

ORIGINAL RESEARCH

Effects of Increased Overnight Supervision on Resident Education, Decision-Making, and Autonomy

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BACKGROUND: New supervisory regulations highlight the challenge of balancing housestaff supervision and autonomy. To better understand the impact of increased supervision on residency training, we investigated housestaff perceptions of education, autonomy, and clinical decision-making before and after implementation of an in-hospital, overnight attending physician (nocturnist).

METHODS: We established a nocturnist program in July 2010 at our academic, tertiary care medical center. We administered pre-surveys and post-surveys of internal medicine residents on night float rotation during the 2010–2011 academic year. We surveyed residents before and after experiencing the nocturnist program.

RESULTS: Housestaff reported an increase in the clinical value of the night float rotation (3.95 vs 4.27, $P = 0.01$) and the adequacy of overnight supervision (3.65 vs 4.30, $P < 0.0001$) without a change in decision-making autonomy

(4.35 vs 4.45, $P = 0.44$). Trainees agreed that nocturnist supervision positively impacted patient outcomes (3.79 vs 4.30, $P = 0.002$). Housestaff contacted attendings more frequently for transfers from outside facilities (2.00 vs 3.20, $P = 0.006$), during adverse events (2.51 vs 3.25, $P = 0.04$), prior to ordering invasive diagnostics (1.75 vs 2.76, $P = 0.004$), and prior to vasopressor use (1.52 vs 2.40, $P = 0.004$). Residents' fear of revealing knowledge gaps and desire to make decisions independently did not change.

CONCLUSIONS: Increased overnight supervision enhanced the clinical value of the night float rotation, increased rates of attending contact during critical clinical decision-making, and improved perception of patient care. These changes occurred without a decrease in housestaff's perceived decision-making autonomy. *Journal of Hospital Medicine* 2012;000:000–000 © 2012 Society of Hospital Medicine

Postgraduate medical education has traditionally relied on a training model of progressive independence, where housestaff learn patient care through increasing autonomy and decreasing levels of supervision.¹ While this framework has little empirical backing, it is grounded in sound educational theory from similar disciplines and endorsed by medical associations.^{1,2} The Accreditation Council for Graduate Medical Education (ACGME) recently implemented regulations requiring that first-year residents have a qualified supervisor physically present or immediately available at all times.³ Previously, oversight by an off-site supervisor (for example, an attending physician at home) was considered adequate. These new regulations, although motivated by patient safety imperatives,⁴ have elicited concerns that increased supervision may lead to decreased housestaff autonomy and

an increased reliance on supervisors for clinical guidance.⁵ Such changes could ultimately produce less qualified practitioners by the completion of training.

Critics of the current training model point to a patient safety mechanism where housestaff must take responsibility for requesting attending-level help when situations arise that surpass their skill level.⁵ For resident physicians, however, the decision to request support is often complex and dependent not only on the clinical question, but also on unique and variable trainee and supervisor factors.⁶ Survey data from 1999, prior to the current training regulations, showed that increased faculty presence improved resident reports of educational value, quality of patient care, and autonomy.⁷ A recent survey, performed after the initiation of overnight attending supervision at an academic medical center, demonstrated perceived improvements in educational value and patient-level outcomes by both faculty and housestaff.⁸ Whether increased supervision and resident autonomy can coexist remains undetermined.

Overnight rotations for residents (commonly referred to as “night float”) are often times of little direct or indirect supervision. A recent systematic review of clinical supervision practices for housestaff in all fields found scarce literature on overnight supervision practices.⁹ There remains limited and conflicting data regarding the quality of patient care provided

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by the resident night float,¹⁰ as well as evidence revealing a low perceived educational value of night rotations when compared with non-night float rotations.¹¹ Yet in 2006, more than three-quarters of all internal medicine programs employed night float rotations.¹² In response to ACGME guidelines mandating decreased shift lengths with continued restrictions on overall duty hours, it appears likely even more training programs will implement night float systems.

