continuity of care, not the extended shifts customarily associated with certain fields, including surgery. Surgical residents belong to a cohort of residents more likely to be affected by these duty hour restrictions given the rigorous training required.²⁷ Although prior research findings suggest that surgical residents believe that some level of restriction is warranted,²⁸ they do not support significant regulation of duty hours.^{9,10,29}

To our knowledge, this is the first study to examine surgical residents' views of the 2011 ACGME Common Program requirements after implementation in July 2011. In particular, the study assesses the perceived effects of the regulations on patient care, resident education, and quality of life. Surgical residents' self-reported compliance and duty hour falsification rates are also evaluated.

A 20-question survey was created to assess resident perceptions of the 2011 ACGME Common Program requirements. The survey focused on the primary goals of the regulations reported by the ACGME: (1) patient safety, (2) resident education, and (3) resident quality of life.⁶ Residents were asked to indicate their opinions on a 3-point ordinal scale. The questionnaire also included demographic variables and postgraduate year of training. Finally, 3 questions were asked to assess compliance with duty hour regulation, frequency of duty hour falsification, and underreporting of hours. The study was approved for a multi-institutional survey by the Rhode Island Hospital Institutional Review Board.

To include a maximum sample of residents, all 682 ACGME-sponsoring institutions were asked to participate in the survey. The designated institutional official (DIO) at each site was e-mailed directly to request assistance with survey distribution. The DIO is the administrator responsible for oversight of all residency programs at each institution and is therefore the ideal resource for distributing surveys to all residents at a teaching hospital.³⁰ A minimum of 2 e-mails was sent to each DIO, requesting assistance in distributing the anonymous, electronic survey link (SurveyMonkey). There were no incentives for participation by institutions or individual residents. Statistical analysis was performed using standard errors of proportions to calculate simultaneous 2-sided CIs³¹ and 2-tailed *t* tests to establish independence of means.

RESULTS

A total of 4140 residents training in surgery or a surgical subspecialty received the survey (based on 2011 ACGME reported data of participating sponsoring institutions). From this sample, 1013 surgical residents submitted responses to the survey (24.5% response rate). Respondents were distributed among programs of varying sizes from 41 states, with demographically representative numbers for sex and year of training. In addition, there was an approximately equal sample of general surgery and surgical subspecialties (48.8% vs 50.7%), which is also demographically representative of US surgical trainees (**Table 1**).

Because of the large sample size, all differences in means reached statistical significance with nonoverlapping 99.9% CIs (α , <.001). The details of the responses are shown in **Table 2**, which demonstrates that, among individual questions and overall, the perception of the changes is generally negative, with a majority of residents (65.9%) reporting disapproval. In subset analysis, general surgical residents expressed greater disapproval than subspecialty surgical residents (71.5% vs 60.4%; P < .001).

As a framework for discussing the responses to individual questions, we have grouped the results into 3 categories based on the goals of the ACGME in implementing the Common Program requirements: (1) patient care, (2) resident education, and (3) resident quality of life. We also compared the results from surgical residents with those from the general population of nonsurgical residents responding to the survey.³³ Finally, we present compliance and falsification results (**Table 2** and **Table 3**).

