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# Perceived Impact of Duty Hours Regulations: A Survey of Residents and Program Directors

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In July 2003, the Accreditation Council for Graduate Medical Education (ACGME) duty hours regulations went into effect for all residents and fellows enrolled in accredited training programs.<sup>1</sup> These changes are thought to have a positive impact on patient care because of the perceived improvement of alertness and health of physicians in training, although systematic reviews of the effects of duty hours regulations have yet to be conclusive.<sup>2-9</sup> Potential benefits of the regulations have been offset by concerns regarding the threats to patient care that may occur as a result of more frequent "hand-offs," including lack of continuity and fragmentation of care from multiple providers.<sup>6,10-12</sup> Several surveys in the surgical fields have cited a perceived negative impact on the quality of care as a result of the new regulations,<sup>13-16</sup> although other studies suggest that the effect on surgical volumes or outcomes has been minimal.<sup>17-20</sup> Potential threats to professionalism in an environment that becomes oriented toward "shift work" also have been noted.<sup>11,21</sup>

The impact of duty hours regulations on the education of residents also has been a point of controversy. Proposed benefits include the potential for well-rested residents to be more receptive to learning, to have a healthier work-life balance, and to have more time for self-directed learning.<sup>6,7,22</sup> Alternatively, several studies note threats to education because of the inability to attend conferences or benefit from the learning that occurs when residents are more available for their pa-

tients.<sup>6,23-26</sup> Resident perceptions have primarily been reported in small samples of surgical residents, although a recent multisite study found predominantly negative attitudes toward duty hours regulations among third-year internal medicine residents.<sup>27</sup> The effects of reductions in resident duty hours also have been perceived both positively and negatively by medical students.<sup>28,29</sup>

To understand the perceptions of internal medicine residents and program directors in the United States 1 year after implementation of the duty hours regulations, this study analyzes responses to a survey administered in association with the Internal Medicine In-Training Examination (IM-ITE).

## METHODS

The IM-ITE is a standardized, 340-item, multiple-choice self-assessment examination offered yearly to residents enrolled in internal medicine residency programs in the United States. Demographic data, including sex, location of medical school, age, postgraduate year (PGY), and career interests, are collected. Examinees are asked to voluntarily complete an accompanying survey at the end of the examination that requests information regarding perceptions of the examination, career interests, educational debt, use of study materials, and perceptions of their training environment. One of the item modules in the 2004 survey pertained to perceptions of the impact of the duty hours regulations on medical education. Residents were asked to respond to the following question:

*"Which (if any) of the following describes how the new work hour regulations have changed your medical education? Choose all that apply:*

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- \_\_\_ no change
- \_\_\_ decreased learning of new medical knowledge
- \_\_\_ decreased clinical skills
- \_\_\_ decreased overall ability to provide patient care
- \_\_\_ increased medical knowledge
- \_\_\_ increased clinical skills
- \_\_\_ increased overall ability to provide patient care"

The examination was completed by 19,937 internal medicine residents in October 2004 (16 months after the institution of the duty hours regulations). This number represents 87% of the 22,909 internal medicine residents in training during the 2004 to 2005 academic year (G. C. Lattie, personal communication, American Board of Internal Medicine, December 2005). Of the test takers, 18,837 (94%) returned surveys and 16,619 (83%) completed the question on duty hours.

Responses in the learning new medical knowledge, clinical skills, and overall ability to provide patient care categories were evaluated separately. In scoring responses, if a respondent marked both increase and decrease in the same category, the response was considered missing for that category. If "no change" was marked in addition to an increase or decrease comment in an individual category, the latter was taken as the intended response for that category and "no change" was taken as the intended response for the other categories. Responses for which "no change" was not marked but some categories were left blank were considered missing for the blank categories.

