

## ORIGINAL ARTICLE

**Nighttime Resident Supervision and Education: Results of a National Survey of Internal Medicine Residency Program Directors**Christopher Bruti<sup>1</sup>, Matthew Tuck<sup>2</sup>, Rebecca Harrison<sup>3</sup>, Dustin Smith<sup>4</sup>, Michael Kisielewski<sup>5</sup>, Jillian S. Catalanotti<sup>6</sup>, Alfred Burger<sup>7</sup>

<sup>1</sup>Rush University Medical Center; 1717 W Congress Pkwy, Chicago, IL 60612 [Christopher.Bruti@rush.edu](mailto:Christopher.Bruti@rush.edu). 312-563-7594.

<sup>2</sup>Veterans Affairs Medical Center, 50 Irving Street NW, Washington, DC 20422; [matthew.tuck@va.gov](mailto:matthew.tuck@va.gov)

<sup>3</sup>Oregon Health & Science University School of Medicine; 3181 SW Sam Jackson Park Rd, Portland, OR 97239; [harrisor@ohsu.edu](mailto:harrisor@ohsu.edu)

<sup>4</sup>Atlanta VA Medical Center, 1670 Clairmont Road, Decatur, GA 30033; [dtsmit2@emory.edu](mailto:dtsmit2@emory.edu)

<sup>5</sup>Alliance for Academic Internal Medicine, 330 John Carlyle Street, Suite 610, Alexandria, VA 22314;

[mkisielewski@im.org](mailto:mkisielewski@im.org)

<sup>6</sup>The George Washington University School of Medicine and Health Sciences, 2150 Pennsylvania Ave, NW, Washington, DC 20037, [jcatalanotti@mfa.gwu.edu](mailto:jcatalanotti@mfa.gwu.edu)

<sup>7</sup>Icahn School of Medicine, Mount Sinai Beth Israel, 16<sup>th</sup> street and 1<sup>st</sup> avenue, New York, NY 10003;

[alfred.burger@mountsinai.org](mailto:alfred.burger@mountsinai.org)

Corresponding author: Christopher Bruti; [Christopher.bruti@rush.edu](mailto:Christopher.bruti@rush.edu)

Received:05/29/2022 Revised: 06/19/2022 Published: 06/30/2022

*Am j Hosp Med* 2022 April;6(2):2022. DOI: <https://doi.org/10.24150/ajhm/2022.005>

**Introduction:** Over the past several years, the Accreditation Council for Graduate Medical Education (ACGME) has issued new restrictions on resident duty hours while calling for increased supervision to ensure patient safety. To meet these requirements, some hospitals have hired overnight in-house hospitalist physicians, also called nocturnists, while others have continued a traditional model wherein a resident in-house can access a supervisor at home by phone as needed. This study examines the current state of internal medicine resident supervision and teaching at night.

**Materials & Methods:** Nationally-representative, web-based survey in 2017 of 379 internal medicine residency program directors whose programs held membership in an academic professional association and were accredited by the ACGME prior to July 1, 2016. We calculated frequencies and percentages for each response as descriptive analysis. We tested for statistical associations between responses using Pearson's Chi-square statistic, Fisher's Exact Test, the Adjusted Wald test or One-Way Analysis of Variance (ANOVA).

**Results:** The survey response rate was 70%. Notably, 77% of respondents reported that their program should have increased nighttime supervision. Program directors reported at least "sometimes" having insufficient attending staffing overnight to ensure high-quality patient care (42.9%) and patient safety (40.1%) in the hospital.

**Conclusions:** The results of this nationally representative survey of program directors suggest that there is insufficient resident supervision at night, which has potential patient safety, educational, and financial implications.

---

**INTRODUCTION**

Overnight supervision and education of residents has changed remarkably in the past 20 years.<sup>12, 3</sup> During this time the Accreditation Council for Graduate Medical Education (ACGME) has mandated restrictions on work hours while requiring faculty to “provide appropriate levels of supervision to promote patient safety.”<sup>4-6 7</sup>To meet these requirements, many teaching hospitals created new staffing models that include hospitalists for supervision during the day and have added an in-house overnight hospitalist faculty member, or dedicated night shift hospitalist referred to as a nocturnist. While some nocturnists provide patient care separate from residents, others provide both formal and informal guidance and teaching at night.<sup>7, 8</sup> Results from a large, representative survey of internal medicine (IM) residents indicate that those in programs with nocturnists perceive greater degrees of supervision, however even among those residents, 40.5% perceived that they did not always have adequate overnight supervision to ensure patient safety.<sup>7</sup>

While resident perception of overnight supervision is known, the objective of this study, conducted via the APDIM Program Directors Annual Survey, was to describe how IM program directors (PDs), perceive overnight supervision and teaching of residents in their programs.

