Hypothesis: Surgical faculty and residents have significantly different attitudes regarding work hour restrictions.

Setting: All general surgery residencies approved by the Accreditation Council for Graduate Medical Education (ACGME).

Participants: All voluntarily participating surgical faculty and residents.

Main Outcome Measures: Current hours worked, days off per month, and attitudes and opinions regarding the current surgical-training environment.

Methods: A 17-question survey instrument was mailed to the program directors of all ACGME-approved surgical-training programs in the United States. They were requested to distribute the survey to all faculty and residents for completion and to return the forms for analysis.

Results: Responses (N=1653) were received from 46% of surgical-training programs. A significant difference was noted between faculty and resident responses in most categories. Most residents (87%) reported more than 80 duty hours per week, whereas 45% reported working more than 100 hours per week. Only 30% of residents reported an average of 1 day per week free of clinical activities. Although a minority of residents (43%) felt that their workload was excessive, 57% felt that their cognitive abilities had been impaired by fatigue. A significant number of residents (64%) and faculty (39%) believe that duty hour restrictions should be adopted. A minority of residents (20%) and faculty (47%) believe that the duration of residency training should be increased to compensate for duty hour restrictions. One quarter of residents regret choosing a career in surgery.

Conclusions: Current duty hours for most surgical residents exceed the proposed ACGME limits. Although most residents support duty hour limits; surgical faculty are less supportive. Significant alterations in the current design and structure of surgical-training programs will be required to meet the ACGME guidelines.

Arch Surg. 2003;138:663-671

William Halsted established the modern American surgical residency in the early 20th century. Surgical training was highly regimented, and residents were expected to work extensive hours for minimal financial compensation. Residents in early training programs were strongly encouraged to forgo marriage until the completion of their training. Many residents were required to live in the hospital. Since the time of Halsted, lifestyle restrictions have lessened, but work hours remain longer than for most other professions, with surgical residents enduring the most demanding schedules.

Recently, the topic of resident work hours has garnered mainstream political and popular attention. This concern began in 1984 with the Libby Zion case in New York, NY. A young woman was treated in an emergency department and ultimately died in the care of junior residents in their 18th consecutive hour of work. Subsequently, a grand jury recommended that the New York Department of Health limit the number of consecutive hours residents could be permitted to work. The publicity of this case resulted in the adoption of the Bell Commission’s recommendations by New York State. This landmark case was the first official restriction of resident work hours.

Relatively little change occurred until the past few years as a groundswell of public concern for patient safety culminated in systematic efforts to reform graduate medical education. The 1999 Institute of Medicine report publicizing medical errors supported the belief that resident fatigue contributes to these errors. Re-
The mean ages of faculty and residents were 46.1 years and 30.7 years, respectively. As shown in Figure 1, there was an equal distribution of male and female respondents. Between faculty and residents, there were significantly more men in the various postgraduate years for both residents and faculty. However, there were significantly more female residents than female faculty (Table 1).

A total of 1653 surveys were received from 46% of general surgery residency programs. Of the respondents, 79.6% were residents, 17.6% were faculty, and 2.8% were program directors; 78% of respondents were men, whereas 22% were women. Data pertaining to faculty and resident demographics are detailed in Table 1 and Figure 1. The mean ages of faculty and residents were 46.1 years and 30.7 years, respectively. As shown in Figure 1, there was an equal distribution of male and female respondents in the various postgraduate years for both residents and faculty. However, there were significantly more female residents than female faculty (Table 1).

These changes will affect all disciplines of medicine to some degree, but few more than surgery programs. As outlined, these guidelines will be as profound as any previous change in graduate medical education. Although minor adjustments to the Halstedian method of educating surgery residents have been implemented incrementally with time, surgeons are steeped in tradition; these changes mark a fundamental shift in the paradigm of time-honored surgical education.

It is clear that physicians have strong opinions on this matter, evidenced by the numerous articles that have been published in the medical and surgical literature each month since the ACGME proposal was released. These reports are subject to the limitations of anecdotal experience rather than benefiting from systematic review. To provide a stronger foundation for discussion on this topic, we designed a study with the following goals: (1) to evaluate the number of hours worked by surgical residents as well as the number of days free of clinical duties each week; (2) to evaluate the attitudes of residents and faculty on the topic of work hour restrictions; (3) to evaluate the necessity of work hour restrictions; and (4) to evaluate differences of opinion between faculty and residents, between faculty and program directors, between sexes, and among residents.

### METHODS

A 17-question survey instrument was mailed to the program directors of all ACGME-approved surgical-training programs in the United States. Program directors were requested to distribute the surveys to all faculty and residents for completion. A stamped, preaddressed envelope was provided for their return. Data collected from the survey instrument included demographic variables regarding the survey participant as well as the length of time in practice for faculty and year of residency for surgical residents. The survey asked individuals to indicate hours worked per week and days free of clinical responsibilities per month. Additionally, the instrument contained questions designed to determine the opinions of residents and faculty regarding effect of workload on performance, personal life, and satisfaction with career choice as well as opinions on work hour limitations and their effect on the adequacy of training. This study was approved for implementation by the Human Subjects Committee 2 of the University of Kansas School of Medicine–Wichita. Confidentiality of the individual respondents and programs was maintained. Analysis of qualitative and quantitative survey data was performed using $\chi^2$ analysis and 1-way analysis of variance, respectively.