At the time the IM-ITE examination results were distributed in early 2005, program directors were invited to complete a voluntary, 16-item mail survey with questions pertaining to the quality and utility of the examination. Two items inquired about program director perceptions regarding the learning environment after implementation of the duty hours regulations:

*"Do you think the ACGME work hour regulations have an adverse impact on your ability to educate your residents?"*

- \_\_\_ yes
- \_\_\_ no"

*"Which of the following ACGME work hour regulations has an adverse impact on your ability to educate your residents?"*

- \_\_\_ 24+6
- \_\_\_ 10 hours off between shifts
- \_\_\_ 80-hour week"

Of the 390 US residency program directors invited to participate in the examination, 202 program directors (52%) returned the survey. Ten surveys were excluded from analysis because of missing data, leaving a cohort of 192 (49%).

## PERSPECTIVES VIEWPOINTS

- Study explores resident and program director perceptions of the impact of the ACGME duty hours regulations.
- The impact of the duty hours regulations was perceived positively by residents.
- Program directors reported a perceived adverse impact of the regulations, specifically citing the 24+6 rule to have a negative effect on medical education.

Primarily descriptive results were reported using standard univariate statistics to characterize the sample. Where appropriate, statistical analyses were conducted using SAS Version 8.2 (SAS Institute Inc, Cary, NC). Two-tailed statistical significance was set at an  $\alpha$  level of 0.05. Associations between each response category and demographic factors were analyzed using Cochran-Mantel-Haenszel statistics. Multivariate analyses were conducted using ordinal logistic regression analysis with cumulative logits. This analysis was approved by the Institutional Review Board of the Mayo Clinic College of Medicine.

## RESULTS

### Resident Survey

Demographics of the study participants are shown in Table 1. Of the respondents, 33% were PGY-1, 35% were PGY-2, and 32% were PGY-3. Fifty-eight percent of the respondents were male, 52% were US medical graduates (USMGs), and 18% were in residency programs in New York State.

Perceptions of the effect of duty hours regulations on the training environment are reported in Table 2. Overall, the impact of the duty hours regulations was perceived to have a primarily neutral or positive impact. A minority of residents reported a decrease in learning new medical knowledge (12%), clinical skills (14%), or overall ability to provide patient care (12%). Alternatively, 30%, 16%, and 41% of residents thought the regulations increased learning of new medical knowledge, clinical skills, and overall ability to provide patient care, respectively.

In multivariate models adjusting for program site, year of training, sex, and medical school location, increasing rates of negative perceptions of the effects of duty hours regulations were observed from the PGY-1 to PGY-3 stage of training for all 3 domains (Table 2;  $P < .0001$  for each domain). In addition, USMGs had higher rates of negative perceptions of the effects of the duty hours regulations compared with international

**Table 1** Demographics of Respondents to the 2004 Internal Medicine In-Training Examination Residents Questionnaire

Variable	Category	Number (Percentage)
Program site	New York State	3003 (18.1)
	Other	13,616 (81.9)
Year of training	PGY-1	5540 (33.2)
	PGY-2	5846 (35.2)
	PGY-3	5233 (31.5)
Sex	Male	9608 (57.8)
	Female	6872 (41.4)
	Missing data	139 (0.8)
Medical school location	United States	8648 (52.0)
	International	7870 (47.4)
	Missing data	101 (0.6)

PGY = postgraduate year.

medical graduates (IMGs) ( $P < .0001$  for each domain). Residents in New York programs were generally less likely overall to express negative perceptions of the effects of the duty hours regulations when compared with residents in US programs outside of New York ( $P = .1461, .0007, \text{ and } .0472$  for medical knowledge, clinical skills, and patient care domains, respectively).

### Program Director Survey

In response to the survey question, "Do you think the ACGME work hour regulations have an adverse impact on your ability to educate your residents?" 97 (51%) of the 192 respondents reported "yes." Residency directors from programs in New York were analyzed separately because duty hours restrictions in the state preceded the ACGME changes in July 2003. Of the 35 New York program directors who responded, 13 (37%) reported an adverse impact of the duty hours regulations compared with 84 (54%) of 157 program directors outside of New York ( $P = .09$ ).

