

BRIEF REPORT: Internal Medicine Residents', Attendings', and Nurses' Perceptions of the Night Float System

Elie A. Akl, MD, MPH,^{1,2} Anshu Bais, MD,¹ Ellen Rich, MD,¹ Joseph Izzo, MD,¹
Brydon J. B. Grant, MD,^{1,2,3,4,5} Holger J. Schünemann, MD, PhD^{1,2,6,7}

¹Department of Medicine, University at Buffalo, Buffalo, NY, USA; ²Department of Social & Preventive Medicine, University at Buffalo, Buffalo, NY, USA; ³Department of Medicine, VAMC, Buffalo, NY, USA; ⁴Department of Biostatistics, University at Buffalo, Buffalo, NY, USA; ⁵Department of Physiology and Biophysics, University at Buffalo, Buffalo, NY, USA; ⁶Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, ON, Canada; ⁷INFORMA/Department of Epidemiology, Istituto Regina Elena/Italian National Cancer Institute, Rome, Italy.

BACKGROUND: Residency training programs use the night float system increasingly to meet the new resident work hour regulations.

OBJECTIVE: To assess and compare residents', attendings', and nurses' perceptions of the night float system.

DESIGN: A survey study.

PARTICIPANTS: One hundred and seven residents, 48 attendings, and 69 nurses in a university-based multicenter internal medicine residency program.

MEASUREMENTS: Perceived impact on patient care, resident training, and resident performance.

RESULTS: The overall response rate was 75%. In general, more residents than both attendings and nurses had positive opinions regarding the night float system, particularly in relation to patient care. Only a small proportion of residents and attendings thought positively about the night float's impact on training quality (29.9%; 18.2%), daily feedback (23.0%; 9.1%), and end of rotation evaluation (21.8%; 6.1%). Less than half of the nurses had positive perceptions of the night residents' performance in terms of promptness (40.9%), physical availability (38.6%), familiarity with the patients' cases, and management plans (15.9%), communication of management plans to nurses (36.4%), professional respect and trust (43.2%), and teamwork (45.5%).

CONCLUSIONS: Residents had more positive perceptions than attendings and nurses. Nurses, in particular, had negative perceptions of resident performance in the setting of the night float system.

KEY WORDS: residency; faculty; nurses; medical education; patient care; inpatient.

DOI: 10.1111/j.1525-1497.2006.00434.x
J GEN INTERN MED 2006; 21:494-497.

Research suggests that resident fatigue and sleep deprivation have adverse effects on patient outcomes.^{1,2} As a result, the Accreditation Council for Graduate Medical Education established new standards limiting the total number of resident work hours in 2002.³ In order to comply with these standards, residency programs are restructuring residents' night coverage system by adopting the night float system.⁴

However, the effects of this system on patient care, resident training, and resident performance are unclear. While some investigators have questioned the educational value of

the night float system,^{5,6} 2 studies suggested that it reduced the stress on residents.^{6,7} Other authors raised concern over the effect on the continuity of patient care.⁸⁻¹⁰ For example, patients admitted to short-call or night-float interns were significantly less satisfied with their care than were patients admitted to long-call residents.¹¹

While patients are the focus of care, perceptions and attitudes of other stakeholders are important for evaluating organizational systems. For residency programs, important stakeholders include residents, attendings, and nursing staff. Given their close interaction with both patients and residents, nurses have a unique perspective that should be valued. The objective of this survey was to assess and compare residents', attendings', and nurses' perceptions of patient care, resident training, and resident performance in the setting of the night float system.

METHODS

Setting

The University at Buffalo Internal Medicine Residency program trains about 130 residents at any one time. We conducted this survey at the 2 main teaching hospitals of this program: a Veterans Affairs (VA) hospital and an inner-city county hospital. The night float system has been in place since 1989. The night float team includes 1 senior resident and interns (1 at the VA and 3 at the county hospital). The duration of the rotation is 4 weeks, with 5 shifts per week of 12 hours each. Duties include admissions and addressing urgent issues of the day teams' patients. At the beginning of each shift, the night float team receives a sign-out from the daytime residents and interns. At the end of each shift, the night float team reports on new admissions and important events to the senior day residents. Night float interns care for patients for particular teams they have been assigned to but also cross-cover various teams and patients.

