

Redesign of an Internal Medicine Ward Rotation: Operational Challenges and Outcomes

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Abstract

Introduction In anticipation of the 2011 ACGME duty hour requirements, we redesigned our internal medicine resident ward experience. Our previous ward structure included a maximum 30-hour duty period for postgraduate year-1 (PGY-1) residents. In the redesigned ward structure, PGY-1 residents had a maximum 18-hour duty period.

Methods We evaluated resident conference attendance and duty hour violations before and after implementation of our new ward redesign. We administered a satisfaction survey to residents and faculty 6 months after implementation of the new ward redesign.

Results Before implementation of the ward redesign, 30-hour continuous and 80-h/wk duty violations were each 2/year, and violations of the 10-hour rest between duty

periods were 10/year for 74 residents. After implementation of the ward redesign, there were no 30-hour continuous or 80-h/wk duty violations, but violations of the 10-hour rest between duty periods more than doubled (26/year for 75 residents). Duty hours were reported by different mechanisms for the 2 periods. Conference attendance improved. Resident versus faculty satisfaction scores were similar. Both groups judged overall professional satisfaction as slightly worse after implementation.

Conclusion Our ward rotation redesign eliminated 30-hour continuous and 80-h/wk duty violations as well as improved conference attendance. These benefits occurred at the cost of more faculty hires, decreased resident elective time, and slightly worse postimplementation satisfaction scores.

Introduction

The Accreditation Council for Graduate Medical Education's (ACGME) 2011 duty hour restrictions¹ limit postgraduate year-1 (PGY-1) learners to 16-hour continuous duty periods and recommend 10 hours rest (8 hours required) between duty periods. Limits for upper-level residents are 24 hours, plus 4 additional hours for transition of patient care, with 14 hours off after a 24-hour

duty period and recommend 10 hours (8 hours required) between shorter duty-periods. The 2003 ACGME duty hour limits allowed 24 hours of continuous duty, plus 6 hours for educational activities and transition of care for all residents. Program directors and trainees have expressed concerns that the 2011 limits will negatively affect patient care, resident education, and faculty satisfaction,²⁻⁶ whereas reports on the educational impact of the 2003 ACGME duty hour restrictions have been mixed.⁷⁻¹⁴ A recent review of the effects of duty hours did not include specific analysis of general internal medicine ward experiences.¹⁵ We report on our redesigned internal medicine ward structure, which was undertaken to address the 2011 ACGME duty hour limit changes.

Methods

Background

In response to an Institute of Medicine report on resident work hours,¹⁶ and in anticipation of the 2011 ACGME duty hour limits, we changed our ward structure in July 2009. We also had a significant number of "overflow" patients and wished to redesign the admitting system so that most patients on a team were admitted by a member of