### RESULTS

Table 1. Comparison of Age, Sex Distribution, Hours Worked per Week, and Days Free per Month Between Surgery Faculty and General Surgical Residents

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Faculty</th>
<th>Residents</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of respondents</td>
<td>337 (20.4)</td>
<td>1315 (79.6)</td>
<td></td>
</tr>
<tr>
<td>Age, mean ± SD, y</td>
<td>46.1 ± 9.4</td>
<td>30.7 ± 3.6</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Sex, M/F</td>
<td>276 (81.9%)</td>
<td>1011 (76.9%)</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>61 (18.1%)</td>
<td>303 (23.1%)</td>
<td></td>
</tr>
<tr>
<td>Hours worked per week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;60</td>
<td>74 (22.4%)</td>
<td>19 (1.5%)</td>
<td></td>
</tr>
<tr>
<td>60-80</td>
<td>179 (54.1%)</td>
<td>144 (11.1%)</td>
<td></td>
</tr>
<tr>
<td>80-100</td>
<td>66 (19.9%)</td>
<td>557 (42.8%)</td>
<td>.001</td>
</tr>
<tr>
<td>100-120</td>
<td>10 (3.0%)</td>
<td>470 (36.1%)</td>
<td></td>
</tr>
<tr>
<td>&gt;120</td>
<td>2 (0.6%)</td>
<td>111 (8.5%)</td>
<td></td>
</tr>
<tr>
<td>Days free per month</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>14 (4.3%)</td>
<td>51 (3.9%)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>25 (7.7%)</td>
<td>182 (14.0%)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>26 (8.0%)</td>
<td>408 (31.3%)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>33 (10.2%)</td>
<td>275 (21.1%)</td>
<td>.001</td>
</tr>
<tr>
<td>4</td>
<td>100 (30.9%)</td>
<td>324 (24.9%)</td>
<td></td>
</tr>
<tr>
<td>≥5</td>
<td>126 (38.9%)</td>
<td>63 (4.8%)</td>
<td></td>
</tr>
</tbody>
</table>

*Data are presented as number (percentage) unless otherwise indicated.

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Resident and faculty work hours and days free of clinical duties are depicted in Figure 2, Figure 3, and Table 1. More than 87% of residents reported working at least 80 hours per week, and 45% of residents reported working 100 hours per week. Residents were more likely than faculty to work more than 80 hours per week (87.4% vs 23.5%; P<.001). In addition, faculty were more likely than residents to have at least 4 days per month free of clinical duties (69.8% vs 29.7%; P<.001).

Responses of faculty and residents to the survey questions are listed in Table 2. Nearly 43% of residents believed that their work hours were excessive, and 25% of residents felt that their workload was more than they had expected. More than half of residents reported cognitive impairment as a result of fatigue. More than 20% of residents regretted pursuing medicine, and 23.3% of residents regretted entering a surgical residency. Nearly two thirds of residents favored restricting resident work hours, and 80% of residents felt that surgical residencies should not be lengthened if work hour restrictions are mandated.

Responses by faculty and residents to 8 of 10 survey questions were significantly different (P<.05) (Table 2). Regret about entering medicine and correctly anticipating the extent of work hours were the only items to which faculty and residents gave similar answers. Thirty-nine percent of faculty vs 63.7% of residents favored work hour restrictions (P<.001). Residents were more likely than faculty to report fatigue-induced cognitive impairment (56.5% vs 19.6%; P<.001) and to report their personal life being adversely affected by excessive work hours (41.1% vs 26.0%; P<.001). Although comparison was made between faculty and program directors, no question achieved statistical significance other than that regarding work hour limitations. Sixty-three percent of faculty felt that work hours should not be limited compared with 47% of program directors (P=.03).

Comparisons of demographics and survey responses according to sex are listed in Table 3 and Table 4. Age, postgraduate year, and hours worked per week were not significantly different between the sexes. Women reported having more days off per month, with 68.9% of women vs 29.7% of men reporting at least 4 days per month free of clinical duties (P<.001). Responses to 6 of 10 questions were significantly different when comparing female with male residents (Table 4). Seventy percent of women vs 61.8% of men favored restricting resident work hours (P=.01). Women were also more likely to report fatigue-induced cognitive impairment, an excessive workload, and having their personal life adversely affected by excessive work hours (P<.05) (Table 4).

Most residents responding to the survey were postgraduate year 1 (PGY-1), as demonstrated in Figure 4. A comparison of demographics and work hours according to postgraduate year status is provided in Table 5. Residents worked fewer hours per week as they accrued seniority. Seventy-eight percent of chief residents (PGY-5) vs 91.3% of interns (PGY-1) worked at least 80 hours per week (P<.001). Residents reported having the same number of days per month free of clinical duties regardless of postgraduate year.

A comparison of responses to survey questions according to postgraduate year is listed in Table 6. Residents of different postgraduate years gave significantly different responses to 8 of 10 survey questions (P<.05) (Table 6). Residents were less likely to favor work hour restrictions as they accrued seniority. Fifty-three percent of chief residents vs 72% of interns favored restrictions on resident work hours. Chief residents were less likely than interns to report feeling impaired as a result of fatigue. They were also less likely to describe their work hours as excessive or to indicate that their personal life had been adversely affected by excessive work hours.