## MATERIALS & METHODS

### Study Setting and Participants

The Association of Program Directors in Internal Medicine (APDIM) is a charter organization of the Alliance for Academic Internal Medicine (AAIM), a professional association that includes internal medicine educators and administrators. The APDIM Survey Committee develops and administers an annual survey for PDs representing all member IM residency programs to study essential characteristics and critical issues

pertaining to graduate medical education (GME) training in IM. The 2017 annual survey was disseminated to PDs from all 379 APDIM member residency programs with ACGME accreditation prior to July 1 of the previous academic year (2016). At the time of the study, APDIM member programs represented 91% of ACGME-accredited residency programs.

### Instrument

The annual APDIM PD Survey collects essential characteristics about residency programs and PDs, and also includes thematic sections that vary each year. Sections are identified through a competitive call for proposals to the membership issued annually by the APDIM Survey Committee. The Academic Hospitalist Commission of the Society of General Internal Medicine submitted 12 questions to the committee for inclusion in the 2017 survey (see Appendix) addressing overnight teaching and supervision of residents. The questions were developed through group consensus based on a similar set of questions included in a previous (2012) independent study.<sup>8</sup> The APDIM Survey Committee blind-reviewed proposals, scored them on merit and relevance, and selected “Overnight Coverage and Supervision” as one of three thematic sections for inclusion. The instrument was pilot-tested by four members of the AAIM Education Committee and four members of the AAIM Research Committee, representing faculty and leaders with subject matter expertise in graduate medical education, and the questions were revised by the committee in response to the pilot test. Response types included multiple-choice, select-all-that-apply or five-point Likert scale, as well as write-in responses for questions with an “other” option.

The study was deemed exempt from full review by the Mayo Clinic Institutional Review Board (ID#: 08-007125).

### Statistical Analysis

Data analysis was conducted by AAIM Surveys staff (MK), who served as project personnel for the study. Prior to de-identifying the survey dataset for analysis, survey responses were appended with data from publicly available sources, including U.S. Census Bureau geographic region.<sup>9</sup> Program type was identified through a data license obtained from the American Medical Association for selected variables from its Fellowship and Residency Electronic Interactive Database Access System Online.<sup>10 9</sup>

Descriptive statistics for analysis included the reporting of frequencies and percentages. To test for statistical associations between categorical variables, we used Pearson's Chi-square statistic, Fisher's Exact Test, or the Adjusted Wald test of association. To assess the statistical representativeness of the survey data, essential characteristics of respondents and their programs were compared to the complete survey population using variables from the third-party data described above. Analyses were two-tailed (where applicable) with an alpha level set to  $p \leq 0.05$ . Group-based significance testing was conducted using the Adjusted Wald test (to minimize Type-I or Type-II errors due to the association between residency program type,

Census region, and ACGME total approved positions) for categorical variables (or Fisher's Exact Test when anticipated cell sizes were less than five), and Welch's t-test (due to unequal variances) to compare mean differences using continuous variables. To test for group-based associations between continuous variables and categorical variables exceeding two categories, we used One-Way Analysis of Variance (ANOVA). Post-hoc testing was conducted but is not reported with the ANOVA models included in this manuscript due to the absence of statistical significance among the variables compared. Analysis was conducted in *Stata SE 14.2*.<sup>11</sup>

### RESULTS

The survey response rate was 70.0%, or 266 of 379 program directors. There was no statistical association between respondents and non-respondents based on program and PD characteristics (Table 1). There was slight over-representation of university programs (38.0% among respondents; 33.3% for the population;  $p = 0.075$ ) and slight under-representation of community-based, university-affiliated programs (47.7% among respondents; 52.4% for the population;  $p = 0.065$ ) but those differences were not statistically significant.