Table 2. Summary of Survey Results

Surveyed Effect of 2011 ACGME Regulations	Respondents, % (99.9% CI)		
	Worse or Decreased	Unchanged	Better or Increased
Overall feelings about 2011 regulations ^a	65.9 (64.0-68.6)	22.7 (20.3-25.0)	11.5 (9.6-13.3)
Quality of life for interns	21.1 (18.3-23.5)	17.0 (14.9-19.2)	61.9 (59.1-64.6)
Quality of life for senior residents	54.4 (52.7-57.2)	35.9 (33.2-38.7)	9.7 (8.0-11.4)
Work schedules	50.7 (48.3-53.6)	27.0 (24.4-29.5)	22.3 (19.9-24.7)
Quality of resident education	55.1 (53.5-57.9)	37.0 (34.2-39.7)	8.0 (6.4-9.5)
Preparation for more senior resident role	68.4 (67.3-71.1)	27.7 (25.1-30.3)	3.9 (2.8-5.0)
Safety of patient care	37.8 (36.2-40.6)	53.4 (50.5-56.3)	8.8 (7.2-10.4)
Amount of rest	22.0 (19.7-24.4)	57.8 (54.9-60.6)	20.2 (17.9-22.5)
Availability of supervision	8.6 (6.8-10.2)	80.8 (78.5-83.0)	10.7 (8.9-12.4)
No. and frequency of transitions/handoffs in patient care compared with last year	1.1 (0.0-1.7)	20.7 (18.3-23.0)	78.2 (75.9-80.6)
Total hours worked this year compared with last year	22.1 (20.1-24.5)	64.2 (61.4-66.9)	13.7 (11.7-15.7)
Senior residents taking on responsibilities of more junior residents	10.8 (8.2-12.6)	20.5 (18.2-22.8)	68.7 (66.0-71.3)

Abbreviation: ACGME, Accreditation Council for Graduate Medical Education.

^aThe response categories for overall feelings were disapprove, neutral, and approve.

PATIENT CARE

The majority of surgical residents (53.4%) reported that there is no improvement in safety of care, and only a small minority (8.8%) reported improvement. Furthermore, in the subset of general surgical residents, more residents indicated that patient safety is actually worse and not just unchanged (48.3% vs 43.6%; $P < .001$). Surgical residents reported that there is no change in availability of supervision (80.8%) and increased frequency of handoffs (78.2%). The magnitude of this effect is more pronounced in general surgical than in surgical subspecialty residents (89.9% vs 66.9%; $P < .001$). Compared with nonsurgical residents, considerably more surgical residents believed that safety of patient care is worse after the 2011 regulations (37.8% vs 24.9%; $P < .001$)¹⁴ (**Figure**).

RESIDENT EDUCATION

Most surgical residents indicated that education (55.1%) and preparation for senior roles (68.4%) were worse under 2011 standards. For both questions—education (58.8% vs 50.1%; $P < .001$) and preparation (75.7% vs 61.3%; $P < .001$)—general surgical residents had more negative perspectives than their subspecialty peers. Notably, interns were significantly more likely to report a positive view on education quality (14.5%) than a composite resident group in postgraduate year 2 or a higher level (6.1%). Nevertheless, the interns' perceptions of education were still generally negative (44.3%). Most respondents (68.7%) reported that senior residents have taken on more junior-level responsibilities, possibly to make up for loss of interns on service, a trend that remained stable across demographic groups. Finally, both education (55.1% vs 38.1%; $P < .001$) and preparedness for senior roles (68.4% vs 48.3%; $P < .001$) were perceived to be worse in surgical than in nonsurgical residencies.³³

Table 3. Summary of Results for Compliance, False Reporting, and 80-Hour Violations or Underreporting

Survey Statement or Question on Compliance	Respondents, %
I comply with all duty hour regulations, % compliance	
Always	32.4
Mostly (>75%)	50.3
Somewhat (approximately 50%)	10.5
Rarely (<25%)	6.4
Never	0.4
How often do you falsely report duty hours to appear in compliance with regulations?	
Never	37.9
Rarely (every few months)	27.0
Sometimes (monthly)	20.3
Often (weekly)	11.0
Always (daily)	3.8
On average, how many hours do you underreport or work >80 h each week?	
None	49.9
1-5 h	23.9
6-10 h	17.1
11-15 h	6.5
16-20 h	1.7
>20 h	1.0

QUALITY OF LIFE

The only positive change reported in the survey was improved quality of life for interns (61.9%). Interestingly, interns were significantly more likely to report a worse quality of life for themselves than were senior residents answering the same question about quality of life for interns (31.5% vs 18.2%; $P < .001$). Respondents in all groups reported worse quality of life for senior residents (54.4%), with no significant differences noted in a subset analysis.