**COMMENT**

Medical education has been remarkably resistant to change since the establishment of the formal surgical residency by Halsted in the early 20th century.1 The acceptance of women as physicians and the increased subspecialization of all fields mark major paradigm shifts from the past. The ACGME regulations regarding resident work hours will require such an extensive revision of residency structures that they represent nothing less than a revolution in medical education. Since the public disclosure of the ACGME proposal, the surgical literature has been inundated with editorials written by surgical faculty and program directors. The mixed views expressed by these individuals highlight the divisiveness of this issue, and the lack of national and systematic data on the topic has limited the focus of these articles to anecdotal experiences.
Table 2. Comparison of Responses of Surgical Faculty and General Surgical Residents to Questions Pertaining to Work Hours and Effect of Work Hours on Training*

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Faculty</th>
<th>Residents</th>
<th>(P) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No</strong></td>
<td><strong>Yes</strong></td>
<td><strong>No</strong></td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td>Workload excessive?</td>
<td>260 (78.3)</td>
<td>72 (21.7)</td>
<td>747 (57.2)</td>
</tr>
<tr>
<td>Workload more than thought?</td>
<td>233 (70.2)</td>
<td>99 (29.8)</td>
<td>967 (75.2)</td>
</tr>
<tr>
<td>Performance impaired?</td>
<td>267 (80.4)</td>
<td>65 (19.6)</td>
<td>569 (43.5)</td>
</tr>
<tr>
<td>Personal life adversely affected?</td>
<td>245 (74.0)</td>
<td>86 (26.0)</td>
<td>766 (58.9)</td>
</tr>
<tr>
<td>Would you choose medicine again?</td>
<td>56 (17.1)</td>
<td>271 (82.9)</td>
<td>264 (20.5)</td>
</tr>
<tr>
<td>Would you choose surgery again?</td>
<td>58 (17.9)</td>
<td>266 (82.1)</td>
<td>303 (23.8)</td>
</tr>
<tr>
<td>Should work hours be limited?</td>
<td>202 (61.0)</td>
<td>129 (39.0)</td>
<td>468 (36.3)</td>
</tr>
<tr>
<td>Would limiting hours adversely affect quality of training?</td>
<td>174 (52.9)</td>
<td>155 (47.1)</td>
<td>1028 (80.0)</td>
</tr>
<tr>
<td>Should attending hours be limited?</td>
<td>241 (71.8)</td>
<td>90 (27.2)</td>
<td>856 (66.9)</td>
</tr>
</tbody>
</table>

*Data are presented as number (percentage).

Table 3. Comparison of Age, PGY Level, Hours Worked per Week, and Days Free per Month Between Female and Male General Surgical Residents*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Women</th>
<th>Men</th>
<th>(P) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of respondents</td>
<td>303 (23.1)</td>
<td>1011 (76.9)</td>
<td></td>
</tr>
<tr>
<td>Age, mean ± SD, y</td>
<td>30.7 ± 3.6†</td>
<td>30.7 ± 3.6‡</td>
<td>.83</td>
</tr>
<tr>
<td>PGY level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>79 (26.9)</td>
<td>328 (33.3)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>65 (22.1)</td>
<td>184 (18.7)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>52 (17.7)</td>
<td>155 (15.8)</td>
<td>.32</td>
</tr>
<tr>
<td>4</td>
<td>51 (17.4)</td>
<td>133 (13.5)</td>
<td></td>
</tr>
<tr>
<td>&gt;5</td>
<td>47 (16.0)</td>
<td>184 (18.7)</td>
<td></td>
</tr>
<tr>
<td>Hours worked per week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;60</td>
<td>2 (0.7)</td>
<td>17 (1.7)</td>
<td>.46</td>
</tr>
<tr>
<td>60-80</td>
<td>30 (9.9)</td>
<td>114 (11.4)</td>
<td></td>
</tr>
<tr>
<td>80-100</td>
<td>128 (42.4)</td>
<td>428 (42.9)</td>
<td></td>
</tr>
<tr>
<td>100-120</td>
<td>111 (36.8)</td>
<td>359 (36.0)</td>
<td></td>
</tr>
<tr>
<td>&gt;120</td>
<td>31 (10.3)</td>
<td>80 (8.0)</td>
<td></td>
</tr>
<tr>
<td>Days free per month</td>
<td></td>
<td></td>
<td>.001</td>
</tr>
<tr>
<td>0</td>
<td>14 (4.3)</td>
<td>51 (3.9)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>25 (7.7)</td>
<td>182 (14.0)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>26 (8.0)</td>
<td>408 (31.3)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>33 (10.2)</td>
<td>275 (21.1)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>100 (30.9)</td>
<td>324 (24.9)</td>
<td></td>
</tr>
<tr>
<td>&gt;5</td>
<td>126 (38.9)</td>
<td>63 (4.8)</td>
<td></td>
</tr>
</tbody>
</table>

*Data are presented as number (percentage) unless otherwise indicated.
†n = 301.
‡n = 1009.

Our study provides data that should shift the discussion of resident work hours from anecdotal reports to an evidence-based assessment.

There is a widely held assumption that surgical residents work longer hours than residents in other fields. Previous reports have suggested that at least 25% of residents work more than 80 h/wk, but these estimates do not apply specifically to surgical residents. Our data show that 87% of surgical residents work more than the 80-h/wk maximum proposed by the ACGME. This suggests that the vast majority of surgical residences involved in our survey must make significant work hour changes to comply with the new regulations.

There was a striking difference of opinion between residents and faculty regarding the topic of work hour restrictions, which supports the widely held belief that residents and faculty have different priorities and attitudes on this topic. Residents as a whole disagreed with faculty on all of the key issues surrounding resident work hours. Specifically, residents were more likely than faculty to favor work hour restrictions (64% vs 39%), and faculty were more than twice as likely to favor lengthening residency training in response to decreased work hours (47% vs 20%). This may be partly due to the belief among faculty that decreasing work hours would be detrimental to resident education. Other influences, such as faculty concern that their responsibilities could increase with restricted resident work hours, were not addressed by our study. These contrasting views highlight profound priority and attitude differences between surgical faculty and residents. Our data suggest the possibility of a generation gap, which has been proposed previously. This gap is most clearly seen among medical students, who have increasingly pursued nonsurgical residencies for the past 6 years. Our data suggest that this clash in viewpoints extends to those who have already chosen to enter surgical-training programs. These differing priorities are likely to create significant tension between residents and faculty as programs alter their work schedules to comply with the ACGME proposal.

