ORIGINAL RESEARCH

Overnight Hospital Experiences for Medical Students: Results of the 2014 Clerkship Directors in Internal Medicine National Survey

Eric N. Goren, MD¹, Debra S. Leizman, MD², Jeffrey La Rochelle, MD, MPH³, and Jennifer R. Kogan, MD¹

¹Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA; ²Case Western Reserve School of Medicine, Cleveland, OH, USA;

³Uniformed Services University of the Health Sciences, Bethesda, MD, USA.

BACKGROUND: Since the 2011 Accreditation Council of Graduate Medical Education (ACGME) work hour rules for residents were implemented, 24–30 h call for interns has been replaced by shift work, including night-float. The impact of these changes on undergraduate medical education experiences in internal medicine has not been described.

OBJECTIVE: We aimed to determine the current status of medical students' overnight experiences in Internal Medicine clerkships and sub-internships, and to assess internal medicine educators' perceptions of the importance of overnight work during internal medicine rotations.

DESIGN AND PARTICIPANTS: In May 2014, the Clerkship Directors in Internal Medicine (CDIM) conducted its annual survey. Twenty-eight questions about student participation in overnight work and perceptions of the importance of overnight work (rated on 1–5 Likert scale, 1=very unimportant and 5=very important) were included. Descriptive statistics were used to summarize responses. Free text results were analyzed qualitatively.

KEY RESULTS: The response rate was 78 %. A minority of respondents reported students having any overnight experience during the clerkship (38.7 %) or the sub-internship (40.7 %). Only 5 % of respondents reported having students assigned to night-float rotations outside of clerkships or sub-internships. Respondents agreed that overnight experiences were more important during the sub-internship than the clerkship, 4.0 ± 1.1 vs. 3.2 ± 1.2 , $p < 0.001$. Admitting new patients, following their course and responding to emergencies were rated as important overnight tasks for both clerkship and sub-internship students.

CONCLUSIONS: Overnight experiences offer students additional educational opportunities. Clerkship directors felt that the overnight experience for the sub-intern in particular was an important chance to practice providing emergency cross coverage and other intern roles. In the era of ACGME duty hours, there is a need to further examine whether there is a role for increased overnight hospital experiences for medical students.

KEY WORDS: overnight; medical student; education; shift; duty hours.

J Gen Intern Med 30(9):1245–50

DOI: 10.1007/s11606-015-3405-4

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INTRODUCTION

At the end of the 19th century, the original “resident physician” resided at the hospital and was responsible for patients 24 h per day, 7 days per week.¹ Residency training evolved into a system where teams of doctors stayed in the hospital for 24–36 h shifts (traditional overnight call) every third or fourth night.² Medical students were assigned to work with residents embracing a philosophy that students should be apprentices, immersed in patient care with gradually increasing responsibility until the student becomes resident and teacher.³

In 2003, the Accreditation Council for Graduate Medical Education (ACGME) established new duty hour regulations that limited residents to an 80-h work week, limited continuous on-site duty, including in-house call, to 24 consecutive hours, prohibited residents from assuming care of new patients following 24 h of duty, and required at least 1 day off per week.^{4,5} An unofficial shift in medical students' work hours followed. The 1994 Liaison Committee on Medical Education (LCME) Dean's survey reported that 86 % of medicine clerkships required students to take overnight call; this decreased to 80 % by 2002. By 2009, only 61 % of medicine clerkships included overnight call.⁶ In 2011, ACGME duty hour restrictions limited interns to less than 16 continuous hours of patient care. Resident schedules began to incorporate more shift work including night shifts (also known as night-float, where residents work consecutive 10–14 h overnight shifts) as an alternative to traditional call.^{7,8} The night-float schedules result in different allocations and timing of admissions to resident teams. For example, more than 40 % of internal medicine hospital admissions are admitted by the night-float team and handed off the next morning.^{9,10} This change in the inpatient residency training environment has the potential to impact medical students whose clinical experiences historically focused on admitting new patients complemented by resident teaching.