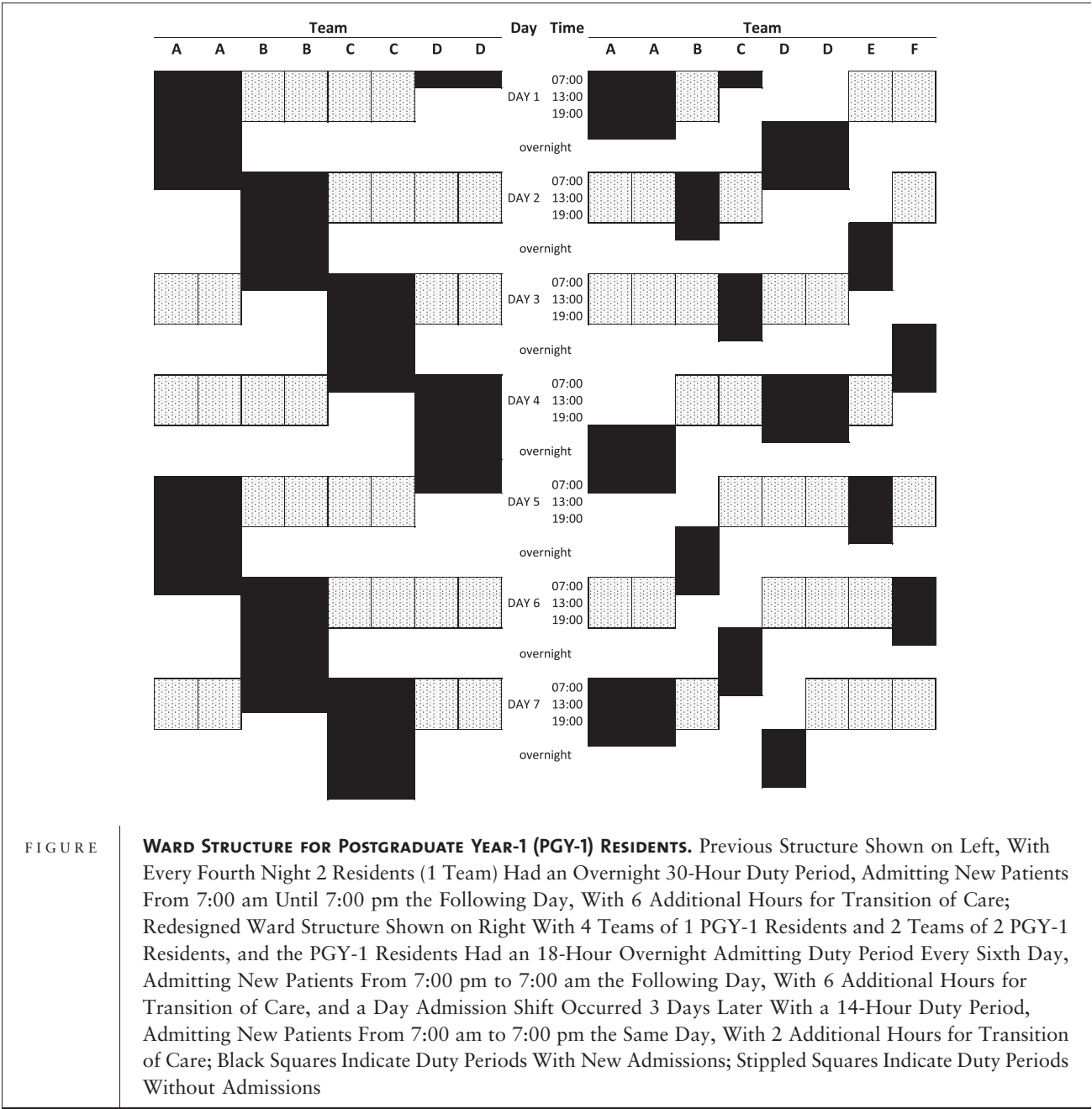
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Funding: The authors report no external funding source for this study.

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Received April 21, 2011; revisions received August 15, 2011, and September 7, 2011; accepted September 9, 2011.

DOI: <http://dx.doi.org/10.4300/JGME-D-11-00092.1>



the team, not passed on from another team. Our previous ward structure was a traditional every-fourth-night over-night call with a 30-hour continuous-duty period for PGY-1 residents and a night-float system for upper-level residents (FIGURE). Our team structures were 1 upper-level resident overseeing 2 PGY-1 residents, with a team cap of 18 patients. Our redesigned ward structure was shift-based on a 6-day call cycle. Four teams had 1 PGY-2 resident and 1 PGY-1 resident with a team cap of 14 patients. Two teams had 1 PGY-3 resident and 2 PGY-1 residents with a team cap of 16 patients. For PGY-1

residents, the redesigned ward structure was an 18-hour overnight admission shift every sixth day (7 PM to 1 PM). A day admission shift occurred 3 days later with a 14-hour duty period (7 AM to 9 PM). A night-float system provided overnight call for upper-level residents. The number of ward teams increased from 4 to 6, necessitating 2 added upper-level residents and 2 added attending physicians year-round. Additional upper-level resident staffing was achieved by decreasing elective time. Each resident gave up 1 elective during the course of 3 years, decreasing average elective months from 12 to 11. Faculty requirements

TABLE 1 RESIDENT CONFERENCE ATTENDANCE BEFORE AND AFTER IMPLEMENTATION OF THE WARD REDESIGN

Conference	Before	After	P Value for Increase
Grand rounds attendance (average attendance/resident), %	3	37	< .001
Resident Thursday School attendance (average attendance/resident), %	46	59	< .001
Categorical internal medicine residents, No.	74	75	

included hiring 2 hospitalists and moving nonteaching consultative duties to the teaching service.

Conference Attendance

For the same 6-month period (July to December), 1 year before and immediately after implementation of our redesign, we evaluated resident conference attendance at internal medicine grand rounds (1 didactic hour) and Resident's Thursday School (3 consecutive didactic hours). Residents were expected to attend at least 60% of these conferences. We calculated for each resident the number of conferences attended as recorded on sign-in sheets, divided by the number of conferences held.

Duty Hour Violations

Before July 2009, duty hours were self-reported weekly. Thereafter, resident duty hours were monitored daily using an Internet-based program. We examined these reports to calculate duty hour violations for the 12-month period before and immediately after implementation of our redesign.