**Table 1.** Core Characteristics of Internal Medicine Residency Responding and Nonresponding Programs: 2017 Survey of U.S. Internal Medicine Residency Program Directors

	<b>Respondents (n=266)</b>	<b>Nonrespondents (n=113)</b>	<b>Total (n=379)</b>	
	<b>No. (Column %)</b>	<b>No. (Column %)</b>	<b>No. (Column %)</b>	<b>P-value**</b>
Program Type*				
<i>University-based</i>	101 (38.0)	25 (22.3)	126 (33.3)	0.075
<i>Community-based</i>	34 (12.8)	11 (9.8)	45 (11.9)	0.319
<i>Community-based, university-affiliated</i>	127 (47.7)	71 (63.4)	198 (52.4)	0.065
<i>Military-based</i>	4 (1.5)	5 (4.5)	9 (2.4)	0.180

Census Region (U.S. Census Bureau)***				
<i>Northeast</i>	96 (36.1)	30 (27.3)	126 (33.5)	0.071
<i>Midwest</i>	53 (19.9)	30 (27.3)	83 (22.1)	0.154
<i>West</i>	38 (14.3)	18 (16.4)	56 (14.9)	0.680
<i>South</i>	79 (29.7)	32 (29.1)	111 (29.5)	0.787
VA Affiliation: Yes (ACGME)	100 (37.6)	32 (28.3)	132 (34.8)	0.083
Accreditation Status (ACGME)				
<i>Continued</i>	254 (95.5)	110 (97.4)	364 (96.0)	0.396
<i>Initial</i>	9 (3.4)	1 (0.9)	10 (2.6)	0.293
<i>Warning or Probation</i>	3 (1.1)	2 (1.8)	5 (1.3)	0.637
	<b>Mean (SD)</b>	<b>Mean (SD)</b>	<b>Mean (SD)</b>	<b>P-value**</b>
Program size: No. ACGME approved positions (Quartile 1-Quartile 3)^	54.5 (15.1)^^	52.5 (14.1)^^	54 (14.8)	0.131
ABIM pass rate 2014-2016 (%); n=248, n=108 <sup>12</sup>	89.4 (7.6)	89.0 (7.9)	89.2 (7.7)	0.679
Program director tenure (years)^	6.0 (6.3)	6.9 (6.6)	6.3 (6.4)	0.238

FREIDA: American Medical Association Residency and Fellowship Database; ACGME: Accreditation Council for Graduate Medical Education; ABIM: American Board of Internal Medicine; SD: Standard Deviation.  
 \*FREIDA data not available for one non-responding program.  
 \*\*Tests difference between “Respondents” and “Nonrespondents.” Bivariate test (Adjusted Wald test of association or Pearson Chi-square with one degree of freedom) used for categorical variables:  $p \leq 0.05$ .  
 \*\*\*Excludes U.S. territories, due to small cell sizes/data confidentiality.  
 ^Welch’s t-test used.  
 ^^Interquartile range: Respondents: 38-88; Nonrespondents: 39-79; Total: 38-91.

### Sufficiency of Attending Staffing

Respondents reported at least “sometimes” having insufficient attending staffing overnight to ensure high-quality patient care (42.9%) and patient safety (40.1%) in the hospital. Just over two percent (2.3%) of PD’s reported “always” having insufficient attending staffing overnight to ensure either high-quality patient care or patient safety. Compared to university-based programs, a higher percentage of respondents from all other program types (community-based with university affiliation, community-based without university affiliation, and military) reported “never” having insufficient attending staffing overnight to ensure high-quality patient care (40.4% and 53.7%, respectively,  $p = 0.024$ ) and patient safety (43.0% and 56.8%, respectively,  $p = 0.027$ ). VA affiliation status and program size were not associated with frequency of reported

insufficient attending staffing overnight to ensure high-quality patient care or patient safety in the hospital.

### Roles of Nocturnists

Among programs that had nocturnists on the general medicine wards, 65.7% reported informal supervisory interactions and 42.4% reported informal teaching with residents whereas 47.7% reported formal supervision and 11.1% reported formal teaching responsibilities.

### Supervision

Tables 2 and 3 report the results for overnight teaching and supervision of residents. Seventy-seven percent of PDs ( $n = 204/264$ ) reported that their program should have more overnight faculty supervision of residents. Of those, 31% responded that it was needed to a moderate or very large extent. There was no

association between program type or VA affiliation and whether PDs reported their residents should have more overnight faculty supervision.

Twenty-one percent of PDs reported no onsite supervision of residents by board-eligible or board-certified physicians overnight. Among the 207 who reported onsite resident supervision, overnight

supervision was provided by a nocturnist (84.5 %), critical care attending (34.3%), emergency department attending (26.1%), or subspecialty fellow (19.8%). There was no association between university or non-university-based programs and use of onsite nocturnists to provide supervision (87.7% and 82.5%, respectively,  $p = 0.288$ ).