The presence of overnight hospitalists (also known as “nocturnists”) is growing within the academic setting, yet their role in relation to trainees is either poorly defined¹³ or independent of housestaff.¹⁴ To better understand the impact of increasing levels of supervision on residency training, we investigated housestaff perceptions of education, autonomy, and clinical decision-making before and after implementation of an in-hospital, overnight attending physician (nocturnist).

METHODS

The study was conducted at a 570-bed academic, tertiary care medical center affiliated with an internal medicine residency program of 170 housestaff. At our institution, all first year residents perform a week of intern night float consisting of overnight cross-coverage of general medicine patients on the floor, step-down, and intensive care units (ICUs). Second and third year residents each complete 4 to 6 days of resident night float each year at this hospital. They are responsible for assisting the intern night float with cross-coverage, in addition to admitting general medicine patients to the floor, step-down unit, and intensive care units. Every night at our medical center, 1 intern night float and 1 resident night float are on duty in the hospital; this is in addition to a resident from the on-call medicine team and a resident working in the ICU. Prior to July 2010, no internal medicine attending physicians were physically present in the hospital at night. Oversight for the intern and resident night float was provided by the attending physician for the on-call resident ward team, who was at home and available by pager. The night float housestaff were instructed to contact the responsible attending physician only when a major change in clinical status occurred for hospitalized or newly admitted patients, though this expectation was neither standardized nor monitored.

We established a nocturnist program at the start of the 2010 academic year. The position was staffed by hospitalists from within the Division of Hospital Medicine without the use of moonlighters. Two-thirds of shifts were filled by 3 dedicated nocturnists with remaining staffing provided by junior hospitalist faculty. The dedicated nocturnists had recently completed their internal medicine residency at our institution. Shift length was 12 hours and dedicated nocturnists worked, on average, 10 shifts per month. The noc-

turnist filled a critical overnight safety role through mandatory bedside staffing of newly admitted ICU patients within 2 hours of admission, discussion in person or via telephone of newly admitted step-down unit patients within 6 hours of admission, and direct or indirect supervision of the care of any patients undergoing a major change in clinical status. The overnight hospitalist was also available for clinical questions and to assist housestaff with triaging of overnight admissions. After nocturnist implementation, overnight housestaff received direct supervision or had immediate access to direct supervision, while prior to the nocturnist, residents had access only to indirect supervision.

In addition, the nocturnist admitted medicine patients after 1 AM in a 1:1 ratio with the admitting night float resident, performed medical consults, and provided coverage of non-teaching medicine services. While actual volume numbers were not obtained, the estimated average of resident admissions per night was 2 to 3, and the number of nocturnist admissions was 1 to 2. The nocturnist also met nightly with night float housestaff for half-hour didactics focusing on the management of common overnight clinical scenarios. The role of the new nocturnist was described to all housestaff in orientation materials given prior to their night float rotation and their general medicine ward rotation.

We administered pre-rolling surveys and post-rolling surveys of internal medicine intern and resident physicians who underwent the night float rotation at our hospital during the 2010 to 2011 academic year. Surveys examined housestaff perceptions of the night float rotation with regard to supervisory roles, educational and clinical value, and clinical decision-making prior to and after implementation of the nocturnist. Surveys were designed by the study investigators based on prior literature,^{1,5-10} personal experience, and housestaff suggestion, and were refined during works-in-progress meetings. Surveys were composed of Likert-style questions asking housestaff to rate their level of agreement (1–5, strongly disagree to strongly agree) with statements regarding the supervisory and educational experience of the night float rotation, and to judge their frequency of contact (1–5, never to always/nightly) with an attending physician for specific clinical scenarios. The clinical scenarios described situations dealing with attending–resident communication around transfers of care, diagnostic evaluation, therapeutic interventions, and adverse events. Scenarios were taken from previous literature describing supervision preferences of faculty and residents during times of critical clinical decision-making.¹⁵

One week prior to the beginning their night float rotation for the 2010–2011 academic year, housestaff were sent an e-mail request to complete an online survey asking about their night float rotation during the prior academic year, when no nocturnist was present.

