

# The Effect of the 16-hour Intern Workday Restriction on Surgical Residents' In-hospital Activities

Bradley M. Dennis, MD, Eric L. Long, MD, Katherine M. Zamperini, MD, and Don K. Nakayama, MD

Department of Surgery, Mercer University School of Medicine, the Medical Center of Central Georgia, Macon, Georgia

**OBJECTIVE:** To observe the effects of the 2011 Accreditation Council on Graduate Medical Education 16-hour intern workday restrictions on surgical residents' clinical and educational activities.

**DESIGN:** All the residents recorded the following weekly in-hospital activities during February and March 2011 (year before intern work restrictions) and 2012 (first year under new requirements): operating room (OR) and clinic; bedside procedures; rounds and ward work; on-call duties in hospital; communication (e.g., checkouts and family and patient discussions); education (conferences and study); and personal (rest and meals). Descriptive statistics were calculated in 3 resident groups (interns, first postgraduate year [PGY1]; junior, PGY2 and 3; and senior, PGY4 and 5). The unpaired t test was used to compare data between 2011 and 2012; significance was set at  $p < 0.05$ .

**SETTING:** Medical school affiliated hospital.

**PARTICIPANTS:** Categorical resident trainees in surgery, PGY1-5, 4 residents per level, with all 20 residents participating in the study.

**RESULTS:** From 2011 to 2012, time spent in the hospital by the intern did not change (all results in h/wk, mean  $\pm$  standard deviation:  $68.5 \pm 13.8$  to  $72.8 \pm 15.8$ , respectively) but the time devoted to specific activities changed significantly. In-hospital personal time decreased by 50% ( $5.3 \pm 4.6$  to  $2.6 \pm 2.0$ ,  $p = 0.004$ ). Interns spent less time placing central lines ( $2.1 \pm 2.2$  to  $0.9 \pm 1.2$ ,  $p = 0.006$ ) and more on rounds ( $8.8 \pm 8.8$  to  $14.2 \pm 9.8$ ,  $p = 0.027$ ), which included supervision with upper level residents. There was no change in the total time spent in the OR, the clinic, performing bedside

procedures, and educational activities. Changes in intern work did not affect the time junior and senior residents spent on bedside procedures, time spent in the clinic, and total time spent in the hospital. In 2012, junior residents spent less time in educational activities ( $11.4 \pm 8.5$  to  $7.0 \pm 4.5$ ,  $p = 0.0007$ ) and the seniors spent more time in the OR ( $13.7 \pm 7.5$  to  $20.6 \pm 10.7$ ,  $p = 0.0002$ ).

**CONCLUSIONS:** The 16-hour restriction preserved interns' educational activities and time spent in the OR and clinic, but changed resident work activities at all levels. The time spent on rounds increased, time spent by the juniors on conferences decreased, and time spent by senior residents in the OR increased. Duty restrictions in general and intern supervision requirements demand ongoing adjustments in resident work schedules. (J Surg 70:800-805. © 2013 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

**KEY WORDS:** surgical training, duty-hour restrictions, time-motion study, resident work

**COMPETENCIES:** Patient Care, Professionalism, System-Based Practice

## INTRODUCTION

Beginning from July 2011, the Accreditation Council for Graduate Medical Education (ACGME) required U.S. training programs to limit intern work hours to 16 hours for a given 24-hour period.<sup>1</sup> The rationale was that the most inexperienced cohort of trainees, those in their first postgraduate year (PGY1) following completion of medical school, was most affected by sleepiness and fatigue. A corresponding requirement was that more senior residents directly supervise PGY1 resident performance. The goal of these rules was to mitigate the effects of fatigue, sleepiness,

*Correspondence:* Inquiries to Don K. Nakayama, MD, MBA, Medical Education Department of Surgery, Medical Center of Central Georgia, 777 Hemlock St., MSC 140, Macon, GA 31201; fax: +478-633-5153; e-mail: nakayama.don@mccg.org, nakayama.don@gmail.com

and inexperience among interns, building on the original duty-hour restrictions imposed by ACGME in 2003 on all residents.<sup>2</sup>