The disagreement between residents and faculty about work hours is paralleled in our survey by similar differences of opinion between program directors and faculty. Several program directors have publicly supported work hour restrictions. Among respondents to our survey, program directors were 45% more likely than faculty to support work hour restrictions (33% vs 37%; \(P = .03\)). Program directors must balance the interests of residents and faculty; they will clearly be influenced by the opposing opinions of the 2 groups. The discrepancy in attitude between program directors and faculty is likely to be a strong point of contention as the ACGME proposal is publicly debated.

Despite the obvious difference of opinion between residents and faculty, residents were not uniform in their attitudes toward work hour restrictions. Residents were incrementally less supportive of work hour restrictions as
seniority increased. Chief residents (PGY-5) were least likely and interns (PGY-1) most likely to favor restrictions. Our study was not designed to explain these differences, but possible explanations exist. Chief residents have more experience than interns, so the wisdom obtained during the course of residency training may change their attitudes. It is also possible that because chief residents are near the completion of residency training, they have little to gain and much to lose by work hour restrictions (ie, the loss of “slave labor,” as termed by Organ14). Chief residents also work fewer hours and typically have more desirable hospital duties than interns, so their perspective may have changed as a result of their elevation in status. Nonetheless, chief residents still favor work hour restrictions more than faculty. This difference is just less than that reported by residents as a whole.

Many practicing surgeons have questioned the need for work hour restrictions. The primary impetus for work hour limitations has presumably been to improve patient safety and secondarily to improve resident lifestyles and education. A sizeable minority of residents felt that their workload was excessive (42%) and that their personal lives had been adversely affected by excessive work hours (41%). Nearly one quarter of residents would not choose surgery again. This is a sobering figure and is highly suggestive that residents are not choosing surgery again is of grave concern. This is likely multifactorial, and faculty have different reasons than residents. Faculty may have grown weary of managed care, over-regulation, and shrinking incomes, whereas residents are often shielded from such influences, with work hours the focus of their discontent. These factors translate into personal strife, diminished job satisfaction, compromised cognitive performance, and thus the 24% response rate among residents that they regret pursuing a surgery career. This is a strong indicator that timely reform in surgical education is crucial to the future of surgery.

The field of medicine has become increasingly diverse during the past 3 decades. Whereas graduating classes of previous generations were predominantly men, nearly 50% of medical students are now women. Among our respondents, women were more likely than men to favor work hour restrictions and to report excessive work hours. They were also more likely to report having their personal life affected by excessive work hours. Female residents gave these responses even though they described personal life affected by excessive work hours. Female residents that reported by residents as a whole.

Several limitations of our study deserve mention. Although we attempted to protect the anonymity of respondents by not requiring names on the data sheets, total confidentiality could not be guaranteed. The age, sex,

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Women</th>
<th>Men</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workload excessive?</td>
<td>155 (51.7)</td>
<td>592 (58.9)</td>
<td>.03</td>
</tr>
<tr>
<td>Workload more than thought?</td>
<td>215 (71.2)</td>
<td>771 (76.4)</td>
<td>.06</td>
</tr>
<tr>
<td>Performance impaired?</td>
<td>100 (33.1)</td>
<td>469 (46.7)</td>
<td>.001</td>
</tr>
<tr>
<td>Personal life adversely affected?</td>
<td>144 (48.0)</td>
<td>622 (62.3)</td>
<td>.001</td>
</tr>
<tr>
<td>Would you choose medicine again?</td>
<td>84 (27.5)</td>
<td>183 (18.5)</td>
<td>.001</td>
</tr>
<tr>
<td>Would you choose surgery again?</td>
<td>67 (23.0)</td>
<td>236 (24.1)</td>
<td>.71</td>
</tr>
<tr>
<td>Should work hours be limited?</td>
<td>88 (30.0)</td>
<td>380 (38.2)</td>
<td>.01</td>
</tr>
<tr>
<td>Would limiting hours adversely affect quality of training?</td>
<td>170 (57.6)</td>
<td>565 (56.6)</td>
<td>.76</td>
</tr>
<tr>
<td>If hours were limited, should residency length be increased?</td>
<td>237 (80.9)</td>
<td>790 (79.6)</td>
<td>.64</td>
</tr>
<tr>
<td>Should attending hours be limited?</td>
<td>171 (59.4)</td>
<td>684 (69.1)</td>
<td>.002</td>
</tr>
</tbody>
</table>

*Data are presented as number (percentage).
and postgraduate year of residents are nearly as identifying as a name in many programs. Nonetheless, this bias would likely underestimate residents’ preference for work hour limitations; residents would be less likely to report favoring such changes if they feared retribution from their program director or faculty. Although we received responses from many programs, half of surgical residencies did not return the surveys.

Survey research inevitably faces responder bias; a complete response rate is nearly impossible to achieve. Historically, survey studies have had response rates between 25% and 40%, so this study’s rate was much higher than average. Nonetheless, the 54% of surgery programs that did not return surveys potentially confound our data. It is possible that those programs would represent opposing views to the ones that returned surveys. As in previously published survey studies, responder bias is an inherent issue and should be factored in by the individual reading the article.