Participants

We surveyed the program's residents and attendings, and the county hospital night-time nurses. Each resident surveyed had completed either a day or a night rotation at both hospital sites and randomly received a questionnaire regarding 1 of the 2 sites. The nurses at the Veteran Hospital could not be surveyed. The University at Buffalo Human Subjects Institutional Review Board approved the study, and all participants provided informed consent.

Conflict of Interest: None to declare.

This study was presented as a poster at the 2005 meeting of the Society of General Internal Medicine in New Orleans.

Address correspondence and requests for reprints to Dr. Akl: Department of Medicine, University at Buffalo, ECMC-CC 142, 462 Grider St., Buffalo, NY 14215 (e-mail: elieakl@buffalo.edu).

Data Collection

In October 2004, we sent residents and attendings an invitation email linking to a web-based survey. We sent nonresponders up to 3 reminders (2 emails, and then a postal mail). During the same time period, we invited nurses to complete a paper-based survey via a 1-time internal mail. The questionnaire included demographic questions and a number of positively framed statements on patient care, resident training (addressed only to residents and attendings), and resident performance (addressed only to nurses) in relation to the night float system. Respondents rated their agreement with the statements on 7-point Likert scales (-3 = strongly disagree, 0 = neutral and 3 = strongly agree). We developed the statements based on the hypothesized effects of the night float system, prior surveys,^{12,13} and discussions with residents, attendings, and nurses. Four attendings, 2 recent residency graduates, and 2 nurses reviewed and commented on the questionnaire.

Statistical Analysis

For each of the statements, and for the 3 groups separately, we calculated the percentage of participants whose ratings on the Likert scale reflected negative (-3 , -2 , and -1), neutral (0), or positive (1 , 2 , and 3) perceptions. We compared the percentages between 2 of the 3 groups at a time using the χ^2 test. To evaluate whether the proportion of participants with positive perceptions were independently associated with respondents' characteristics, we performed multivariable regression analyses using logistic models.

RESULTS

Ninety of 107 residents (84%), 33 of 48 attendings (69%), and 44 of 69 nurses (64%) completed the survey. Table 1 shows the respondents' characteristics. Table 2 shows the percentage of participants with negative, neutral, and positive perceptions. It also shows the P values for the differences between the proportions.

For all patient care-related statements, a significantly higher proportion of residents than of attendings or nurses had positive perceptions. There was no statistically significant difference between the proportion of attendings and nurses. Low proportions of the 3 groups (among their lowest) had positive perceptions of residents' communication with patients (residents: 41.1%, attendings: 15.2%, nurses: 14.0%).

For resident training-related statements, a significantly higher proportion of residents than of attendings had positive perceptions of: appropriateness of daily feedback (23.0% and 9.1%, respectively), end of rotation evaluation by attendings (21.8%; 6.1%), the level of accountability of night residents to their team (63.2%; 15.2%), and the level of support available to them (47.1%; 21.2%). More than half of residents and attendings (no statistically significant difference) positively perceived the acceptability of clinical burden (59.8%; 66.7%), the night float's independence (79.3%; 81.8%), and confidence (70.1%; 57.6%). Less than half of residents and attendings (no statistically significant difference) positively perceived reading time (31.0%; 45.5%) and training quality (29.9%; 18.2%).

