Effect of Residency Duty-Hour Limits
Views of Key Clinical Faculty

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Background: To determine the effect of duty-hour limitations, it is important to consider the views of faculty who have the most contact with residents.

Method: We conducted a national survey of key clinical faculty (KCF) at 39 internal medicine residency programs affiliated with US medical schools selected by random sample stratified by federal research funding and program size to elicit their views on the effect of duty-hour limitations on residents' patient care, education, professionalism, and well-being and on faculty workload and satisfaction.

Results: Of 154 KCF surveyed, 111 (72%) responded. The KCF reported worsening in residents' continuity of care (87%) and the physician-patient relationship (75%). Faculty believed that residents' education (66%) and professionalism, including accountability to patients (73%) and ability to place patient needs above self-interests (57%), worsened, yet 50% thought residents' well-being improved. The KCF reported spending more time providing inpatient services (47%). Faculty noted decreased satisfaction with teaching (56%), ability to develop relationships with residents (40%), and overall career satisfaction (31%). In multivariate analysis, KCF with 5 years of teaching experience or more were more likely to perceive a negative effect of duty hours on residents' education (odds ratio, 2.84; 95% confidence interval, 1.15-7.00).

Conclusions: Key clinical faculty believe that duty-hour limitations have adversely affected important aspects of residents' patient care, education, and professionalism, as well as faculty workload and satisfaction. Residency programs should continue to look for ways to optimize experiences for residents and faculty within the confines of the duty-hour requirements.

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Residency duty-hour restrictions were implemented by the Accreditation Council for Graduate Medical Education (ACGME) in July 2003 to reduce the risk of adverse events resulting from sleep deprivation and to enhance residents’ well-being. Before implementation of duty-hour regulations, some cautioned that reductions in duty hours may have unanticipated negative effects on patient care, resident education, and professionalism. In addition, some feared that a reduction in residents' duty hours would be accompanied by an increase in workload for clinical faculty. Studies evaluating the effect of programmatic changes to comply with duty-hour limitations have shown mixed effects on these outcomes. As anticipated, several studies show improvements in residents' well-being and quality of life; however, effects on patient care, education, and professionalism among residents remain unclear.

Faculty who are heavily involved with teaching residents have valuable perspectives on the effect of duty-hour changes, yet few studies have included faculty views. Surgical faculty report decreased expectations for residents, loss of time for teaching, and decreased career satisfaction as a result of duty-hour changes; however, national studies among medical teaching faculty are few. Furthermore, the effect of residents' duty-hour limitations on the workload and career satisfaction of internal medicine faculty members is not fully understood.

We sought to elicit the perspectives of faculty who are responsible for the majority of clinical teaching and who, because of their frequent interactions with residents, are in the best position to ob-
serve the effect of duty-hour limitations. Therefore, we surveyed a national sample of key clinical faculty (KCF) at internal medicine residency programs affiliated with US schools of medicine, as defined by ACGME.17 These faculty members provide the largest share of clinical teaching and supervision of residents. The objectives of this study were to elicit KCF views on the effect of duty-hour limitations in internal medicine residency programs on residents’ patient care, education, professionalism, and well-being and on the workload and career satisfaction of clinical faculty.

In May 2005, we conducted a national cross-sectional survey of 154 KCF at 40 ACGME-accredited categorical internal medicine residency programs affiliated with schools of medicine in the United States. This study was approved by The Johns Hopkins Medical Institutions Review Board.

STUDY POPULATION: KCF

The residency review committee of the ACGME requires accredited internal medicine residency programs to designate institutionally based KCF.17 These are faculty members who are heavily involved in the residency program but who are not program directors, associate program directors, or chief residents. The KCF must be “active clinicians with broad knowledge of, experience with, and commitment to internal medicine as a discipline and to the generalist training of residents”17(p9); dedicate at least 15 hours per week, on average, to the residency program; provide clinical teaching and supervision of residents; assist in development and evaluation of the ACGME competencies for residents; and help monitor stress among residents. Each residency program designates between 4 and 10 KCF, depending on program size.17