Although the majority of surgical residents (50.7%) reported that work schedules were worse as a result of

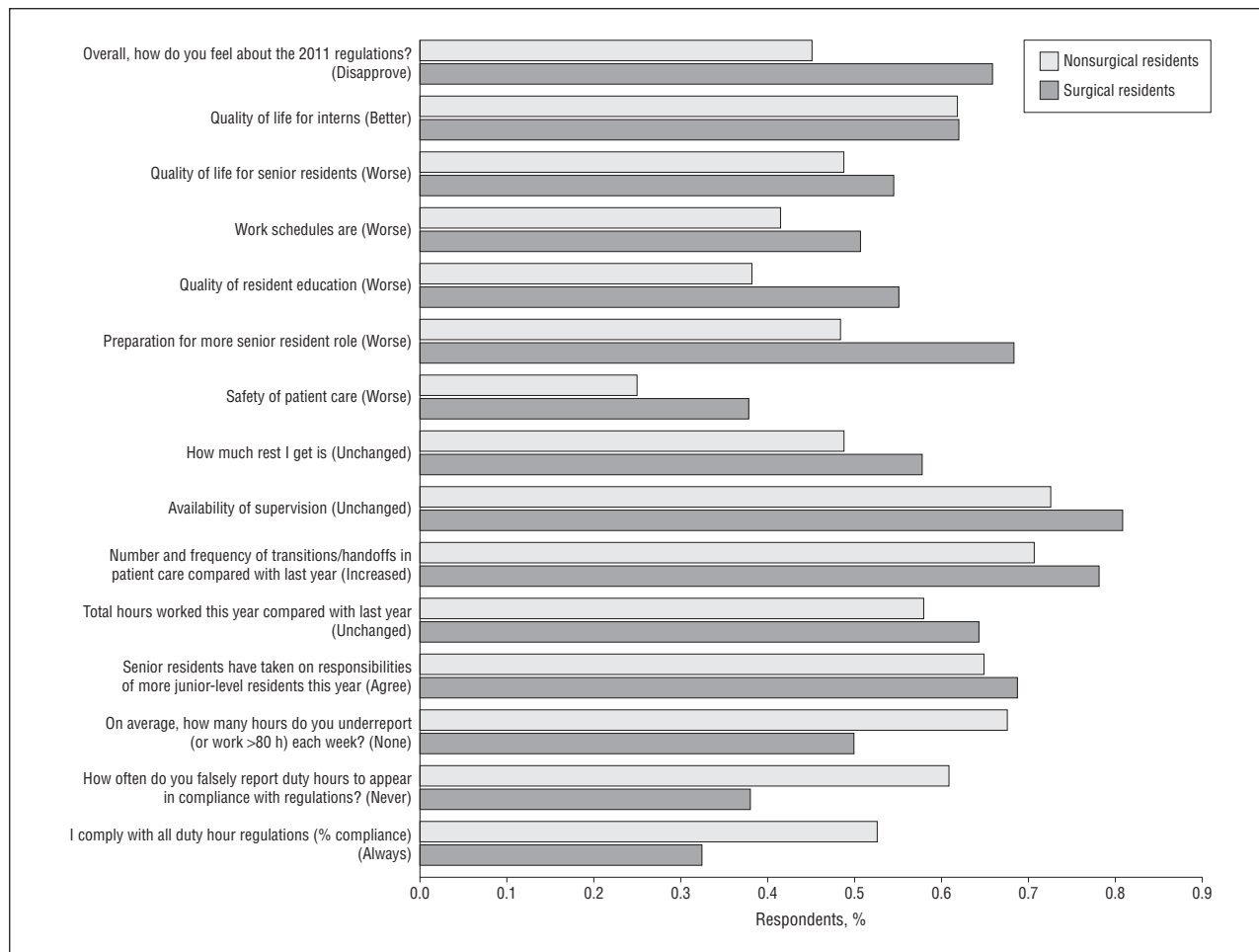


Figure. This graph of comparative responses demonstrates differences between surgical and nonsurgical residents in the study. Each question asked is followed by an answer (eg, *Disapprove*) and the percentage of the respondents providing that answer. Surgical residents generally have more negative perspectives of the 2011 Accreditation Council for Graduate Medical Education Common Program requirements and their effects on safety, education, and quality of life.