To our knowledge, the prevalence of overnight experiences and their structure has not been described in Internal Medicine

Electronic supplementary material The online version of this article (doi:10.1007/s11606-015-3405-4) contains supplementary material, which is available to authorized users.

Published online July 15, 2015

undergraduate medical education (UME) since the 2011 duty hours were implemented. Additionally, there has been little research on the importance of overnight experience in developing medical students' clinical skills. To date, most publications have been editorials or single institution studies^{6,11–19} that highlight potential pros and cons of overnight experiences. Our survey was undertaken to better understand the status of student overnight experiences during core Internal Medicine rotations, and to determine whether Internal Medicine educators perceive overnight experience as an important component of training for undergraduate medical students.

METHODS

Survey Participants

The Clerkship Directors in Internal Medicine (CDIM) is the organization of educators teaching internal medicine to medical students. The CDIM annually conducts a survey of its institutional members on topics relevant to teaching Internal Medicine to medical students. Each institution nominates its own institutional member to respond on behalf of the institution on educational matters or surveys. Per CDIM Bylaws, this individual shall be the Clerkship Director or other qualified educator designated by the Chair (or equivalent) of those Departments of Internal Medicine of LCME /Committee on Accreditation of Canadian Medical Schools accredited medical schools of the United States of America, the Commonwealth of Puerto Rico, and Canada (AAIM. <http://www.im.org>).

Survey Development and Implementation

Each fall, CDIM members may submit survey questions for potential inclusion in the annual survey.²⁰ The CDIM Research Committee selects questions for inclusion based on clarity, quality, appropriateness, and importance to the CDIM mission. A series of questions addressing student participation in overnight experiences during the medicine clerkship or sub-internship were selected for inclusion in the annual survey. Questions were edited and revised before being presented to CDIM Council, who provided further revisions and final approval. The online survey instrument underwent pilot testing by members of the Research Committee and Council, with edits for optimal flow and clarity made prior to launch. In May 2014, CDIM conducted its annual, online, confidential survey of its 121 US and Canadian member medical schools. The designated institutional member from each medical school was invited by email to participate. Non-responders were contacted up to three additional times by email and once by telephone. The Institutional Review Board at the Washington DC Veterans Affairs Medical Center exempted this study.

Survey Instrument

One section of the 2014 CDIM Survey included 28 questions about overnight experiences in the Internal Medicine clerkship and sub-internship (survey available as [online appendix](#)). Questions first addressed the prevalence of overnight experiences in clerkships and sub-internships. If overnight experiences were present, respondents were asked who students worked with and what activities were performed. There was a question about the overall perceived importance of overnight experiences. Eight additional questions asked about the perceived importance of different aspects of overnight experiences (i.e., admitting new patients, following the initial course of newly admitted patients, observing the management of patients, responding to cross cover, observing role of intern/resident and attending, and preparing for future roles). These questions were rated on a 1–5 interval Likert scale (5 very important, 4 important, 3 neutral, 2 unimportant, 1 very unimportant). There was an open-ended question about why there should or should not be support of overnight experiences. The survey also included demographic questions (see [online appendix](#) for full survey).

Analysis

Descriptive statistics were used to summarize demographic data and outcome measures. Chi-squared analysis was used to determine differences between the frequency of medical student roles on the core clerkship and sub-internship overnight experiences. A student's *t* test was used to determine differences in perceived levels of importance between medical student roles on the core clerkship and sub-internship overnight experiences. Analysis of the variance was used to determine perceived importance of medical student roles by respondents' academic rank. SPSS, version 22 was used for statistical analysis.

RESULTS

The response rate for the overnight experiences survey section was 77.8 ($n=94/121$). By rank, 26 % of respondents were Professors, 44.5 % were Associate Professors and 29.5 % were Assistant Professors. Fifty-five percent were from private medical schools and 45 % were from public medical schools. Respondents were predominantly clerkship directors (63.7 %); 2.1 % were sub-internship directors, 29.8 % were both sub-internship and core clerkship directors and 6.4 % had other roles.