Professional Satisfaction

We developed, piloted, and revised a brief online survey that asked respondents to rate the effect of the ward redesign on 3 aspects of professional satisfaction using a 5-point Likert scale. Six months after implementation of the redesign, we administered this survey anonymously to residents and attending faculty who had served on the wards during the redesign's implementation.

Statistical Analysis

We tested changes in Thursday School attendance and in grand rounds attendance with a 1-sided Mann-Whitney test, as well as resident satisfaction and faculty satisfaction with 1-sided Mann-Whitney tests. This study was reviewed and granted an exemption by the University of New Mexico Human Research Review Committee.

Results

Before implementation of the redesign, 30-hour continuous and 80-h/wk duty violations were each 2/year, and 10-hour rest period violations were 10/year ($n = 74$ residents). After implementation of the redesign, there were no 30-hour or 80-hour duty violations; 10-hour violations more than doubled (26/year for 75 residents). There were no 8-hour violations before or after implementation. As noted above, a different reporting mechanism was used for the 2 periods. The measured increase in 10-hour violations was almost entirely attributable to duty hour violations by upper-level night float residents who worked consecutive 7-night 14-hour shifts (7 PM to 9 AM). Conference attendance improved, especially for grand rounds, where attendance had previously been very poor (TABLE 1).

Surveys were completed by 27/50 residents (54%) and 18/30 faculty members (60%). Both resident and faculty judged overall professional satisfaction as slightly worse after implementation (TABLE 2). Frequently cited concerns were the necessity for more handoffs in patient care and increased work load by upper-level residents and faculty.

TABLE 2 RESPONSE TO SURVEY QUESTIONS^a

Question	Residents, Mean Score	Faculty, Mean Score	P Value ^b
"Your overall professional satisfaction."	2.59	2.72	.82
"Your energy level while on service"	2.56	2.56	.96
"A positive attitude about the ward experience"	2.48	3.06	.10

^a Mean Likert scores for the question "Compared with the ward experience before July 2009, please rate the effect of the current ward structure on ..." (5-point Likert scale: 1 = much worse, 2 = worse, 3 = about the same, 4 = better, 5 = much better).

^b P value for the difference between faculty and residents.

Discussion

Our ward redesign addressed some of the concerns raised in the Institute of Medicine report¹⁶ and was within 2 hours of compliance with the 2011 ACGME duty hour limits.

Since this study, we have adjusted our PGY-1 overnight shift from 8 PM to 12 noon and moved our postcall rounding time from 7 AM to 6:30 AM. This has resulted in compliance with the new duty hour restrictions, eliminated most 10-hour violations, and allowed faculty to review all newly admitted patients with the PGY-1 resident following overnight duty. Supervising residents and/or faculty often do procedures, discharges, and family meetings for patients admitted overnight by the PGY-1 resident. We plan future surveys of resident and faculty satisfaction about this shift adjustment and about the upper-level residents having less elective time.

Resident conference attendance improved after the redesign, in contrast to a study involving upper-level residents, in which 16-hour shifts were associated with lower conference attendance.³ Our increased conference attendance may be because, with the addition of 2 teams, our average patient census per team fell by about 30% (from 13.1 to 9.1). Indeed, a lower patient census has been associated with increased resident participation in educational activities.⁸ Thus, a similar effect might have been seen with a different ward structure that reduced average patient census but did not reduce duty hours.

We had anticipated that implementation of the 2011 ACGME duty hour limits would be operationally challenging and might result in significant resident and faculty dissatisfaction. Our findings suggest that the redesign was successful and accompanied by increased educational conference attendance. The largest operational challenge presented by our redesign was the need for increased staffing. Our redesigned ward structure required an increase in upper-level residents and attending faculty. We were able to accomplish this by decreasing resident elective time by 1 month and hiring 2 additional hospitalists.

Our intervention has several limitations. It is the experience of a single institution. Duty hour violations were captured by a different system after implementation of the ward redesign, and capturing of data may have differed. Our survey has not been validated, and the return rate of 56% is relatively low and may suggest the presence of nonresponse bias. Patient outcomes were not assessed. Finally, the increased conference attendance that we

observed might be due to factors other than the structural changes that we made in our ward teams.

Conclusions

We redesigned the structure of our internal medicine resident ward in response to the Institute of Medicine Report and in anticipation of new ACGME duty hour restrictions. Our ward redesign eliminated 30-hour and 80-hour duty violations and was accompanied by improved conference attendance. These benefits occurred at the cost of more faculty hires, decreased resident elective time, and slightly worse satisfaction scores.

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