We relied on residents’ reports of work hours rather than prospectively collecting work hour data. It is possible that residents misreported their work hours. A final critique is that our data state the obvious and do not deliver any new information. Numerous editorials and symposiums on the topic of resident work hours have been published in recent months, yet little credible data exist on this topic. Although our results and conclusions were expected, our data provide a necessary evidence-based foundation for further debate on this topic.

Many different options have been proposed to limit resident work hours. Chief residents reported working fewer hours and having more days off than interns, and the mandatory reduction in work hours may result in a shifting of responsibilities to residents who work fewer hours as part of a seniority privilege. This would likely be met with ire by chief residents and would be possible in only a few programs because 79% of chief residents currently work more than 80 h/wk. In previous decades, residents were assigned to nonphysician tasks such as patient transport and phlebotomy. Although these duties have largely been shifted to ancillary staff, some programs still rely on residents to perform them.16 These programs will likely be forced to hire

Table 5. Comparison of Age, Sex Distribution, Hours Worked per Week, and Days Free per Month Between PGY Levels of General Surgery Residents*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>PGY-1</th>
<th>PGY-2</th>
<th>PGY-3</th>
<th>PGY-4</th>
<th>PGY-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of respondents</td>
<td>407 (31.8)</td>
<td>250 (19.6)</td>
<td>207 (16.2)</td>
<td>184 (14.4)</td>
<td>231 (18.1)</td>
</tr>
<tr>
<td>Age, mean ± SD, y</td>
<td>29.5 ± 3.9</td>
<td>29.7 ± 3.0</td>
<td>30.7 ± 2.7</td>
<td>32.0 ± 3.4</td>
<td>32.7 ± 2.7</td>
</tr>
<tr>
<td>Sex, M</td>
<td>328 (80.6)</td>
<td>184 (73.9)</td>
<td>155 (74.9)</td>
<td>133 (72.3)</td>
<td>184 (79.7)</td>
</tr>
<tr>
<td>Hours worked per week</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;60</td>
<td>4 (1.0)</td>
<td>2 (0.8)</td>
<td>5 (2.4)</td>
<td>2 (1.0)</td>
<td>6 (2.6)</td>
</tr>
<tr>
<td>60-80</td>
<td>31 (7.7)</td>
<td>20 (8.1)</td>
<td>22 (10.7)</td>
<td>23 (12.6)</td>
<td>44 (19.1)</td>
</tr>
<tr>
<td>80-100</td>
<td>156 (38.9)</td>
<td>104 (41.9)</td>
<td>90 (40.8)</td>
<td>90 (49.5)</td>
<td>111 (48.3)</td>
</tr>
<tr>
<td>100-120</td>
<td>167 (41.7)</td>
<td>100 (40.3)</td>
<td>79 (38.4)</td>
<td>58 (31.9)</td>
<td>56 (24.4)</td>
</tr>
<tr>
<td>&gt;120</td>
<td>43 (10.7)</td>
<td>22 (8.9)</td>
<td>20 (9.7)</td>
<td>9 (5.0)</td>
<td>13 (5.7)</td>
</tr>
<tr>
<td>Days free per month</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>13 (3.3)</td>
<td>10 (4.0)</td>
<td>11 (5.3)</td>
<td>5 (2.8)</td>
<td>11 (4.8)</td>
</tr>
<tr>
<td>1</td>
<td>55 (13.8)</td>
<td>29 (11.6)</td>
<td>25 (12.1)</td>
<td>25 (13.8)</td>
<td>44 (19.1)</td>
</tr>
<tr>
<td>2</td>
<td>128 (32.0)</td>
<td>86 (34.4)</td>
<td>54 (26.2)</td>
<td>64 (35.4)</td>
<td>68 (29.4)</td>
</tr>
<tr>
<td>3</td>
<td>101 (25.3)</td>
<td>51 (20.4)</td>
<td>49 (23.8)</td>
<td>31 (17.1)</td>
<td>32 (13.9)</td>
</tr>
<tr>
<td>4</td>
<td>86 (21.5)</td>
<td>65 (26.9)</td>
<td>56 (26.7)</td>
<td>44 (24.3)</td>
<td>63 (27.3)</td>
</tr>
<tr>
<td>≥5</td>
<td>17 (4.3)</td>
<td>9 (3.6)</td>
<td>12 (6.8)</td>
<td>12 (6.6)</td>
<td>13 (5.6)</td>
</tr>
</tbody>
</table>

Abbreviation: PGY, postgraduate year.
*Data are presented as number (percentage) unless otherwise indicated.

Table 6. Comparison of Responses of General Surgery Residents by PGY Level to Questions Pertaining to Work Hours and Their Effect on Training*