For each of the resident performance-related statements, less than half the nurses positively perceived: night float's promptness (40.9%), physical availability (38.6%), familiarity

Table 1. Respondents' Characteristics

Characteristic	N (%)		
	Residents*, N=90	Attendings, N=33	Nurses, N=44
Gender			
Female	28 (31.1)	8 (25.0)	39 (90.7)
Site†			
ECMC	43 (47.8)	13 (40.6)	43 (100)
VAMC	47 (52.2)	19 (59.4)	0 (0)
Education			
International graduates	63 (70.0)	13 (40.6)	N/A
Postgraduate year			
1	35 (38.9)	N/A	N/A
2	27 (30.0)	N/A	N/A
3	22 (24.4)	N/A	N/A
4	3 (3.3)	N/A	N/A
Mean (SD)			
Age	29.4 (3.52)	45.5 (9.16)	34.9 (10.91)
Years since graduation from medical school	4.1 (3.19)	18.8 (8.90)	N/A
Number day rotations	2.2 (1.57)	N/A	N/A
Number night rotations	0.5 (0.61)	N/A	N/A
Years as teaching attending	N/A	12.1 (8.65)	N/A
Weeks per year on inpatient service	N/A	7.3 (4.39)	N/A
Years as nurse	N/A	N/A	5.3 (6.97)
Years with internal medicine	N/A	N/A	3.8 (4.92)

*Three residents did not respond to demographic questions.

†ECMC, Erie County Medical Center; VAMC, Veterans Affairs Medical Center; IMG, International medical graduate; BSN, Bachelors of Science in Nursing; N/A, not applicable.

with the patients' cases and management plans (15.9%), communication of management plans to nurses (36.4%), professional respect and trust (43.2%), teamwork (45.5%), and ease of identification of the resident in charge of a particular patient (38.6%).

The multivariable analysis showed that residents who completed more night rotations were more likely to positively perceive the effectiveness of the sign-in and the sign-out rounds, communication with nurses, the acceptability of clinical burden, the end of rotation evaluation, and the night rotation overall.

DISCUSSION

While perceptions of the night float system among residents, attendings, and nurses were generally negative, the perceptions of residents about the impact of the night float system on aspects of patient care were the most positive. The night residents' communication with patients was generally negatively perceived by the 3 groups. A very low proportion of both residents and attendings positively perceived the residents' training quality, daily feedback, and end of rotation evaluation. Less than half the nurses had positive perceptions for each of the resident performance aspects.

Our study has 2 main strengths. First, while previous studies assessed either residents and attendings' perceptions,^{13,14} or nurses' perceptions,⁸ this study is the first, to our knowledge, to compare nurses' with residents' and attendings' perceptions. Second, the high survey response rate reduces the possibility of response bias.¹⁵ In terms of limitations, we surveyed only 1 internal medicine residency

Table 2. Univariate and Comparative Analysis of Participants' Perceptions of Patient Care

Question	Residents, N=90			Attendings, N=33			Nurses, N=44			Residents vs Attendings	Residents vs Nurses	Attendings vs Nurses
	Neg*	Neu*	Pos*	Neg*	Neu*	Pos*	Neg*	Neu*	Pos*	P Value [†]	P Value [†]	P Value [†]
Involvement	6.7	20.0	70.0	24.2	24.2	51.5	29.5	25.0	43.2	.02	.001	.79
Continuity of care	12.2	11.1	76.7	42.4	18.2	39.4	45.5	27.3	25.0	<.001	<.001	.38
Quality of care	8.9	13.3	77.8	30.3	24.2	45.5	31.8	34.1	31.8	.002	<.001	.46
Communication with patients	30.0	28.9	41.1	48.5	36.4	15.2	61.4	22.7	13.6	.02	.001	.41
Communication with nurses	13.3	17.8	68.9	36.4	45.5	18.2	20.5	43.2	34.1	<.001	.001	.17
Sign-in effectiveness	11.1	17.8	71.1	51.5	24.2	24.4	—	—	—	<.001	N/A	N/A
Sign-out effectiveness	11.1	11.1	77.8	30.3	36.4	33.3	—	—	—	<.001	N/A	N/A
Day team efficiency	8.9	20.0	71.1	39.4	33.3	27.3	—	—	—	<.001	N/A	N/A
Length of stay	21.1	30.0	48.9	36.4	51.5	12.1	—	—	—	.001	N/A	N/A
Outcomes	10.0	18.9	71.1	21.2	42.4	36.4	—	—	—	.002	N/A	N/A

*Percentages of participants with negative (neg), neutral (neu), and positive (pos) perceptions, respectively.