duty hour changes, interns reported a perception of better work schedules more frequently than senior residents (35.6% vs 18.7%; $P < .001$). The majority of residents (57.8%) reported that there has been no change in the amount of rest they get, but a much larger proportion of interns reported that they get more rest than senior residents did when responding to the same question (40.9% vs 14.6%; $P < .001$). Finally, residents reported that the number of hours they work is unchanged (64.2%), with no differences by surgical specialty or year of training. Compared with the aggregate data set, nonsurgical residents were more likely than surgical residents to report improved rest (30.8% vs 20.2%; $P < .001$), and surgical residents were more likely to report worse work schedules (50.7% vs 41.5%; $P < .001$).³³

COMPLIANCE

When asked about compliance with all duty hour regulations, surgical residents reported significant noncompliance (defined as any response not demonstrating 100% compliance). In fact, 67.6% reported some degree of noncompliance and half (50.1%) reported either underreporting or working at least 1 to 5 hours more than the

80-hour limit. In addition, 62.1% of residents reported some degree of duty hour falsification.

Although no significant differences were noted by postgraduate years, subspecialty surgical residents were more likely than general surgical residents to report compliance (36.9% vs 27.7%; $P < .001$). Likewise, specialty residents reported significantly fewer 80-hour week violations (56.7% vs 42.8%; $P < .001$). Of particular note, surgical residents reported much greater noncompliance (67.6% vs 47.5%; $P < .001$) and more frequent reporting falsification (62.1% vs 39.2%; $P < .001$) than their nonsurgical peers³² (Figure).

DISCUSSION

The 2003 ACGME Common Program requirements incited criticism from many surgeons and were then followed by a dearth of evidence to support the goals of regulating duty hours.³⁴ Although residents likely support some form of regulation and would not revert to 120-hour work weeks, the data in this study demonstrate that surgical residents do not support the further regulations implemented in 2011.

In theory and in practice, errors may occur from fatigue caused by extended duty periods. Landrigan et al³⁵

demonstrated an increased rate of medical errors occurring when interns worked extended (24-hour) shifts in intensive care units compared with an intervention schedule with shortened hours. However, that study failed to show any statistically significant difference in the occurrence of preventable adverse events resulting in patient harm. Thus, a key to improving patient care while maintaining resident quality of life and education may be improving patient handoffs and ensuring appropriate supervision with graduated responsibility, not merely regulating work hours.

The burden of residency lies in educating trainees to be skilled, independent physicians who are able to take care of patients while maintaining a sense of responsibility and continuity of care. Although unfortunate cases of medical errors (such as the death of Libby Zion in 1984³⁶) have been attributed to a system of graduate medical education in which residents are overworked and undersupervised, numerous studies¹⁸⁻²⁰ have failed to show that ACGME regulations have decreased errors or improved patient safety.

Adequate supervision of physician trainees is absolutely necessary. Fatigue mitigation is commendable and equally necessary. However, graduated responsibility with independence and learning to function under circumstances of prolonged, focused patient care are vital components of graduate medical education, particularly for surgeons. Before implementation of the 2011 ACGME regulations, program directors expressed mixed feelings, with a particular objection to 16-hour shifts for interns.⁸ Likewise, residents expressed concerns regarding the quality of education and patient care that would result.^{11,14} Some of these concerns seem to have been borne out from the perspective of the surgical residents responding to our postimplementation survey.

Although our study has several important limitations, particularly a low response rate, its results demonstrate an overwhelming disapproval of the changes. The quality of this survey research is not necessarily represented by response rate,³⁷ but it is demonstrated by the large sample size and demographic representation of the respondents, which improve external validity and minimize nonresponse bias.^{38,39} A second flaw of the study is its evaluation of intern responses to a system for which they have no basis for comparison. However, although interns cannot answer questions “compared with last year” through direct experience, they do have relevant experiences observing interns and residents from clinical years as medical students. This exposure, particularly as rotating subinterns, provides the background for interns to make inferences regarding these questions. When data analysis was performed after first-year residents were removed from the sample, there was a trend toward more negative responses, but mean proportions showed no statistically significant changes (eg, overall disapproval was 66.1% for residents in postgraduate year 2 or later vs 65.8% when interns were included). This analysis demonstrates that, although interns have no direct basis for comparison, their perceptions are similar to those of their more senior colleagues.