**Table 2.** Responses to overnight teaching and supervision questions on 2017 survey of U.S. Internal Medicine Residency Program Directors

<b>How much teaching from attending physicians residents experience during overnight shift (including the following morning) caring for general medicine ward patients</b>	<b>Total (n=264)</b>
	<b>No. (Column %)</b>
<i>None</i>	17 (6.4)
<i>Very little</i>	62 (23.5)
<i>Some</i>	118 (44.7)
<i>The right amount</i>	67 (25.4)
<b>Type(s) of teaching residents experience from attending physicians during their overnight shift caring for general medicine ward patients<sup>*,****</sup></b>	<b>Total (n=244)</b>
	<b>No. (Column %)</b>
<i>In-person didactic series</i>	17 (7.0)
<i>Web-based curriculum</i>	14 (5.7)
<i>Case-based teaching using cases the residents have seen</i>	67 (27.5)
<i>Teaching informally by the overnight attending</i>	161 (66.0)
<i>Rounds-style teaching by the overnight attending</i>	30 (12.3)
<i>Teaching about patients by the morning attending during patient presentations</i>	161 (66.0)
<b>Type(s) of board-eligible or board-certified physician(s) who provide residents with onsite supervision overnight on general medicine wards<sup>*,^</sup></b>	<b>Total (n=207)</b>
	<b>No. (Column %)</b>
<i>Hospitalist or nocturnist</i>	175 (84.5)
<i>Emergency department attending</i>	54 (26.1)
<i>Critical care attending</i>	71 (34.3)
<i>Subspecialty fellow</i>	41 (19.8)
<i>PGY-4 chief resident</i>	11 (5.3)
<i>Moonlighter/locum tenens physician</i>	16 (7.7)
<b>Nocturnist's role on general medicine wards<sup>*,^^</sup></b>	<b>(n=172)</b>
	<b>No. (Column %)</b>
<i>Formal night time supervision is provided by nocturnists on the resident-covered teaching services</i>	82 (47.7)
<i>Formal teaching session(s) are led and/or facilitated overnight by nocturnists</i>	19 (11.1)
<i>Informal interactions occur between nocturnists and residents regarding informal discussions about patients</i>	113 (65.7)
<i>Informal interactions occur between nocturnists and residents with informal teaching</i>	73 (42.4)

<b>How often program has insufficient attending staffing overnight to ensure high-quality patient care in primary hospital</b>	<b>(n=261)</b>
	<b>No. (Column %)</b>
<i>Never</i>	127 (48.7)
<i>Sometimes</i>	112 (42.9)
<i>Usually</i>	16 (6.1)
<i>Always</i>	6 (2.3)
<b>How often program has insufficient attending staffing overnight to ensure patient safety in primary hospital</b>	<b>(n=262)</b>
	<b>No. (Column %)</b>
<i>Never</i>	135 (53.5)
<i>Sometimes</i>	105 (40.1)
<i>Usually</i>	16 (6.1)
<i>Always</i>	6 (2.3)
*Multiple responses allowed: totals will exceed number of respondents and total column percentages will exceed 100.	
**Excludes responses of “other,” due to small cell sizes.	
***Based on respondents who reported that their residents experience one or more types of teaching from attending physicians.	
^Based on respondents who reported that a board-eligible or board-certified physician(s) provides their residents with onsite supervision overnight on general medicine wards.	
^^Based on respondents who reported that a hospitalist or nocturnist provides their residents with onsite supervision overnight on general medicine wards.	
Note: Denominators might not equal the total number of survey respondents, due to item non-response.	