[†]P value for the χ^2 test comparing the percentages of the 2 groups.

program, limiting the generalizability of our results. In addition, the survey statements have face validity but not construct validity. The pattern and consistency in the difference between residents', attendings', and nurses' perceptions is an interesting finding. Barden et al.¹³ found a similar pattern comparing surgical residents and attendings' perceptions of limiting work hours. In that study, of 21 positively framed statements, 6 received statistically different ratings from the 2 groups, all with higher ratings by residents. This pattern emphasizes the importance of assessing the perceptions of all stakeholders, notably nurses, given their unique perspective. The results could suggest that attendings and nurses are more objective in their assessment than residents who may believe that they are evaluating their own performance. The results could also suggest that attendings and nurses are negatively biased toward residents or have higher expectations than the residents themselves have.

In a 1989 survey, Buff et al.⁸ found that a significant majority of nurses in an Internal Medicine residency program preferred a night float system over a standard on-call system. While the nurses in this study did not experience the 2 systems, and were not asked to compare them, they apparently had lower perceptions of the night float system than the nurses in the study by Buff et al. This lack of enthusiasm for the night float system might be related to program differences and/or a time trends in characteristics of patients', residents', and nurses' populations or in the night float structure itself.

Our findings raised concerns about a number of issues in this residency training program. The most noteworthy findings were related to the night residents' communication with patients and nurses, continuity of care, familiarity with patients' cases and management plans, daily feedback to the night residents, and the end of rotation evaluation. As a result of our study, the program leadership restructured the night float system to address these concerns. These changes included assigning each night float intern as a member of 1 floor team and not just as "the covering intern." This intern would admit and cover all that team's patients, provide the sign-in to the whole team during morning rounds, and receive daily feedback and end of rotation evaluation from the team attending. The intention is to increase continuity and quality of care and enhance the training quality through increased awareness of the patients' cases and plans, increased accountability, and improved feedback and evaluation.

While the generalizability of the findings of our survey might be limited, the approach of assessing stakeholders' perceptions and using them to improve the organizational structure should be generalizable. Further research should assess the impact of such organizational structure changes on desired outcomes.

The authors thank the Internal Medicine residents and attendings at the University at Buffalo. They also thank Ms. Nancy Maroun for her help, and Mrs. Linda Sachs for her administrative assistance.

The Research for Health in Erie County Inc., the Graduate Medical Education of the University at Buffalo, and the Italian National Cancer Institute in Rome, Italy, funded this study. The funding source was not involved in the design of the study; in the collection, analysis, or interpretation of data; or in the decision to submit the manuscript for publication. Investigators received salary support from institutional sources.

Author contributions: Conception and design: E.A.A., H.J.S., J.I.; analysis and interpretation of data: E.A.A., H.J.S.; drafting of the article: E.A.A., H.J.S.; critical revision of the article for important intellectual content: E.A.A., A.B., E.R., J.I., B.G., H.J.S.; final approval of the article: E.A.A., A.B., E.R., J.I., B.G., H.J.S.; provision of study materials or patients: E.A.A., A.B., E.R., J.I., B.G., H.J.S.; statistical expertise: H.J.S., E.A.; obtaining of funding: E.A., H.J.S., A.B.; administrative, technical, or logistic support: Linda Sachs; collection and assembly of data: E.A., A.B., H.J.S.