Interestingly, the only reported variable that seems to be improved is quality of life for interns. Despite this find-

ing, interns were significantly more likely to report worse quality of life for themselves (31.5%) than senior residents were to report worsened quality of life for interns (18.2%). Although this was not a majority response (57.3% of interns reported improved quality of life for interns), it is nevertheless interesting that many more interns reported a worsened experience for themselves. Under the 16-hour rule, first-year residents no longer have postcall days (the day remaining after a 24-hour shift); in many programs they are scheduled into 12-hour shifts 6 days a week with substantially increased time spent in night floating positions. These 12-hour shifts easily transmogrify into at least 13 hours with the inclusion of signing in and out each day. Understandably, there has been no change in total hours worked (6 days of 13-hour shifts results in at least 78 hours a week), as reported in the study. With the difficult scheduling of night floating positions and no postcall days, the “golden weekend” may be a vestige of the past. More time spent in night floating positions may mean less time spent in teaching rounds with an attending physician present and less interaction in team environments, thus isolating interns. Therefore, it is surprising that there is any positive report on quality of life.

For senior residents, assignment of junior-level responsibilities has become necessarily more frequent. This probably results in negative educational and quality-of-life experiences, both of which are reported in this study. Although this was not examined directly, time in the operating room for second-year residents may also have suffered as these residents cover intern call (shifts or overnight periods that were previously taken by interns), further delaying their maturation as surgeons. Unfortunately, it is difficult to quantify the educational experience of residents in the wake of these changes, and it is too soon to report case volume and patient experiences. The result of 2003 regulations showed no changes in these areas. However, it is evident that the development of residents is being delayed as interns are forbidden from 24-hour overnight call and are required to be directly supervised, even though they will be expected to perform these duties and provide supervision on July 1 of their second year.

Finally, the effects on patient care are yet to be quantified. Research on reduction of errors after 2003 has been unconvincing, and it is likewise too soon to comment on changes after a July 2011 implementation of the new changes. However, 4 of 5 residents report that there is no change in availability of supervision despite the dramatic change in supervisory rules for first-year residents. Likewise, a similar proportion of residents report that there are more frequent handoffs in patient care, which greatly diminishes continuity of care. An increase in transitions of care would seem to negatively affect safety and quality, which are necessarily dependent on continuity.

Based on these results, a new model for duty hour regulation may be better for both patients and residents. A major issue raised in this study is continuity of care, which may be diminished by regulating work hours into shifts and ultimately increasing frequency of patient handoffs. As part of training, residents must learn to deal with

and recognize fatigue in preparation for independent medical practice. Although there is public concern about tired residents making critical decisions, this is more often a problem of image than of reality, especially because the frequency of adverse patient events has never been directly linked with fatigue.

We propose a training model that emphasizes continuity through extended duty periods and greater scheduling flexibility while imposing reasonable limits on shifts (eg, 24-hour overnight call with additional hours for patient care) and total hours (eg, 80 h/wk). Junior residents should have graduated levels of responsibility with decreasing shift regulations throughout the intern year, appropriately available supervision, and—most important—mentorship, as deemed by program directors and senior residents. Finally, we would model the chief resident experience after call systems for attending surgeons, emphasizing greater home call and patient management responsibility, with the goal to prepare residents adequately for a transition to the independent practice of surgery.

In conclusion, our survey, performed after the implementation of the 2011 ACGME Common Program requirements, showed that 3 of 5 surgical residents disapprove of these regulations. Residents believe that the intended improvements in patient safety, resident quality of life, and education have not been borne out after implementation of the changes. Furthermore, a concerning majority of surgical residents report non-compliance and falsification of duty hours. It may be difficult for residents, particularly in surgical fields, to learn and care for patients under the current ACGME regulations. A new paradigm of work-hour regulations should be considered, with greater flexibility, fewer transfers of care to promote continuity, and more focus on graduated responsibility.