In response to the survey question, "Which of the following ACGME work hour regulations has an adverse impact on your ability to educate your residents?" 66 (68%) of the 97 program directors who perceived an adverse impact of the duty hour regulations cited the 24+6 regulations. Thirty-seven respondents (38%) cited the 10 hours off between shifts regulations, and 30 respondents (31%) cited the 80-hour week regulations.

### DISCUSSION

This study represents the largest cohort of learners to date reporting on the perceived impact of ACGME duty hours regulations. Most internal medicine residents reported that duty hours regulations had a neutral or positive effect on learning of medical knowledge (88%), clinical skills (86%), and overall ability to provide patient care (87%). For learning of medical knowl-

edge and overall ability to provide patient care, residents in each of the 3 training years were more likely to report that the duty hours regulations had a positive effect. For clinical skills, the number reporting a positive effect was similar to the number reporting a negative effect, both of which were markedly outweighed by the number of neutral responses. In general, PGY-3 respondents were more likely than junior responders to report negative perceptions of the duty hours regulations. Notably, respondents in their third year of training would be most familiar with the system before the implementation of duty hours regulations. In conclusion, a minority of residents perceived the duty hours regulations to have a negative effect on learning of medical knowledge, clinical skills, or overall ability to provide patient care, but individuals who did were more likely to be senior residents.

IMGs were more likely than USMGs to report a favorable impact of duty hours regulations on learning medical knowledge, clinical skills, and overall ability to provide patient care. Data from this study do not suggest a reason for this difference. However, IMGs often have experienced unrestricted duty hours in settings outside the United States. They may have to rely on self-directed learning skills more than USMGs to succeed and may better appreciate the increased time for learning that could potentially be accommodated by the duty hours regulations.

Duty hours regulations may affect residents and program directors from New York State less because of previous regulations that were in effect in this state. Among residents, this hypothesis generally held although negative perceptions of the duty hours regulations were uncommon for both resident groups. Although program directors in New York were less likely to report that duty hours had negatively affected medical education, a sizeable proportion (37%) still reported a perceived adverse impact of the regulations. Of the specific regulations, the rule that residents can only be on duty for 24+6 hours was most commonly perceived to have an adverse effect on medical education. The findings of this study are consistent with previous studies that point out faculty may be more concerned than residents about the potential negative impact of these changes on training.<sup>10,18,30</sup> Program directors and faculty have found it particularly challenging to find common times when members of a team or residency group could be available for formal teaching conferences.<sup>31</sup> Furthermore, some institutions have been tempted to compress the clinical activity that existed before duty hours regulations into a shorter interval to the exclusion of education or sleep.<sup>11,32</sup> However, this survey did not detect a substantial degree of concern regarding negative effects of these changes among the residents who responded to the survey questions.

This study has several limitations. First, this report is based on the perceived impact of duty hours regulations