A minority of respondents (38.7 %) reported that students at their institutions had overnight experiences during the clerkship or sub-internship (40.2 % of respondents). On average, students participated in 4.0 ± 1.0 overnights on the clerkship and 4.8 ± 1.9 during the sub-internship. Only 5 % reported students participating in dedicated night-float work outside of the clerkship or sub-internship.

Figure 1. Importance of medical student activities during Overnight Experiences. Demonstrates the importance of medical student activities based upon a 5-point Likert scale (5 being very important) for both the core clerkship and sub-internship. The sub-internship was perceived as a statistically more important overnight experience overall ($p < 0.001$), and as statistically more important for all medical student roles identified ($p < 0.001$).

Among those respondents who reported student participation in overnights during the clerkship or sub-internship, a majority reported that students worked directly with housestaff (92 and 95 %, respectively), admitted new patients (95 and 100 %, respectively), and performed subsequent day/follow-up visits (77 and 75 %, respectively). Fewer respondents reported clerkship and sub-internship students working directly with attending physicians (42 and 45 % respectively), or doing consecutive overnights as a night-float responsibility within their medicine rotation (42 and 38 % respectively). Sub-internships were more likely to involve cross cover responsibilities than clerkships (77 % vs. 62 %, $p = 0.009$).

Respondents rated the overall importance of overnight work in the sub-internship higher than the clerkship (3.2 ± 1.2 vs. 4.0 ± 1.1 , $p < 0.001$). Although not statistically significant, there was a trend toward decreasing perceived overall importance with increasing academic rank for both the clerkship and the sub-internship. There was a difference in assistant and full professors' perceived importance of overnight work for admitting new patients during the clerkship (4.4 ± 0.8 vs. 3.3 ± 1.6 , $p = 0.01$) and the sub-internship (4.7 ± 0.5 vs. 3.8 ± 1.3 , $p = 0.016$). Additionally, there was a significant difference in

associate and full professors' perceived importance of overnight work for experiencing future roles during the clerkship (4.0 ± 0.9 vs. 3.3 ± 1.2 , $p = 0.04$) and sub-internship (4.6 ± 0.6 vs. 4.1 ± 0.7 , $p = 0.037$).

Respondents felt many aspects of overnight experiences were important in the clerkship and/or the sub-internship, and most activities were felt to be more important in the sub-internship. (Fig. 1) Respondents rated admitting new patients (3.9 ± 1.2 (clerkship) and 4.2 ± 1.1 (sub-internship), $p < 0.001$), following the course of new patients (4.1 ± 0.9 and 4.4 ± 0.8 , $p < 0.001$), and responding to patient emergencies (4.0 ± 0.1 and 4.5 ± 0.8 , $p < 0.001$) as important aspects of the overnight experience. Several other aspects of overnight work, such as responding to cross cover issues (3.5 ± 1.2 vs. 4.4 ± 0.8 , $p < 0.001$) and experiencing future roles as an intern (3.8 ± 1.0 vs. 4.4 ± 0.7 , $p < 0.001$), were also viewed as having greater importance in the sub-internship than in the clerkship. For both the clerkship and sub-internship, overnight work was perceived as less important in allowing students to observe future roles as an attending (2.6 ± 1.3 and 2.9 ± 1.3 , $p < 0.001$ respectively).