Accepted for Publication: November 6, 2012.

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Author Contributions: Dr Drolet had full access to all data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. *Study concept and design:* Drolet and Sangisetty. *Acquisition of data:* Drolet and Sangisetty. *Analysis and interpretation of data:* All authors. *Drafting of the manuscript:* Drolet, Sangisetty, and Tracy. *Critical revision of the manuscript for important intellectual content:* All authors. *Statistical analysis:* Drolet and Sangisetty. *Administrative, technical, and material support:* Sangisetty and Tracy. *Study supervision:* Tracy and Cioffi.

Conflict of Interest Disclosures: None reported.

Previous Presentation: This paper was presented at the 93rd Annual Meeting of the New England Surgical Society; September 22, 2012; Rockport, Maine; and is published after peer review and revision.

Additional Contributions: The authors wish to thank Staci Fischer, MD, and Derrick Christopher, MD, MBA, for their contributions in study design and execution.

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INVITED CRITIQUE

The Accreditation Council for Graduate Medical Education Duty Hour Regulations

How Do We Make the Best of an Unpopular Situation in Training the Surgeons of Tomorrow?

In 2003, the Accreditation Council for Graduate Medical Education (ACGME) established the hour limits for postgraduate residency training programs based on an 80-hour work week, 1 day off in 7, a maximum shift length of 24 hours with 6 hours of care continuity, and overnight call coverage no more frequent than every third night.^{1,2} In 2011, the ACGME further restricted duty hours, with interns limited to 16-hour duty shifts, coupled with tighter junior resident supervision rules and further reduction of duty continuity to 4 hours (after a shift length of 24 hours).²

The primary tenets for the ACGME mandate defining duty hour limitations and increased supervision rules are to improve patient safety and quality of care and promote a safe and humanistic educational environment for all residents in training.^{3,4} An undeniable motivation was avoidance of public backlash to excessive hours worked by physicians in training and the threat of federal and Occupational Safety and Health Administration intervention.¹

Unfortunately, uniform implementation of the iterative ACGME duty hour rules has left program directors and other educators without a mechanism to prospectively evaluate their effect on residency education. We are left with a “one shoe fits all” approach based on empirical data in the absence of high-level evidence, because peer-reviewed published reports have not shown consistent effects of duty hour restrictions on patient care, quality, or mortality rates.¹

There have been at least 4 published surveys of residents' perceptions and satisfaction with the educational experience under the ACGME duty hour regulations.³⁻⁶ The article by Drolet et al⁷ reports another survey evaluating residents' perception of their experience,

6 months after implementation of the recent 2011 ACGME rules. The study hypothesis is that surgical residents do not approve of regulations of duty hours. A 20-question electronic survey was administered after the July 1, 2011, implementation of the rules at 123 institutions, using the designated institutional officer to distribute the surveys.

A cohort of 1013 of 4140 eligible surgical and surgical subspecialty residents returned the survey from a total pool of 6202 surveyed residents. Not unexpectedly, surgical residents globally indicated that education (55.1%), preparation for senior roles (68.4%), and work schedules (50.7%) were worse after implementation of the 2011 regulations. Surprisingly, they reported no change in supervision (80.8%), safety and patient care (53.4%), or amount of rest (57.8%). Quality of life was perceived to be better for interns (61.9%), but most residents reported that quality of life was worse for seniors (54.4%). In subset analysis, general surgical residents expressed significantly greater disapproval than subspecialty surgical residents. (71.5% vs 60.4%). The unintended consequences were an increase in handoffs (78.2%) and a shift in responsibilities to senior residents (68.7%).

The “spoiler” is that 50.1% of surveyed surgical residents underreported duty hours, 62.1% falsely reported duty hours, and only 32.4% acknowledged complying with the ACGME duty hour rules. This is extremely troubling behavior that could inevitably lead to unwanted scrutiny and stewardship action by Occupational Safety and Health Administration and Congress. The ACGME rules are the law of the land. It is no longer about adoption but about adaptation and demonstrating resolve. Noncompliance is not an option and must not be encouraged.