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>PGY-1</th>
<th>PGY-2</th>
<th>PGY-3</th>
<th>PGY-4</th>
<th>PGY-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workload excessive? (yes)</td>
<td>204 (50.6)</td>
<td>115 (46.4)</td>
<td>90 (43.7)</td>
<td>66 (36.1)</td>
<td>74 (32.2)</td>
</tr>
<tr>
<td>Workload more than thought? (yes)</td>
<td>119 (29.4)</td>
<td>62 (24.8)</td>
<td>52 (25.1)</td>
<td>45 (24.6)</td>
<td>38 (16.5)</td>
</tr>
<tr>
<td>Performance impaired? (yes)</td>
<td>267 (66.4)</td>
<td>147 (59.0)</td>
<td>115 (55.8)</td>
<td>88 (47.8)</td>
<td>103 (44.8)</td>
</tr>
<tr>
<td>Personal life adversely affected? (yes)</td>
<td>166 (41.3)</td>
<td>110 (44.4)</td>
<td>90 (44.1)</td>
<td>68 (37.4)</td>
<td>83 (36.2)</td>
</tr>
<tr>
<td>Would you choose medicine again? (no)</td>
<td>68 (16.5)</td>
<td>53 (21.5)</td>
<td>57 (28.1)</td>
<td>32 (17.9)</td>
<td>49 (21.8)</td>
</tr>
<tr>
<td>Would you choose surgery again? (no)</td>
<td>126 (32.6)</td>
<td>41 (16.7)</td>
<td>51 (25.3)</td>
<td>28 (15.6)</td>
<td>51 (22.8)</td>
</tr>
<tr>
<td>Should work hours be limited? (yes)</td>
<td>230 (72.0)</td>
<td>165 (68.9)</td>
<td>124 (61.7)</td>
<td>99 (54.7)</td>
<td>121 (53.1)</td>
</tr>
<tr>
<td>Would limiting hours adversely affect quality of training? (yes)</td>
<td>122 (30.3)</td>
<td>97 (39.6)</td>
<td>94 (46.1)</td>
<td>85 (47.2)</td>
<td>142 (62.3)</td>
</tr>
<tr>
<td>If hours were limited, should residency length be increased? (yes)</td>
<td>57 (14.2)</td>
<td>43 (17.5)</td>
<td>44 (21.6)</td>
<td>40 (22.4)</td>
<td>7 (21.2)</td>
</tr>
<tr>
<td>Should attending hours be limited? (yes)</td>
<td>159 (40.3)</td>
<td>91 (37.3)</td>
<td>57 (28.8)</td>
<td>49 (27.1)</td>
<td>58 (25.6)</td>
</tr>
</tbody>
</table>

Abbreviation: PGY, postgraduate year.
*Data are presented as number (percentage).
more ancillary staff to complete these tasks. Residents may be unable to cover all operative cases, especially cases that are overrepresented in their program.

Another significant impediment to effective change is resistance of faculty “in the trenches.” Whereas program directors are more supportive of changes, faculty are particularly resistant to change, and their participation is crucial to ensuring a successful transition. Other areas that will require special consideration include in-house call coverage, operating room environment, resident clinics, trauma services, early-morning rounds, protected time for conferences, and establishing a core curriculum. Finally, the following point is often mentioned but bears repeating: surgeons and patients must be encouraged to involve themselves in the political process as it happens. Moreover, they must do so proactively rather than by reacting to decisions already made with which they disagree. The surgical literature contains myriad problems with and solutions to the ACGME proposal. This article does not purport to endorse any position but rather provides a basis for analyzing the situation and choosing appropriate solutions.

The response of all interested parties to the issues at hand will define surgical education for generations to come. Therefore, it is critical that responses be thorough and based on reliable information rather than presumptions. These data provide information on which to base further discussion and decisions regarding work hour limitations.

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REFERENCES


DISCUSSION

David R. Farley, MD, Rochester, Minn: My congratulations to Dr Niederee and his coauthors for a very succinct presentation. While this is not the best science of this meeting, in my mind this work is the most important of the 28 papers presented here in Vancouver. The authors compiled some 1600 responses regarding duty hour regulations collected from nearly half of the 259 general surgery–training programs across the United States. These data represent less than 20% of the current 7000 American general surgery residents and an even lesser percentage of surgical staff and program directors. While one must be extremely careful to attribute these opinions to the greater group, I personally do agree with the authors’ conclusions and the state of affairs in surgery training today, which I summarize as follows:

1. Most general surgery residents currently work more than 80 hours per week.
2. Less than half of all residents get 1 day off the pager per week.
3. Most residents feel their current workload is acceptable.
4. Most residents do prefer duty hour restrictions; most surgical faculty do not.

As a program director for the past 6 years and having lured 10 categorical and 13 preliminary residents each year into surgery, I am incredibly biased and opinionated on this subject. While not prone to emotional outbursts or having political aspirations of any kind, I apologize that my discussion of this paper gets personal. I would like to go on record in front of this distinguished group of surgical leaders to state the following:

1. Libby Zion’s death was tragic. It seems to have occurred secondary to poor decision making and poor supervision. Fatigue was not a crucial factor in her demise.
2. Generating training and duty hour regulations from our own governing body before the government or public does so is prudent and laudable.
3. The current ACGME mandates will, without any doubt:
   • Entice more medical students to become surgeons. In fact, the quantity of applicants is up more than 200 medical students this year over last year already.
   • Lessen work hours for trainees on busy services and foster a better work-life balance for surgical trainees.
4. The current ACGME mandantes unfortunately will also:
   • Have a negative effect on the training of future general surgeons: less hours, less experience, less operations, less decision making.
   • Decrease the supervision of trainees.
   • Create an environment of less ownership and responsibility for the care of each individual patient.
   • Force evil-minded and penny-pinching program directors like myself to actually increase the work hours for trainees on less busy services as they cover call slots for trainees on busier services.
   • Decrease the quality of care patients currently receive.
   • Change the fabric of surgery and expectations of surgeons in this country.
5. Our program and 7800 other fellowships and programs throughout the country should attempt and will try to comply with these duty hour regulations, but I for one do so with great reservation and caution.

The residents we train are worried about less operations, less experience, and less education in a field where knowledge grows exponentially. Preparing young surgeons for a lifetime of commitment to their patients and their specialty is not an easy process. I personally feel it is similar to preparing young marines for combat. We shouldn’t offer up a training regimen that is easier than their final task. Soldiers do practice in foxholes, and they do go without sleep. So do surgical trainees. Many have commented on the similarity of surgical training to aviation training. While I like the thought of my pilot being rested and refreshed prior to takeoff, flying airplanes is easy compared with the art of surgery. Thousands of surgeons fly airplanes in their spare time. I don’t know of a single pilot who does surgery on the side.