REFERENCES

1. Veasey S, Rosen R, Barzansky B, Rosen I, Owens J. Sleep loss and fatigue in residency training: a reappraisal. *JAMA*. 2002;288:1116-24.
2. Weinger MB, Ancoli-Israel S. Sleep deprivation and clinical performance. *JAMA*. 2002;287:955-7.
3. Accreditation Council for Graduate Medical Education C. Common duty hour standards for programs, 2002. Available at: <http://www.acgme.org/>. Accessed October 2004.
4. Morelock JA, Stern DT. Shifting patients: how residency programs respond to residency review committee requirements. *Am J Med*. 2003;115:163-9.
5. Bekes CE. A time for work and a time for rest. *Crit Care Med*. 2003; 31:987-8.
6. Lieu TA, Forrest CB, Blum NJ, Cornfeld D, Polin RA. Effects of a night-float system on resident activities and parent satisfaction. *Am J Dis Child*. 1992;146:307-10.
7. Schwartz AJ, Black ER, Goldstein MG, Jozefowicz RF, Emmings FG. Levels and causes of stress among residents. *J Med Educ*. 1987;62:744-53.
8. Buff DD, Shabti R. The night float system of resident on call: what do the nurses think? *J Gen Intern Med*. 1995;10:400-2.

9. **Cavallo A, Ris MD, Succop P.** The night float paradigm to decrease sleep deprivation: good solution or a new problem? *Ergonomics*. 2003;46:653–63.
10. **Lofgren RP, Gottlieb D, Williams RA, Rich EC.** Post-call transfer of resident responsibility: its effect on patient care. *J Gen Intern Med*. 1990;5:501–5.
11. **Griffith CH III, Wilson JF, Rich EC.** Intern call structure and patient satisfaction. *J Gen Intern Med*. 1997;12:308–10.
12. **Akl EA, Maroun N, Klocke RA, Schünemann HJ.** Is shorter better? A survey of internal medicine residents and faculty about the duration of attendings' inpatient rotations. *J Gen Intern Med*. 2004;19:1133–9.
13. **Barden CB, Specht MC, McCarter MD, Daly JMF, Fahey TJ.** Effects of limited work hours on surgical training. *J Am Coll Surg*. 2002;195:531–8.
14. **Niederee MJ, Knudtson JL, Byrnes MC, Helmer SD, Smith RS.** A survey of residents and faculty regarding work hour limitations in surgical training programs. *Arch Surg*. 2003;138:663–9.
15. **Asch DA, Jedrzewski MK, Christakis NA.** Response rates to mail surveys published in medical journals. *J Clin Epidemiol*. 1997;50:1129–36.

Appendix: Survey statements

Patient care

1. The night house staff have an adequate level of involvement in the care of patients
2. The night house staff provide adequate continuity of care
3. The night house staff provide high quality of patient care
4. The night house staff have high quality communication with the patients and their families
5. The night house staff have high quality communication with the nursing staff
6. The morning sign-in is highly effective in passing on the adequate information about patients' cases and management plans
The evening sign-out is highly effective in passing on the adequate information about patients' cases and management plans
7. The night house staff have positive impact on the efficiency of the day house staff
8. The night house staff have positive impact on patients' length of stay
9. The night house staff have positive impact on patients' outcomes (i.e., morbidity and mortality)

Resident training

1. The night house staff have an acceptable clinical burden
2. The night house staff have sufficient time for academic reading
3. The night house staff receive high quality clinical training
4. The night house staff receive appropriate daily feedback regarding their performance
5. The night house staff receive appropriate end of rotation evaluation
6. The night house staff are accountable to their team for their patient care decisions
7. The night house staff have an adequate level of support in making patient care decisions
8. The house staff have an adequate level of independence in making patient care decisions
9. The night house staff have an adequate level of confidence in making patient care decisions

Resident performance

1. Promptness of the night house staff in responding to patients' needs
2. Physical availability of the night house staff
3. Familiarity of the night house staff with the patient's case and management plan
4. Professional respect and trust of the night house staff towards the nursing staff
5. The ability of the night house staff to work with the nursing staff as a team
6. Effectiveness of communication of the night house staff of the plan of care to the nursing staff
7. Ease of identification of the night house staff in charge of a particular patient