Repeated themes were collated within the free text response section (Table 1). The most common reported reason to support overnight work was the chance for learners to work up "fresh" patients and follow the initial course of disease. The ability to observe the role of the resident at night was also considered an important benefit of overnight work. Untapped learning experiences, the ability to work as part of the night-float team, cross coverage opportunities and teaching proper sign out techniques were less commonly identified as reasons to include overnight experiences. The unique overnight work environment with less competing responsibilities was considered another advantage of overnight clinical work. The most commonly reported negative themes or reasons not to support overnight experiences were poor nighttime supervision of students, medical student duty hour violations, challenging logistics and educators who were commenting upon the old "traditional" call schedule where students stayed in house for 24–36 h. The inconsistency of the learning environment overnight, the inability to attend daytime didactics and the lack of call room space were reported less frequently as barriers to

Table 1 Themes Regarding Student Participation in Overnight Hospital Experiences

Negative themes	# comments	Positive themes	# comments
Poor supervision by attendings/residents	20	De novo presentation of disease process and patients	15
Duty hour violation concerns	19	Observe future role as resident	13
Challenging logistics, no support system in place	15	Untapped learning opportunities	10
Reflecting upon TRADITIONAL call model of all day and all night call	15	Part of night-float team, shift experience	10
Competing daytime priorities	13	More clinical time, less competing responsibilities	4
Lack of call room space	9	Cross coverage of emergencies	4
Miss next day didactics	6	More autonomy	3
Too early for 3rd year students to learn from this activity	6	Teach proper sign-in/sign-out techniques	2
Not enough consistency in night experiences	6	Continuity of care	2
Student time imposition	5	Fosters graded responsibility environment	1

Positive and negative themes extracted from survey respondent comments about whether or not students should work overnight. The frequency with which each theme was cited is listed in the column following the theme. Comments were optional to record and were not limited to a single theme

overnight call. Finally, multiple respondents questioned the appropriateness of overnights for third years as opposed to sub-interns.

DISCUSSION

Our findings confirm the continuing trend of decreasing student participation in overnight experiences in core Internal Medicine rotations.^{2,6} The majority of respondents (61.3 %) reported having no overnight experiences for clerkship students or sub-interns (59.3 %).

The recently introduced Association of American Medical College's Core Entrustable Professional Activities for Entering Residency (CEPAER) will likely increase focus on how medical school curricula prepare students for residency.²¹ Literature about the transition from medical school to residency highlights the value of students gradually gaining proficiency in how to approach and manage clinical problems and decision making.²² More opportunities for students to manage patients and practice their upcoming roles as residents reflect an important paradigm for future doctors' training.^{18,22} Our findings suggest that overnight experiences, once an integral part of undergraduate and graduate medical training, may still have a role in preparing medical students for their future responsibilities.

According to the survey results, overnight experiences were a particularly important venue for admitting new patients. While no precise national data exists on the timing of admissions to internal medicine services, a large percentage (62 %) of emergency room visits that might lead to admission occur after "normal business hours."²³ Smaller studies have found that a large percentage of patients are now being admitted by night-float teams and handed off to day teams.^{9,10,24} In the survey, most respondents whose students rotated on overnights in the clerkship or sub-internship reported students admitting patients during overnight experiences. Tasks related to admitting and following the initial course of admitted patients were also perceived as an important component of overnights. Certainly students working during the day have the opportunity to admit new patients who have not been extensively worked up by others. However, our findings imply that limited student participation in overnights may represent a missed opportunity to give students greater exposure to admitting the undifferentiated patient. Given that at least seven of the Core Entrustable Professional Activities for Entering Residency (CEPAERs) have skills that are well taught through the admission of patients, the role of overnight experiences in providing students with greater admitting opportunity is worth further study. It will be important to determine if students who work exclusively during the day admit enough new patients and if the addition of overnight work increases this opportunity.

The survey particularly highlights how overnights in the sub-internship might prepare students for internship

and residency. Multiple aspects of overnight work were viewed as more important for sub-interns than for clerkship students. Responding to emergencies and cross cover were noted skills felt to be particularly relevant to internship. The opportunity to ease the transition between student and intern likely was a major contributor. Many survey respondents supported overnights especially for sub-interns and commented that overnight hospital experiences offered an environment that fostered the gradual increase in responsibility for the student. As the discussion of the particular values of the fourth year of medical school continues, the perception of the importance of overnights in the sub-internship may be important to consider. Overnights may be easier to incorporate into a fourth year schedule that lacks the rigid time frame and didactic schedule of the clerkship year.