**Table 3.** Responses to Overnight Teaching and Supervision Questions by Residency Program Type in Two Categories and VA Affiliation: 2017 Survey of U.S. Internal Medicine Residency Program Directors

	<b>No. (Column %)</b>	<b>No. (Column %)</b>	
<b>How much teaching from attending physicians residents experience during overnight shift (including the following morning) caring for general medicine ward patients</b>	<b>University-based (n=100)</b>	<b>All other program types* (n=164)</b>	<b>P-value**</b>
<i>None</i>	9 (9.0)	8 (4.9)	0.248
<i>Very little</i>	29 (29.0)	33 (20.1)	0.118
<i>Some</i>	43 (43.0)	75 (45.7)	0.636
<i>The right amount</i>	19 (19.0)	48 (29.3)	0.106
<b>Type(s) of teaching residents experience from attending physicians during their overnight shift caring for general medicine ward patients***,^^,^^</b>	<b>University-based (n=91)</b>	<b>All other program types* (n=153)</b>	<b>P-value**</b>
<i>In-person didactic series</i>	10 (11.0)	7 (4.6)	<b>0.049</b>
<i>Web-based curriculum</i>	6 (6.6)	8 (5.2)	0.556

<i>Case-based teaching using cases the residents have seen</i>	24 (26.4)	43 (28.1)	0.814		
<i>Teaching informally by the overnight attending</i>	56 (61.5)	105 (68.6)	0.398		
<i>Rounds-style teaching by the overnight attending</i>	15 (16.5)	15 (9.8)	0.062		
<i>Teaching about patients by the morning attending during patient presentations</i>	58 (63.7)	103 (67.2)	0.490		
<b>How much teaching from attending physicians residents experience during overnight shift (including the following morning) caring for general medicine ward patients</b>	<b>Not VA-Affiliated (n=165)</b>	<b>VA-Affiliated (n=99)</b>	<b>P-value**</b>		
<i>None</i>	11 (6.7)	6 (6.1)	0.831		
<i>Very little</i>	40 (24.2)	22 (22.2)	0.601		
<i>Some</i>	67 (40.6)	51 (51.5)	0.074		
<i>The right amount</i>	47 (28.5)	20 (20.2)	0.082		
<b>Type(s) of teaching residents experience from attending physicians during their overnight shift caring for general medicine ward patients***.^^.^^</b>	<b>Not VA-Affiliated (n=152)</b>	<b>VA-Affiliated (n=92)</b>	<b>P-value**</b>		
<i>In-person didactic series</i>	8 (5.3)	9 (9.8)	0.230		
<i>Web-based curriculum</i>	7 (4.6)	7 (7.6)	0.253		
<i>Case-based teaching using cases the residents have seen</i>	41 (27.0)	26 (28.3)	0.746		
<i>Teaching informally by the overnight attending</i>	105 (69.1)	56 (60.9)	0.390		
<i>Rounds-style teaching by the overnight attending</i>	15 (9.9)	15 (16.3)	0.132		
<i>Teaching about patients by the morning attending during patient presentations</i>	97 (63.8)	64 (69.6)	0.259		
	<b>U.S. Census Region</b>				
<b>How much teaching from attending physicians residents experience during overnight shift (including the following morning) caring for general medicine ward patients</b>	<b>Northeast (n=96)</b>	<b>Midwest (n=51)</b>	<b>West (n=38)</b>	<b>South (n=79)</b>	<b>P-value^^^</b>
<i>None</i>	10 (10.4)	2 (3.9)	0 (--)	5 (6.3)	0.242
<i>Very little</i>	22 (22.9)	11 (21.6)	13 (34.2)	16 (20.3)	0.499
<i>Some</i>	38 (39.6)	28 (54.9)	13 (34.2)	39 (49.4)	0.091
<i>The right amount</i>	26 (27.1)	10 (19.6)	12 (31.6)	19 (24.1)	0.446
<b>Type(s) of teaching residents experience from attending physicians during their overnight shift caring for general medicine ward patients***.^^.^^</b>	<b>Northeast (n=85)</b>	<b>Midwest (n=49)</b>	<b>West (n=36)</b>	<b>South (n=74)</b>	<b>P-value^^^</b>
<i>In-person didactic series</i>	6 (7.1)	4 (8.2)	3 (8.3)	4 (5.4)	0.963
<i>Web-based curriculum</i>	5 (5.9)	3 (6.1)	0 (--)	6 (8.1)	0.214
<i>Case-based teaching using cases the residents have seen</i>	30 (35.3)	9 (18.4)	6 (16.7)	22 (29.7)	<b>0.014</b>
<i>Teaching informally by the overnight attending</i>	65 (76.5)	28 (57.1)	25 (69.4)	43 (58.1)	0.488
<i>Rounds-style teaching by the overnight attending</i>	9 (10.6)	6 (12.2)	5 (13.9)	10 (13.5)	0.957
<i>Teaching about patients by the morning attending during patient presentations</i>	56 (65.9)	30 (61.2)	24 (66.7)	54 (68.9)	0.798
*Includes community-based, university-affiliated, community-based, and military (collapsed). Program type obtained from American Medical Association (AMA) Fellowship and Residency Electronic Interactive Database Access System (FREIDA) Online. Available at: <a href="https://freida.ama-assn.org/Freida/#/">https://freida.ama-assn.org/Freida/#/</a> ; VA affiliation and Census Region obtained					

through Accreditation Council for Graduate Medical Education, [Online]. Available: <https://apps.acgme.org/ads/Public/Programs/Search>.