The intern work rules were based, in part, on the research data on the work performance of PGY1 residents in intensive care units and reviewed by Tan et al.<sup>3</sup> Elimination of the 24-hour call shifts and limitation of scheduled hours of work to 63 per week decreased the number of serious errors made by interns on an intensive care unit rotation.<sup>4</sup> Interns were found to be at an increased risk for a car crash immediately after an extended work shift of more than 24 hours and in the months when they worked more than 5 shifts.<sup>5</sup>

Despite scientific evidence that work restrictions decreased trainees' clinical performance and improved their well-being, concerns persisted whether a limit is being reached regarding the minimum number of hours needed for a meaningful training experience in surgery.<sup>3</sup> A survey of internal medicine and surgery directors indicated that the new work restrictions would negatively affect both the learning environment and the patient outcomes.<sup>6</sup> A workshop at the 2011 meeting of the Association of Program Directors in Surgery summarized some concerns, including reorganization of residents' schedules, costs associated with physician extenders to cover noneducational work, and the effects of hand-offs on continuity of care. An important issue was the effect of duty-hour restrictions on resident's learning and attending surgeon's teaching, and whether attendance at teaching conferences and rounds, and time spent in the operating room (OR) would suffer.

We wanted to determine the changes in hours spent in clinical, educational, and service activities experienced by surgical residents in training brought on by the new work restrictions on interns' workday. Accordingly, we conducted a time-work study on all residents in our residency program in surgery during the last year before the new rules took effect on July 2011 and during their first year in practice.

## METHODS

### Time-Work Survey

All surgery residents completed a form that summarized their work, study, and personal activities in 15-minute intervals while in the hospital (Table 1). Surveys were taken during an 8-week period in February and March 2011, before the institution of the 16-hour intern work limitation in July 2011, and during a similar period in the same 2 months in 2012, during the first year it went into effect. Weeks when the resident was on vacation, on a rotation not on the main hospital campus, or on a research rotation where he or she did not have regular clinical duties were excluded.

**TABLE 1.** List of Activities Recorded

1.	Operating room
2.	Clinic
3.	Bedside procedures
a	Central lines
b	Chest tubes
4.	Floor work
a	Rounds
b	Orders and DCs
c	Consults
5.	Education
a	Conferences and reading
6.	Call activities
a	Trauma, ER, and floor
7.	Communication
a	Checkouts
b	Discussions with family and patients
8.	Personal
a	Rest
b	Meals
Total	All time spent in the hospital

ER, emergency room; DCs, discharges.

Weekly totals for each resident were tabulated and they were grouped by postgraduate training year (PGY): interns (PGY1), juniors (PGY2 and 3), and seniors (PGY4 and 5). Group data from 2011 were compared with data from the same resident category obtained in 2012. Data from an individual resident could thus be included in 1 group in 1 year (e.g., 2011 interns) and a different group the next (2012 juniors). Results were expressed as hours per week; results for each group, mean  $\pm$  1 standard deviation. Statistical analysis was carried out by the unpaired t test, with  $p < 0.05$  considered as significant.

### On-Call Coverage

During both 2011 and 2012 study periods, a night float system provided night-time in-hospital coverage by pairs of interns and junior residents. Intern work-hour restrictions had little influence on the interns and residents who were assigned to night float coverage, as shifts began at 6 PM and the residents left the hospital after morning checkout conferences, which finished by 7:30 AM, when the OR schedule began, or at 8:30 AM, when morning morbidity and mortality conference and grand rounds finished. The night float team, interns included, had 24-hour shifts on Saturdays in 2011 that were eliminated for interns in 2012. Interns and residents not assigned to night float rotations were not affected by the intern duty-hour restrictions. They arrived in the hospital at around 6 AM and left after the evening checkout conferences at 6:30 PM. Senior residents had an independent call system where they had a "stretch"

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