Give me the dedicated surgery resident who reevaluates the elderly man with a subdural hematoma. Only he or she knows if the right-hand grip is stronger or weaker. You can’t pass along that information on a crib sheet to some poor soul covering 6 other services that night. Evolving peritoneal signs in an 8-year-old boy happen on the job, not between on-call, “wanna-be physicians.” Walking out of an operation because your 80 hours are up seems preposterous. Make no mistake, I am all for making life better for trainees. However, I am not for lowering the quality of care of patients. These regulations, well meaning as they are, will do just that.

My question to the authors is simplistic: Short of increasing remuneration and Medicare payments, or all surgeons taking pay cuts to pay for additional care providers, or simply taking all of the extra call on ourselves, do you in Wichita have any novel thoughts about how to adhere to the regulations yet not allow the training of our future surgeons to suffer or the quality of patient care to steadily decline?

Claude H. Organ, Jr, MD, Oakland, Calif: The panel discussion and dialogue that we are having now are very necessary. The answer to this has to be professional. It can’t be legal or legislative. We must show our interest, dedication, and commitment to something more than the green screen and our wallet. We need to develop the best models of young surgeons that we should be. Delegating the services to the faculty is not going to be the answer because you are going to hear a hue and cry from them right away.

My final thought: I think there are going to be rebound phenomena here in which a lot of very good students will continue to apply, and those who never had a real commitment are not going to be applying and taking up our time. I sense that already this year. The pool of candidates we are seeing is superior. I am pleased to see so many people interested in this problem. We should solve this problem before the solution is put on us by someone else.

Stephen G. Jolley, MD, Anchorage, Alaska: I have a question regarding the data presented. An average age of 31 years for the resident pool seems pretty high if most of the respondents were first-year residents. If that is true, did the authors look at the responses with respect to the ages of the residents?

Gary L. Dunnington, MD, Springfield, Ill: I would like to thank the authors for bringing to our attention something that we have known for many years but have done so little about. It reminds me of the observation made by health improvement organizations that there is typically a 10-year gap between confirmation of new scientific knowledge and incorporation of that knowledge into clinical practice. The message has been clear for at least the last 3 years that general surgery programs have been the most frequent offenders of work hour guidelines and more important, that the percentage of programs cited in this area has remained unchanged.

Some have expressed concern as to the possible fallout in quality patient care as ultimate proof that we are on the wrong track with work hour guidelines. David Leach, executive director of the ACGME, has suggested that we can probably anticipate some patient care problems with these work hour changes. It is not because reform is not the right thing to do, but instead because the system was designed with the resident filling all the cracks in a broken system. With limited resident work hours, they will be less available to back up system problems, and this may result in patient care difficulties. The fault, however, is not with the reform but with the system.

There is a piece of data here that I think is very important for everyone to note. Fifty-three percent of program directors in this country, despite everything we have seen for the last number of years, still believe the new ACGME guidelines are not appropriate for surgical-training programs. I believe this stance potentially bodes poorly for these residency-training programs, since medical students are listening and requesting information on how program directors will be dealing with this issue. A number of medical students will be pursuing surgical training who may not have considered it a few years ago specifically because of work hour reform. Program directors who resist changes fail to recognize this as a societal issue and, I believe, put their programs at risk in the recruitment of high-quality future surgical house staff. On the other hand, I am encouraged by program directors who recognize that this work hour reform offers great opportunity for restructuring of surgical training to enhance both the quality of the educational experience and the quality of resident life during surgical training.

Rawson James Valentine, MD, Dallas, Tex: There is 1 remaining problem that we seem to have forgotten about and that is attrition of residents who are already in the surgery programs. This trend seems to be increasing also, but attrition has not improved with the work hour restrictions. I found 1 piece of data in this presentation very disturbing, that 23% of the respondents regret having gone into surgery. Were most of the respondents who answered in the affirmative in their junior year, or was this a trend spread across all 5 years of training?

Donald E. Fry, MD, Albuquerque, NM: This is certainly a provocative presentation, and I would rise to say that we as a program in New Mexico have already gone to the 80-hour week beginning in July of 2001. Our solution may not be the correct one, but it is the one we have chosen, since it was the only way with our program the size it is that we could do it. That was to go to an every fourth night call and a centralized float of residents, which has had the expected outcome that the in-house attending covering general surgery and trauma has become the provider of the evening, that the attending is in fact the only shred of continuity of care that exists for the patient, and that we now are wondering when the 80-hour workweek for the attendings is going to become necessary, since most of the attending faculty are in fact working more than 80-hour weeks. And you don’t have to have too many 24- and 36-hour shifts in-house to run up some pretty big numbers. One of the real problems I presented at the Society of Surgical Chairs last month in San Francisco—and this now gets to the issue of what are the differences in faculty compensation in full-time academic positions compared with comparable incomes of individuals who are in private practice (since my faculty are arguing the point that I am now working like a private practitioner, and I am on every night taking the constipation calls for my patients, so why shouldn’t we be compensated in kind?)—is that the MGMA [Medical Group Management Association] data for 2001 show the comparison of faculty and full-time specialty-specific private practice incomes, and in general the private surgeon makes about 20% to 50% more than what the full-time academic faculty member makes. That’s MGMA data; that is not Fry’s

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data. In general surgery it is about 20% more. For trauma surgeons in private trauma centers, it’s a full third more. For pediat-
tric surgeons and for neurosurgeons, it’s actually 50% more. So I
think that what we are really confronting now in our institution—

nearly 18 months into being what I believe is truly compliant with
80-hour weeks, being compliant with 1 full day off—is the prob-
lem that the dissatisfaction of the residents has been fully trans-
ferred to the dissatisfaction of the attending staff, and I would en-
courage our senior attending staff and others in the audience to
explain to me how we will solve the next step. I think the fact
that we have had 4 presentations on this I paper reflects that this
subject is of interest to this entire group.