TABLE 1. General Perceptions of the Night Float Rotation

| Statement | Pre-Nocturnist (n = 43) | Post-Nocturnist (n = 53) | P Value |
|---|----------------------------|-----------------------------|------------|
| | Mean (SD) | Mean (SD) | |
| Night float is a valuable educational rotation | 3.83 (0.81) | 4.04 (0.83) | 0.24 |
| Night float is a valuable clinical rotation | 3.95 (0.65) | 4.27 (0.59) | 0.01 |
| I have adequate overnight supervision | 3.65 (0.76) | 4.30 (0.72) | <0.0001 |
| I have sufficient autonomy to make clinical decisions | 4.35 (0.57) | 4.45 (0.60) | 0.44 |
| Overnight supervision by an attending positively impacts patient outcomes | 3.79 (0.88) | 4.30 (0.74) | 0.002 |

NOTE: Responses are strongly disagree (1) to strongly agree (5). Response rate (n) fluctuates due to item non-response.

Abbreviations: SD, standard deviation.

One week after completion of their night float rotation for the 2010–2011 academic year, housestaff received an e-mail with a link to a post-survey asking about their recently completed, nocturnist-supervised, night float rotation. First year residents received only a post-survey at the completion of their night float rotation, as they would be unable to reflect on prior experience.

Informed consent was imbedded within the e-mail survey request. Survey requests were sent by a fellow within the Division of Hospital Medicine with a brief message cosigned by an associate program director of the residency program. We did not collect unique identifiers from respondents in order to offer additional assurances to the participants that the survey was anonymous. There was no incentive offered for completion of the survey. Survey data were anonymous and downloaded to a database by a third party. Data were analyzed using Microsoft Excel, and pre-responses and post-responses compared using a Student *t* test. The study was approved by the medical center's Institutional Review Board.

RESULTS

Rates of response for pre-surveys and post-surveys were 57% (43 respondents) and 51% (53 respondents), respectively. Due to response rates and in order to convey accurately the perceptions of the training program as a whole, we collapsed responses of the pre-surveys and post-surveys based on level of training. After implementation of the overnight attending, we observed a significant increase in the perceived clinical value of the night float rotation (3.95 vs 4.27, $P = 0.01$) as well as in the adequacy of overnight supervision (3.65 vs 4.30, $P < 0.0001$; Table 1). There was no reported change in housestaff decision-making autonomy (4.35 vs 4.45, $P = 0.44$). In addition, we noted a nonsignificant trend towards an increased perception of the night float rotation as a valuable educational experience (3.83 vs 4.04, $P = 0.24$). After implementation of the nocturnist, more resident physicians agreed that overnight supervision

TABLE 2. Self-Reported Incidence of Overnight Attending Contact During Critical Decision-Making

| Scenario | Pre-Nocturnist (n = 42) | Post-Nocturnist (n = 51) | P Value |
|---|----------------------------|-----------------------------|------------|
| | Mean (SD) | Mean (SD) | |
| Receive transfer from outside facility | 2.00 (1.27) | 3.20 (1.58) | 0.006 |
| Prior to ordering noninvasive diagnostic procedure | 1.09 (0.29) | 1.31 (0.58) | 0.03 |
| Prior to ordering an invasive procedure | 1.75 (0.84) | 2.76 (1.45) | 0.004 |
| Prior to initiation of intravenous antibiotics | 1.11 (0.32) | 1.47 (0.76) | 0.007 |
| Prior to initiation of vasopressors | 1.52 (0.82) | 2.40 (1.49) | 0.004 |
| Patient experiencing adverse event, regardless of cause | 2.51 (1.31) | 3.25 (1.34) | 0.04 |

NOTE: Responses are never contact (1) to always contact (5). Response rate (n) fluctuates due to item non-response.

Abbreviations: SD, standard deviation.