SAMPLING STRATEGY

To ensure inclusion of KCF from a broad representation of residency programs, we stratified schools of medicine by both National Institutes of Health (NIH) funding and program size. First, we stratified all 125 US medical schools by NIH research funding dollars for fiscal year 2004.18 Second, we divided schools into 2 groups: those in the top and lower halves of NIH awards, respectively. Third, we stratified each of these 2 groups by the total number of ACGME-approved resident positions for the 2004 academic year (greater than or equal to the median number of resident positions vs less than the median number of resident positions).19 We used a computer-generated table of random numbers to select 10 schools of medicine from each of the 4 strata. Fourth, we identified the categorical internal medicine residency program affiliated with each of the 40 schools of medicine using the ACGME Web site.19 If more than 1 residency program was affiliated with a school, the program with the greatest number of resident rotations at the primary hospital affiliated with the school was selected. We contacted directors of selected residency programs using postal and e-mail addresses provided on the ACGME Web site. We asked program directors to supply contact information for 4 KCF in their residency program, as designated to the ACGME. We chose 4 KCF from each program because 4 is the minimum number of KCF a residency program is required to designate. If a program director declined to provide KCF contact information, another residency program was randomly selected using the same sampling process. One program provided only 2 KCF and 1 program agreed to participate but did not provide contact information for their KCF before the conclusion of data collection. Therefore, 154 KCF from 39 residency programs were included in this study.

SURVEY CONTENT AND ADMINISTRATION

The survey instrument was developed by a team of medical education researchers and clinical faculty. Content validity was achieved by using an iterative process and repeated rounds of pilot-testing among groups of clinical faculty and residency program directors at our institutions, which were not included in the study sample. The survey assessed characteristics of the KCF including demographic data, academic rank, number of years of teaching residents, and the average number of hours per week spent teaching residents. The survey also assessed faculty opinions about the effect of duty-hour limitations on 5 domains: residents’ patient care, education, professionalism, and well-being, and faculty workload and satisfaction. All opinion questions began with the statement, “Please indicate your opinion as to the effect of duty-hour limitations at your institution.” Outcomes in each domain were measured using a 5-point Likert scale: 1, worsened a lot; 2, worsened a little; 3, no change; 4, improved a little; and 5, improved a lot. The survey was sent by mail in May 2005. To encourage full participation, nonrespondents were contacted by repeat mailings, e-mail, and telephone.

STATISTICAL ANALYSIS

We used descriptive statistics to summarize responses to all questions. To evaluate whether respondents were more likely to report worsening vs improvement, we performed the sign test. We assigned −2 to worsened a lot, −1 to worsened a little, 0 to no change, +1 to improved a little, and +2 to improved a lot.20 The findings are presented as 3 categories (worsened a lot and worsened a little, no change, and improved a little and improved a lot) for ease of presentation.

We preformed bivariate and multivariate analyses using general estimating equations (GEEs)21 to identify faculty characteristics associated with views of the effect of the duty-hour limitations. We chose GEEs to account for the potential correlation of KCF observations within residency programs. For GEE analyses, we dichotomized outcomes based on a priori hypotheses. Based on results of previous studies,11,22 we hypothesized that outcomes related to residents’ well-being including fatigue, personal and professional life balance, perception of burnout, and overall well-being would improve. Therefore, well-being outcomes were dichotomized as worsened a lot, worsened a little, or no change vs improved a little or improved a lot. We hypothesized that all other outcomes related to patient care, education, professionalism, and faculty workload and satisfaction would worsen. Thus, these outcomes were dichotomized as worsened a little and worsened a lot vs no change, improved a little, and improved a lot. Faculty views in each of the 5 domains (residents’ patient care, education, professionalism, and well-being, and faculty workload and satisfaction) served as the outcome measures for the GEE analyses. Faculty covariates included sex, specialty (general internal medicine vs subspecialty internal medicine), years of experience in teaching residents (<5 years vs ≥5 years), and hours per week spent teaching or supervising residents (<15 hours per week vs ≥15 hours per week). We also considered program variables including program size and NIH funding of the affiliated school of medicine. However, we did not find any associations between these variables and any faculty views (data not shown). Before running multivariate regression analyses, model variables were examined for evidence of colinearity. All covariates were included in full model regression analyses. Results are reported.
as adjusted odds ratios (ORs) with 95% confidence intervals (CIs). Data were analyzed using SAS software (version 8.2; SAS Institute Inc, Cary, NC).