Ramon Cestero, MD, Oakland: I am a chief resident at
the UCSF [University of California, San Francisco]—East Bay
program, and I was curious if the authors had found a corre-
lation between the programs in which both faculty and resi-
dents agreed on duty hour restrictions and residents who would
choose surgery or medicine again as a career choice. In other
words, were residents more satisfied with their career choice
in surgical programs in which faculty were more aware or in-
formed about resident duty hours?

James R. DeBord, MD, Peoria, III: What can you tell us
about the rule that surgery residencies can petition their gradu-
ate education committee for a 10% exemption leading to an 88-
hour workweek?

Dr Smith: I would like to thank Dr Farley and all of the other
discussants for their very pertinent comments and questions. Dr
Farley, you inquired whether or not this information had actu-
ally helped us to transition into an 80-hour workweek. I would
love to tell you that the information has facilitated a graceful tran-
sition, but in fact, I think that is probably not the case.

Thus far, we have implemented some initial positive mea-
sures to address the issue. These include the employment of a
number of physician extenders, which has reduced the amount
of time that residents spend in noneducational service activi-
ties. Very soon we will implement a night float system, and this
is the only way that we could find to meet the ACGME work-
week restrictions and the call limitations. Some additional changes that we have made involve resident assignments to spe-
cific services, but in all honesty I think the rationale for many
of these changes in resident assignments remains fairly ob-
scure. For example, resident participation in emergency sur-

surgery, trauma, and critical care has been reduced, and as you all

know, these services are particularly dependent on a high level
of resident participation and autonomy. Meanwhile, resident
assignments to daytime elective services have been preserved.
Resident participation in these services is somewhat less criti-
cal and at times is quite frankly superfluous. So it would seem
that neither concern for patient safety, which I think is the driv-
ing force in this issue, nor optimal resident education was the
primary consideration in making these changes.

I believe Dr Fry commented on the workload of attend-
ing surgeons, and certainly our attending surgeons are work-
ing much longer hours and much harder than they were a few
months ago. The bottom line is that at the end of the day some-
one has to take care of the patient, and this is increasingly be-
coming the attending surgeon.

This point also generates another very difficult question: if
a 25- or 30-year-old surgery resident is too fatigued to perform
safely after 24 hours on call or after an 80-hour workweek,
wouldn’t the same be true for a 50- or 60-year-old attending sur-
geon, or in particular a 47-year-old trauma surgeon? I believe
that this question is something that we are going to have to deal
with very soon. If we don’t address the issue, I believe that gov-
ernmental agencies may develop a solution for us.

Additionally, in the midst of some of our efforts to comply
with the ACGME rules and regulations, our residents are still
allowed to moonlight, and I think that this is clearly an extra-
curricular activity that has little to do with education and that
this activity will have to be curtailed in the very near future.

As you can see, we continue to grapple with this revolu-
tion in surgical education, and obviously we possess no spe-
cial insight regarding the optimal approach to these difficult
issues. We are continuing to try to put forth our best effort. I
personally believe that with the reduction in resident work hours,
we are at risk of unleashing on the public incompletely trained
surgeons. I see no option other than to lengthen surgical train-

ing programs. I think the bottom line is that we must main-
tain the quality of surgeons, and unfortunately, with reduced
work hours, I think that our residents will be required to spend
an extra year in training.

Dr Organ, I agree with you that many of these issues are con-
sumer driven and not resident driven. I have recently discussed
this with all of our chief residents. They all believe that the ACGME
restrictions will impair surgical education, and in fact they are
not in favor of it. I believe that the lifestyle issues dissuade many
medical students from applying to surgical-training programs. I
believe that the workweek restrictions will increase the number
of students applying for surgical residency.

Dr Jolley, the average age for surgical residents truly was
31 years. As the student clerkship director at our institution, I
have found that a number of our medical students have had other
careers prior to entering medical school. As a rule, the
medical students are getting significantly older. We did not spe-
cifically break down the responses of the residents by age.

Dr Dunnington, I share your concerns regarding patient
care. I believe that continuity of care is going to be a real issue.
In fact, I think that if you examine the Libby Zion case in de-
tail, one of the biggest problems in the case was the serial hand-
off of her care between several residents. I believe this is some-
thing that we are going to have to track very closely, or additional
errors will be made.

Dr Valentine, I don’t know how to address the issue of at-
traction. We have lost some very good residents from our pro-
gram in the past 5 years. With 24% of the residents responding
that they regretted pursuing a surgical career, I think this is an
issue that we must address. We have to pay attention to these num-
bers. The number of residents who regretted following a surgi-
cal career did not diminish as resident seniority increased.

Dr Fry, I think that I have answered your question. I appreci-
your comments. The surgical faculty are increasingly be-
coming senior residents all over again, and there is a tremen-
dous amount of dissatisfaction with this new role that we are fill-
ing.

Dr Cestero, we did not match the resident responses with
faculty responses. I think that program directors and faculty
still serve as important role models, and if there is dissatisfac-
tion in the faculty, that is bound to trickle down to residents.

I am not certain that the option of increasing the work-
week to 88 hours will be available to us. If it is available, this
option will relieve some of the pressure on surgical residencies.
At the present time, we are aiming for an 80-hour work-
week for our residents.