TABLE 3. Self-Reported Incidence of Night Float Contact With Overnight Providers for Patient Care

| Provider | Pre-Nocturnist (n = 43) | Post-Nocturnist (n = 53) | P Value |
|----------------------------|----------------------------|-----------------------------|------------|
| | Mean (SD) | Mean (SD) | |
| ICU Fellow | 1.86 (0.70) | 1.86 (0.83) | 0.96 |
| On-call resident | 2.67 (0.89) | 2.04 (0.92) | 0.006 |
| ICU resident | 2.14 (0.74) | 2.04 (0.91) | 0.56 |
| On-call medicine attending | 1.41 (0.79) | 1.26 (0.52) | 0.26 |
| Patient's PMD | 1.27 (0.31) | 1.15 (0.41) | 0.31 |
| Referring MD | 1.32 (0.60) | 1.15 (0.45) | 0.11 |
| Nocturnist | ... | 3.59 (1.22) | ... |

NOTE: Responses are never (1) to nightly (5). Response rate (n) fluctuates due to item non-response.

Abbreviations: ICU, intensive care unit; PMD, primary medical doctor; SD, standard deviation.

by an attending positively impacted patient outcomes (3.79 vs 4.30, $P = 0.002$).

After implementation of the nocturnist, night float providers demonstrated increased rates of contacting an attending physician overnight (Table 2). There were significantly greater rates of attending contact for transfers from outside facilities (2.00 vs 3.20, $P = 0.006$) and during times of adverse events (2.51 vs 3.25, $P = 0.04$). We observed a reported increase in attending contact prior to ordering invasive diagnostic procedures (1.75 vs 2.76, $P = 0.004$) and noninvasive diagnostic procedures (1.09 vs 1.31, $P = 0.03$), as well as prior to initiation of intravenous antibiotics (1.11 vs 1.47, $P = 0.007$) and vasopressors (1.52 vs 2.40, $P = 0.004$).

After initiating the program, the nocturnist became the most commonly contacted overnight provider by the night float housestaff (Table 3). We observed a decrease in peer to peer contact between the night float housestaff and the on-call overnight resident after implementation of the nocturnist (2.67 vs 2.04, $P = 0.006$).

Attending presence led to increased agreement that there was a defined overnight attending to contact (2.97 vs 1.96, $P < 0.0001$) and a decreased fear of waking an attending overnight for assistance (3.26 vs 2.72, $P = 0.03$). Increased attending availability, however, did not change resident physician's fear of

TABLE 4. Reasons Night Float Housestaff Do Not Contact an Attending Physician

| Statement | Pre-Nocturnist (n = 42) | Post-Nocturnist (n = 52) | P Value |
|-----------------------------------|----------------------------|-----------------------------|------------|
| | Mean (SD) | Mean (SD) | |
| No defined attending to contact | 2.97 (1.35) | 1.96 (0.92) | <0.0001 |
| Fear of waking an attending | 3.26 (1.25) | 2.72 (1.09) | 0.03 |
| Fear of revealing knowledge gaps | 2.26 (1.14) | 2.25 (0.96) | 0.95 |
| Would rather make decision on own | 3.40 (0.93) | 3.03 (1.06) | 0.08 |
| Will not change patient outcome | 3.26 (1.06) | 3.21 (1.03) | 0.81 |

NOTE: Responses are strongly disagree (1) to strongly agree (5). Response rate (n) fluctuates due to item non-response. Abbreviations: SD, standard deviation.

revealing knowledge gaps, their desire to make decisions independently, or their belief that contacting an attending would not change a patient's outcome (Table 4).

DISCUSSION

The ACGME's new duty hour regulations require that supervision for first-year residents be provided by a qualified physician (advanced resident, fellow, or attending physician) who is physically present at the hospital. Our study demonstrates that increased direct overnight supervision provided by an in-house nocturnist enhanced the clinical value of the night float rotation and the perceived quality of patient care. In our study, increased attending supervision did not reduce perceived decision-making autonomy, and in fact led to increased rates of attending contact during times of critical clinical decision-making. Such results may help assuage fears that recent regulations mandating enhanced attending supervision will produce less capable practitioners, and offers reassurance that such changes are positively impacting patient care.