Students on core internal medicine rotations, according to respondents, rarely participate in night-float rotations and the majority do not work consecutive overnights. However, upon starting internship, graduating students will almost certainly rotate extensively through night-float services,⁸ where they will work multiple consecutive overnights. The ACGME currently mandates that all residents be taught to assess and be aware of fatigue and assess their "fitness for duty."²⁵ Learning to adjust to a nocturnal schedule is a skill that might not be easily or safely taught while concurrently providing direct patient care as a resident. There may be value in preparing students to recognize and cope with the fatigue that comes with a nocturnal schedule during medical school. The survey should prompt a discussion of whether undergraduate medical educators might incorporate overnights into their curricula in response to the changes at the graduate medical education level, to expose trainees to overnight work prior to internship. While much has been written on the effects of fatigue and a nocturnal schedule, little has been published on how to teach students and residents to recognize and cope with fatigue.

Despite the perceived potential benefits of overnight experiences, respondents raised several concerns. These included students missing daytime didactics, the limited availability of call room space, the challenging logistics to create student overnight schedules, the need to maintain student duty hours and the lack of adequate supervision for students overnight. These barriers suggest that many survey respondents did not distinguish between overnight experiences and traditional overnight call. For example, limited availability of call room space is immaterial if students are doing a night-float rotation where they are expected to be working throughout the night and sleeping during the day. It was interesting that the most senior faculty members were most reticent to support overnight experiences, while junior faculty

members were more likely to rate overnight experiences as important. Perhaps this reflects that most of the senior faculty participated in overnight call before duty hour changes and considered the older schema of traditional overnights rather than emerging night-float structures. Regardless of the structure of overnight experiences, it may be difficult to convince students of the need to remain in the hospital overnight, as they are not a part of the current overnight culture at most institutions.

There are several limitations to consider. The survey only asked about perceived barriers to overnights in the free text question. Generalizability to other disciplines is limited, as the survey only assessed student involvement in overnight work during the internal medicine clerkship and sub-internship. Findings also represent clerkship directors' perception of student involvement in overnight work; actual student participation was not measured. Students' perceptions of overnight work were also not assessed. No data exists on students' willingness to remain in the hospital overnight, but it can likely be assumed that the addition of more overnights would not be widely welcomed. Most importantly, the survey did not examine whether the perceived decrease in overnight experiences has impacted students' attainment of milestones and core competencies. Lastly, the survey included a small number of Canadian respondents who are not affected by ACGME regulations.

The survey data suggest that the progressive disappearance of overnight experience from the medicine clerkship and sub-internship is a topic worth addressing. While there may be challenges adding overnight experiences or transitioning from traditional overnight call, it is important to also consider what may be lost from student training without overnight experience. It will be important to consider how to compensate for the decreased opportunity to admit and follow newly admitted patients and cross cover, activities that may be less prevalent with the loss of overnight rotations. Medical student education is closely tied to and affected by changes in graduate medical education. Duty hour regulations have made major changes to resident schedules, particularly around nights. Yet little data or discussion in the undergraduate literature has focused on how to adapt to these newest changes. This survey will hopefully serve as a starting point for how overnights can remain a key part of facilitating the transition of medical students into residents.

Acknowledgements: The authors acknowledge Katherine Chretien, MD for her contributions to the data collection. There was no funding for this study

Funding: None.

Conflict of Interest: The authors declare that they do not have a conflict of interest.

Disclaimer: The views expressed in this manuscript are those of the authors and do not necessarily reflect the official policy or position of the Uniformed Services University of the Health Sciences, Department of Defense, nor the U.S. Government.

Corresponding Author: Eric N. Goren, MD; Perelman School of Medicine, University of Pennsylvania, 3400 Spruce St #2009, Philadelphia, PA 19104, USA (e-mail: eric.goren@uphs.upenn.edu).

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