## RESULTS

### KCF CHARACTERISTICS

Of 154 KCF targeted, 111 (72%) responded. Two KCF or more from 34 (87%) of 39 programs completed the survey. In 4 programs, just 1 KCF responded. The Table gives characteristics of KCF respondents. The distribution of KCF sex and academic rank are similar to all faculty at US medical schools. Three fourths of KCF had 5 years or more of experience in teaching residents and one third had more than 15 years of experience. More than half of faculty spent, on average, 15 hours per week or more teaching or supervising residents.

### RESIDENTS’ PATIENT CARE

Key clinical faculty reported worsening in the continuity of patient care provided by residents (87%), residents’ communication with patients and families (66%), and overall quality of patient care as a result of duty-hour limitations (60%) (all \( P < .001 \)). Faculty views on the quality of residents’ sign-out were mixed (Figure 1A).

### RESIDENTS’ EDUCATION

Key clinical faculty perceived that duty-hour limitations have compromised residents’ education. Faculty reported decreased opportunities for didactic (69%) and bedside (73%) teaching, decreased opportunities for residents to perform clinical procedures (57%), decreased conference attendance (51%), and worsening of residents’ autonomy (57%) (all \( P < .001 \)). Faculty views on residents’ accountability to patients (73%), residents’ professionalism overall had worsened, and most KCF believed residents’ accountability to patients (73%) and ability to place patient needs above self-interests impaired their ability to accurately evaluate residents (57%) worsened as a result of duty-hour limitations (all \( P < .001 \); Figure 1B).

### RESIDENTS’ PROFESSIONALISM

Approximately half the KCF (51%) perceived that residents’ professionalism overall had worsened, and most KCF believed residents’ accountability to patients (73%) and ability to place patient needs above self-interests (57%) worsened as a result of duty-hour limitations (all \( P < .001 \); Figure 1C). Seventy-five percent of KCF reported an increase in time spent attending on inpatient teaching services directly providing patient care without residents (\( P < .001 \); Figure 2). Forty-seven percent of faculty reported an increase in time spent attending on inpatient teaching services directly providing patient care without residents (\( P < .001 \)).

Many KCF indicated that duty-hour restrictions impaired their ability to accurately evaluate residents (49%) and to develop mentoring relationships with residents (40%) (both \( P < .001 \)). Fifty-six percent of the KCF reported decreased overall satisfaction with teaching residents (\( P < .001 \); Figure 2). One-third of the KCF reported a decrease in overall satisfaction with their careers as a result of duty-hour limitations for residents (\( P < .001 \)).

### INFLUENCE OF KCF TEACHING EXPERIENCE AND HOURS SPENT TEACHING

In multivariate analysis using GEEs adjusted for sex, specialty, teaching experience, and average hours per week spent teaching, faculty with 5 years or more of teaching experience were more likely to report a negative effect of duty-hour limitations on residents’ opportunities to perform clinical procedures (OR, 3.01; 95% CI, 1.10-8.21) and the quality of residents’ education overall (OR, 2.84; 95% CI, 1.15-7.00). In the same multivariate model, KCF who spent, on average, 15 hours or more per week teaching residents were more likely to report worsening in opportunities for bedside teaching (OR, 5.03; 95% CI, 1.77-14.33) and the quality of care provided by residents (OR, 2.38; 95% CI, 1.14-4.99). There were no associations between teaching experience or hours spent teaching and views about...
effect of duty-hour restrictions on residents’ professionalism and well-being or faculty satisfaction.

**COMMENT**

The results of this national, cross-sectional study indicate that KCF with the most frequent interactions with internal medicine residents believe that duty-hour reductions have adversely affected important aspects of residents’ patient care, education, and professionalism, as well as their own workload and satisfaction.