Many academic institutions are implementing nocturnists, although their precise roles and responsibilities are still being defined. Our nocturnist program was explicitly designed with housestaff supervision as a core responsibility, with the goal of improving patient safety and housestaff education overnight. We found that availability barriers to attending contact were logically decreased with in-house faculty presence. Potentially harmful attitudes, however, around requesting support (such as fear of revealing knowledge gaps or the desire to make decisions independently) remained. Furthermore, despite statistically significant increases in contact between faculty and residents at times of critical decision-making, overall rates of attending contact for diagnostic and therapeutic interventions remained low. It is unknown from our study or previous research, however, what level of contact is appropriate or ideal for many clinical scenarios.

Additionally, we described a novel role of an academic nocturnist at a tertiary care teaching hospital and offered a potential template for the development

of academic nocturnists at similar institutions seeking to increase direct overnight supervision. Such roles have not been previously well defined in the literature. Based on our experience, the nocturnist's role was manageable and well utilized by housestaff, particularly for assistance with critically ill patients and overnight triaging. We believe there are a number of factors associated with the success of this role. First, clear guidelines were presented to housestaff and nocturnists regarding expectations for supervision (for example, staffing ICU admissions within 2 hours). These guidelines likely contributed to the increased attending contact observed during critical clinical decision-making, as well as the perceived improved patient outcomes by our housestaff. Second, the nocturnists were expected to be an integral part of the overnight care team. In many systems, the nocturnists act completely independently of the housestaff teams, creating an additional barrier to contact and communication. In our system, because of clear guidelines and their integral role in staffing overnight admissions, the nocturnists were an essential partner in care for the housestaff. Third, most of the nocturnists had recently completed their residency training at this institution. Although our survey does not directly address this, we believe their knowledge of the hospital, appreciation of the role of the intern and the resident within our system, and understanding of the need to preserve housestaff autonomy were essential to building a successful nocturnist role. Lastly, the nocturnists were not only expected to supervise and staff new admissions, but were also given a teaching expectation. We believe they were viewed by housestaff as qualified teaching attendings, similar to the daytime hospitalist. These findings may provide guidelines for other institutions seeking to balance overnight hospitalist supervision with preserving resident's ability to make autonomous decisions.

There are several limitations to our study. The findings represent the experience of internal medicine housestaff at a single academic, tertiary care medical center and may not be reflective of other institutions or specialties. We asked housestaff to recall night float experiences from the prior year, which may have introduced recall bias, though responses were obtained before participants underwent the new curriculum. Maturation of housestaff over time could have led to changes in perceived autonomy, value of the night float rotation, and rates of attending contact independent of nocturnist implementation. In addition, there may have been unaccounted changes to other elements of the residency program, hospital, or patient volume between rotations. The implementation of the nocturnist, however, was the only major change to our training program that academic year, and there were no significant changes in patient volume, structure of the teaching or non-resident services, or other policies around resident supervision.

It is possible that the nocturnist may have contributed to reports of increased clinical value and perceived quality of patient care simply by decreasing overnight workload for housestaff, and enhanced supervision and teaching may have played a lesser role. Even if this were true, optimizing resident workload is in itself an important goal for teaching hospitals and residency programs alike in order to maximize patient safety. Inclusion of intern post-rotation surveys may have influenced data; though, we had no reason to suspect the surveyed interns would respond in a different manner than prior resident groups. The responses of both junior and senior housestaff were pooled; while this potentially weighted the results in favor of higher responding groups, we felt that it conveyed the residents' accurate sentiments on the program. Finally, while we compared two models of overnight supervision, we reported only housestaff perceptions of education, autonomy, patient outcomes, and supervisory contact, and not direct measures of knowledge or patient care. Further research will be required to define the relationship between supervision practices and patient-level clinical outcomes.

The new ACGME regulations around resident supervision, as well as the broader movement to improve the safety and quality of care, require residency programs to negotiate a delicate balance between providing high-quality patient care while preserving graduated independence in clinical training. Our study demonstrates that increased overnight supervision by nocturnists with well-defined supervisory and teaching roles can preserve housestaff autonomy, improve the clinical experience for trainees, increase access to support during times of critical decision-making, and potentially lead to improved patient outcomes.

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