\*\*Bivariate test (Adjusted Wald test of association or Pearson Chi-square with one degree of freedom) used for categorical variables:  $p \leq 0.05$ .

\*\*\*Multiple responses allowed: totals will exceed number of respondents and total column percentages will exceed 100.

^Excludes responses of “other,” due to small cell sizes.

^^Based on respondents who reported that their residents experience one or more types of teaching from attending physicians.

^^^Adjusted Wald (Pearson) Chi-square (three degrees of freedom).

Note: Denominators might not equal the total number of survey respondents, due to item non-response.

### Supervision Policy

Most PDs ( $n = 258/262$ , 98.5%) reported that their program had some form of overnight supervision policy. Among them, policies included stipulations for when a resident is to contact an attending for indirect supervision (82.6%), how a resident should contact an attending (57.8%), when onsite direct supervision of residents by an attending was needed (36.1%), and use of telemedicine for indirect supervision (10.5%). The majority (91.0%) reported their policies explicitly required real-time notification of an attending for escalation of care to an intensive care unit or death of a patient. No respondents reported that their residents “always” followed the supervision policy; 68% reported that residents “usually” followed the policy.

### Barriers to Contacting Supervisors

PDs were presented with nine possible “barriers” that residents might encounter when contacting overnight supervising attendings and were asked to describe the extent to which those barriers limit contact, using on a five-point Likert scale from “no effect” to “very large effect.” The barriers most frequently reported as having a “large” or “very large” effect were: residents wanting to make decisions on their own (42%), not wanting to wake (38%) or disturb (33%) the attending, and residents not feeling they need the attending’s input (30%).

### Teaching

Twenty-five percent of respondents reported that the amount of teaching overnight was the “right amount,” whereas 29% reported that very little to no teaching occurred. Most teaching provided to residents overnight was from the attending the following morning during patient presentations, and informal teaching from the overnight attending (66.0% for both). A small percentage reported having “an in-person didactic series” (7.0%) or web-based curriculum (5.7%). Generally, there was no association between the amount of teaching provided to overnight residents with the program type, U.S. Census Bureau region, program size, mean accreditation year, PD length of time in position, affiliation with a Veterans Affairs (VA) Medical Center, and number of participating ACGME institutions. Exceptions were observed in two areas: case-based teaching was slightly more frequently reported among programs in the Northeast ( $p = 0.014$ ) and in-person didactic series were more frequently reported among university programs ( $p = 0.049$ ).

## DISCUSSION

Nighttime patient care provides opportunities for resident autonomy and growth but should occur with appropriate supervision for training and patient safety<sup>13</sup>. Although studies suggest increased in-person overnight supervision of residents over time,<sup>14</sup> our study demonstrates that programs address nighttime supervision of residents using a



variety of models. Just over half of all IM PDs believed that attending staffing was insufficient to ensure high-quality, safe patient care at night at least “sometimes” or with greater frequency. More than three-quarters of PDs indicated they felt that their program should have more overnight faculty supervision of residents. When in-house supervision was reported, it was most frequently provided by either a hospitalist or an intensivist. Given the heterogeneity of training programs, standardization would likely be difficult to enact as a formal policy, however further study of best practices in overnight supervision may be important.

Nocturnists have a relatively new and growing role for patient care and resident supervision.<sup>15</sup> Since the previous study in 2012 of a smaller cohort of programs, the percentage of hospitals with nocturnists has not changed substantially<sup>8</sup> despite more recent data showing that increasing presence of nocturnists and formalizing educational activities on overnight rotations improves resident education.<sup>16</sup> In our study, most teaching of overnight residents was reported to be provided by an attending the following morning, which may be suboptimal when resident fatigue is maximal and duty-hour restrictions may limit time available for in-depth discussion. Increased direct interactions between nocturnists and residents may help to bridge the perceived gap in supervision and education at night. In addition, faculty development for nocturnists in their important supervisory and teaching roles may be helpful to support their growth as clinician educators and optimize patient safety and resident learning.