**Table 2** Resident Perceived Impact of Duty Hours Regulations\*

Variable	Category	Decrease (%)	No Change (%)	Increase (%)	P Value†
<b>(A) Effect on Learning of New Medical Knowledge</b>					
Program site	New York	169 (9.2)	1101 (59.7)	574 (31.1)	.1461
	Other	1051 (12.2)	4985 (58.0)	2564 (29.8)	
Year of training	PGY-1	236 (6.9)	2156 (63.4)	1011 (29.7)	<.0001
	PGY-2	435 (12.1)	2024 (56.4)	1130 (31.5)	
	PGY-3	549 (15.9)	1906 (55.2)	997 (28.9)	
Sex	Male	685 (10.8)	3667 (58.0)	1975 (31.2)	.0006
	Female	526 (13.0)	2368 (58.6)	1146 (28.4)	
Medical school location	United States	913 (16.1)	3416 (60.4)	1330 (23.5)	<.0001
	International	299 (6.3)	2636 (55.8)	1793 (37.9)	
Total		1220 (11.7)	6086 (58.3)	3138 (30.0)	
<b>(B) Effect on Clinical Skills</b>					
Program site	New York	129 (8.5)	1102 (72.7)	285 (18.8)	.0007
	Other	1082 (15.2)	4993 (69.9)	1067 (14.9)	
Year of training	PGY-1	201 (7.0)	2163 (75.7)	495 (17.3)	<.0001
	PGY-2	473 (15.8)	2030 (67.9)	486 (16.3)	
	PGY-3	537 (19.1)	1902 (67.7)	371 (13.2)	
Sex	Male	738 (14.1)	3669 (69.9)	846 (16.1)	.4359
	Female	465 (13.9)	2375 (71.2)	498 (14.9)	
Medical school location	United States	891 (18.5)	3416 (70.9)	508 (10.6)	<.0001
	International	313 (8.3)	2644 (69.7)	837 (22.1)	
Total		1211 (14.0)	6095 (70.4)	1352 (15.6)	
<b>(C) Effect on Overall Ability to Provide Patient Care</b>					
Program site	New York	205 (9.1)	1100 (48.7)	953 (42.2)	.0472
	Other	1395 (13.0)	4970 (46.4)	4345 (40.6)	
Year of training	PGY-1	263 (6.3)	2153 (51.2)	1789 (42.5)	<.0001
	PGY-2	559 (12.2)	2017 (44.1)	1996 (43.7)	
	PGY-3	778 (18.6)	1900 (45.3)	1513 (36.1)	
Sex	Male	928 (12.4)	3656 (48.8)	2913 (38.9)	<.0001
	Female	659 (12.3)	2362 (44.0)	2349 (43.7)	
Medical school location	United States	1203 (17.1)	3395 (48.3)	2431 (34.6)	<.0001
	International	386 (6.6)	2640 (45.0)	2845 (48.5)	
Total		1600 (12.3)	6070 (46.8)	5298 (40.9)	

PGY = postgraduate year.

\*Missing data and responses for which a single answer could not be determined are not included.

†P values from multivariate ordinal logistic regression model, including program site, year of training, gender, and medical school location.

on the training and learning environment. Actual outcomes in terms of patient care or learning could not be assessed. Second, the answers provided by respondents were based in part on personal values that may not be all-inclusive. For example, personal opinions regarding the negative impact of sleep deprivation versus fragmentation of care or individual perceptions of the tolerance for long duty hours may have influenced answers to the survey question. Third, within internal medicine residencies, research suggests that the greatest losses in education have been in teaching and conference time.<sup>24,33</sup> This study did not specifically address the mechanisms by which residents were acquiring medical knowledge. Fourth, although the percentage of residents completing the survey was high, the response rate among program directors was limited. This study also is unable to account for any characteristics beyond program location that might influence how program directors perceive the effects of the duty

hours regulations. Finally, despite the high overall survey response rate, a substantial number of individual item responses were categorized as missing. It is possible that response bias could result from these missing data, although preliminary sensitivity analyses did not appreciably alter the results.

Although questions about the benefits of duty hours regulations continue to be raised, most internal medicine residents do not report a negative impact on their training or ability to deliver care. However, approximately one-half of a subset of program directors think that the changes have had an adverse effect on the educational environment. Although these perceptions based on the first year of experience under the regulations are informative, future studies will need to address the impact of duty hours regulations on measurable aspects of medical education, professionalism, patient safety, and outcomes. Limited evidence suggests patients may be less satisfied with care from post-call residents and residents with heavy inpatient

workloads.<sup>34,35</sup> Results from a study specifically addressing patient preferences for resident duty hours would provide additional insight into the likely future of resident duty hours.

With the ongoing focus on the quality of health care, duty hours regulations are likely to remain under considerable public scrutiny. This study provides the largest collection of data to date addressing internal medicine resident and program director perspectives on the ACGME-mandated duty hours regulations. Continual monitoring of the impact of these changes is necessary as residency and fellowship programs seek to optimize the training environment.

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