The primary purpose of residency is education. Although duty-hour reductions may be expected to result in residents who are more alert and prepared to learn,24-26 the findings of this study suggest that certain aspects of residents’ education may be compromised. Similar to previous studies,11,15,27-29 findings of this study show that duty-hour regulations have resulted in decreased time available for teaching. Transitioning to more efficient, focused teaching in the moment may be one solution27; however, nearly three fourths of the KCF in this study believe that opportunities for both traditional didactic and targeted bedside teaching were limited as a result of duty-hour regulations. This may be, in part, because patient care needs and service obligations may take precedence over education in some residency programs.30

Few studies have evaluated the effect of duty-hour limitations on professionalism among residents. Our results suggest that residents’ accountability to patients and ability to place needs of patients and society above self-interests have worsened. These findings, though concerning, must be interpreted with the understanding that most current KCF teachers, including most participants in this study, were trained in an era without limitations on duty hours.27 Many KCF may view placing the needs of patients and society above personal needs as a professional obligation of physicians.5,31 However, with the increasing focus on safety and the advent of duty-hour limitations, our understanding of professionalism may be evolving to include greater valuation of personal needs.27,31,32

Our understanding of the optimal relationship between residents and patients may also be evolving. The results of this study indicate that the strength of the physician-patient relationship and residents’ continuity of care with patients has worsened. This may reflect a transi-

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**Figure 1.** Views of 111 key clinical faculty on the effect of duty-hour regulations on aspects of residents’ patient care (A), education (B), professionalism (C), and well-being (D). Sign test, $P < .001$ for all outcomes except as noted.
tion from the primary physician-patient approach to a team-based approach to patient care. Is this transition in the best interest of patients? The public demands safety (a primary driving force behind ACGME duty-hour reform), but also desires patient-centered care, continuity of providers, and long-term relationships with physicians. Furthermore, the evidentiary link between work-hour reduction and enhanced patient safety remains unclear. Additional studies are needed to determine optimal models of care that provide safety and continuity for patients cared for by residents.

Although duty-hour limits may have negatively affected aspects of residents’ patient care, education, and professionalism, KCF believe that residents’ well-being has improved. This finding is supported by previous studies. Further research is needed to determine the influence of changes in patient care, education, and professionalism resulting from duty-hour limits on residents’ well-being in the long-term.

The adverse effects of duty-hour regulations on faculty workload and satisfaction may impair recruitment and retention of clinical teachers. Clinical teachers derive satisfaction from interacting with learners. Decreased opportunities for teaching and replacement of teaching roles with clinical responsibilities may cause some faculty to leave residency programs or choose non-teaching career paths. This problem is compounded because there are few incentives and rewards for clinical teaching beyond personal satisfaction. Dissatisfied physicians are more likely to leave their jobs and less likely to recommend their specialty to students. Potential adverse effects on faculty recruitment and retention are of particular concern for generalists because of the declining interest in general internal medicine careers among learners. Furthermore, generalists constitute a substantial portion of teaching faculty at many internal medicine residency programs (57% of KCF in this study were general internists), making it difficult for programs to function without them.

Several limitations of this study should be considered. First, this is an observational study that relies on self-report of the KCF about the effect of duty-hour limitations. Second, we included KCF at residency programs affiliated with schools of medicine; therefore, the results may not reflect views of KCF at community-based programs not affiliated with medical schools. Third, we did not evaluate the degree of compliance with duty-hour requirements at the 39 residency programs, and the variability in compliance that still exists among programs may influence KCF views. Fourth, although our iterative process of instrument development among KCF and program directors establishes some degree of content validity, we do not provide any measure of criterion validity for the survey instrument. However, no true “gold standards” for survey items exist. Fifth, studies suggest that major changes in the nature or structure of work that threaten institutional culture or physicians’ identity may be met with resistance. Because we surveyed KCF 1 year after implementation of duty-hour regulations, when many residency programs were struggling to achieve compliance with duty-hour standards, KCF views may have been influenced by resistance to change.

To our knowledge, this is the first study to report the views of KCF at residency programs across the United States. These faculty, who have the most contact with residents, believe that duty-hour limitations have adversely affected important aspects of residents’ patient care, education, and professionalism, as well as the workload and satisfaction of faculty teachers. Residency programs should continue to look for ways to optimize experiences for residents and faculty within the confines of the duty-hour limitations.

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