Although use of the APDIM Annual PD survey for our study allows for a representative response rate from internal medicine residency programs, it is not without limitations. This study is limited to PDs’ perspectives. Because few PDs are likely to be present in the hospital at night,

they may not have a complete understanding of residents’ overnight experiences, though most PDs likely have a sense of their programs’ learning environment through various feedback mechanisms. Also, certain questions relied upon PDs’ self-reported opinions as a proxy for residents’ perspectives (*e.g.*, why residents do not call supervising physicians). With this caveat, our findings are consistent with a 2017 nationally-representative survey of over 20,000 IM residents conducted in conjunction with this study, in which only 51.4% reported their supervision overnight was “always” adequate.<sup>7</sup> Future study of residents and nocturnists perceptions would be helpful to explore this question.

## CONCLUSION

This study offers perspectives from PDs about the current state of overnight supervision and teaching of internal medicine residents. Further studies are needed to explore the optimal approach to address these issues, including comparative analysis of different models accounting for residents’ need for graduated autonomy and learning, financial and logistical considerations of nighttime attending staffing, and patient care and safety. The perception by PDs that there is insufficient attending staffing at night merits further exploration through directed study of the experiences of nocturnists and residents and of patient outcomes. This research provides groundwork for such studies.

## References

1. Khon L, Corrigan J, Donaldson M. *To Err is Human: Building a Safer Health System*. 2000.
2. Finlayson A, Bartolucci G, Streiner D. Deployment, supervision and decision-making of residents in an emergency psychiatric service. *Canadian Journal of Psychiatry*. 1979;24(3):207-211.

3. Asch D, Bilimoria K, Desai S. Resident Duty Hours and Medical Education Policy — Raising the Evidence Bar. *New England Journal of Medicine*. 2017;376(18):1704-1706.
4. Philibert I, Friedmann P, William W, al. e. New Requirements for Resident Duty Hours. *Journal of the American Medical Association*. 2002;288(9):1112-1114.
5. Antiel R, Thompson S, Reed D, et al. ACGME Duty-Hour Recommendations — A National Survey of Residency Program Directors. *New England Journal of Medicine*. 2010;363(8):e12.
6. Bolster L, Rourke L. The Effect of Restricting Residents' Duty Hours on Patient Safety, Resident Well-Being, and Resident Education: An Updated Systematic Review. *Journal of Graduate Medical Education*. 2015:349-363.
7. Catalanotti JS, O'Connor AB, Kisielewski M, Chick DA, Fletcher KE. Association Between Nocturnist Supervision and Perceived Overnight Supervision Adequacy Among Internal Medicine Residents in the US. *JAMA*. 2020;323(14):1407-1409.
8. Farnan J, Burger A, Boonayasai R, et al. Survey of overnight academic hospitalist supervision of trainees. *Journal of Hospital Medicine*. 2012;7(7):521-523.
9. [https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us\\_regdiv.pdf](https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf). Ref #11.
10. American Medical Association (AMA) Fellowship and Residency Electronic Interactive Database Access System (FREIDA) Online. <https://freida.ama-assn.org/Freida/#/>. Ref #12.
11. StataCorp. Release 14 ed. Stata Statistical Software.
12. Residency Program Pass Rates 2016 - 2018. [www.abim.org/pdf/pass-rates/residency-program-pass-rates.pdf](http://www.abim.org/pdf/pass-rates/residency-program-pass-rates.pdf).
13. Blum A, Shea S, Czeisler CA, Landrigan CP, Leape L. Implementing the 2009 Institute of Medicine recommendations on resident physician work hours, supervision, and safety. *Nat Sci Sleep*. 2011;3:47-85.
14. Haber LA, Lau CY, Sharpe BA, Arora VM, Farnan JM, Ranji SR. Effects of increased overnight supervision on resident education, decision-making, and autonomy. *J Hosp Med*. 2012;7(8):606-610.
15. Finn KM, Metlay JP, Chang Y, et al. Effect of Increased Inpatient Attending Physician Supervision on Medical Errors, Patient Safety, and Resident Education: A Randomized Clinical Trial. *JAMA Intern Med*. 2018;178(7):952-959.
16. Weltz AS, Cimeno A, Kavic SM. Strategies for improving education on night-float rotations: a review. *Journal of Surgical Education*. 2015;72(2):297-301.