

Characterizing Hospitalist Practice and Perceptions of Critical Care Delivery

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BACKGROUND: Intensivist shortages have led to increasing hospitalist involvement in critical care delivery.

OBJECTIVE: To characterize the practice of hospitalists practicing in the intensive care unit (ICU) setting.

DESIGN: Survey of hospital medicine physicians.

SETTING: This survey was conducted as a needs assessment for the ongoing efforts of the Critical Care Task Force of the Society of Hospital Medicine Education Committee.

PARTICIPANTS: Hospitalists in the United States.

INTERVENTION: An iteratively developed, 25-item, web-based survey.

MEASUREMENTS: Results were compiled from all respondents then analyzed in subgroups. Various items were examined for correlations.

RESULTS: A total of 425 hospitalists completed the survey. Three hundred and twenty-five (77%) provided critical care services, and 280 (66%) served as primary physicians

in the ICU. Hospitalists were significantly more likely to serve as primary physicians in rural ICUs (85% of rural respondents vs 62% of nonrural; $P < .001$ for association). Half of the rural hospitalists who were primary physicians for ICU patients felt obliged to practice beyond their scope, and 90% at least occasionally perceived that they had insufficient support from board-certified intensivists. Among respondents serving as primary physicians for ICU patients, 67% reported at least moderate difficulty transferring patients to higher levels of ICU care. Difficulty transferring patients was the only item significantly correlated with the perception of being expected to practice beyond one's scope ($P < .05$ for association).

CONCLUSIONS: Hospitalists frequently deliver critical care services without adequate training or support, most prevalently in rural hospitals. Without major changes in intensivist staffing or patient distribution, this is unlikely to change. *Journal of Hospital Medicine* 2018;13:6-12. Published online first December 6, 2017 © 2018 Society of Hospital Medicine

Despite calls for board-certified intensivist physicians to lead critical care delivery,¹⁻³ the intensivist shortage in the United States continues to worsen,⁴ with projected shortfalls of 22% by 2020 and 35% by 2030.⁵ Many hospitals currently have inadequate or no board-certified intensivist support.⁶ The intensivist shortage has necessitated the development of alternative intensive care unit (ICU) staffing models, including engagement in telemedicine,⁷ the utilization of advanced practice providers,⁸ and

dependence on hospitalists⁹ to deliver critical care services to ICU patients. Presently, research does not clearly show consistent differences in clinical outcomes based on the training of the clinical provider, although optimized teamwork and team rounds in the ICU do seem to be associated with improved outcomes.¹⁰⁻¹²

In its 2016 annual survey of hospital medicine (HM) leaders, the Society of Hospital Medicine (SHM) documented that most HM groups care for ICU patients, with up to 80% of hospitalist groups in some regions delivering critical care.¹³ In many United States hospitals, hospitalists serve as the primary if not lone physician providers of critical care.^{6,14} HM, with its team-based approach and on-site presence, shares many of the key attributes and values that define high-functioning critical care teams, and many hospitalists likely capably deliver some critical care services.⁹ However, hospitalists are also a highly heterogeneous work force with varied exposure to and comfort with critical care medicine, making it difficult to generalize hospitalists' scope of practice in the ICU.

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Because hospitalists render a significant amount of critical care in the United States, we surveyed practicing hospitalists to understand their demographics and practice roles in the ICU setting and to ascertain how they are supported when doing so. Additionally, we sought to identify mismatches between the ICU services that hospitalists provide and what they feel prepared and supported to deliver. Finally, we attempted to elucidate how hospitalists who practice in the ICU might respond to novel educational offerings targeted to mitigate cognitive or procedural gaps.

METHODS

We developed and deployed a survey to address the aforementioned questions. The survey content was developed iteratively by the Critical Care Task Force of SHM's Education Committee and subsequently approved by SHM's Education Committee and Board of Directors. Members of the Critical Care Task Force include critical care physicians and hospitalists. The survey included 25 items (supplemental Appendix A). Seventeen questions addressed the demographics and practice roles of hospitalists in the ICU, 5 addressed cognitive and procedural practice gaps, and 3 addressed how hospitalists would respond to educational opportunities in critical care. We used conditional formatting to ensure that only respondents who deliver ICU care could answer questions related to ICU practice. The survey was delivered by using an online survey platform (Survey Monkey, San Mateo, CA).

The survey was deployed in 3 phases from March to October of 2016. Initially, we distributed a pilot survey to professional contacts of the Critical Care Task Force to solicit feedback and refine the survey's format and content. These contacts were largely academic hospitalists from our local institutions. We then distributed the survey to hospitalists via professional networks with instructions to forward the link to interested hospitalists. Finally, we distributed the survey to approximately 4000 hospitalists randomly selected from SHM's national listserv of approximately 12,000 hospitalists. Respondents could enter a drawing for a monetary prize upon completion of the survey.

None of the survey questions changed during the 3 phases of survey deployment, and the data reported herein were compiled from all 3 phases of the survey deployment. Frequency tables were created using Tableau (version 10.0; Tableau Software, Seattle, WA). Comparisons between categorical questions were made by using χ^2 and Fischer exact tests to calculate *P* values for associations by using SAS (version 9.3; SAS Institute, Cary, NC). Associations with *P* values below .05 were considered statistically significant.

RESULTS

Objective 1: Demographics and Practice Role

Four hundred and twenty-five hospitalists responded to the survey. The first 2 phases (pilot survey and distribution via professional networks) generated 101 responses, and the third phase (via SHM's listserv) generated an additional 324 responses. As the survey was anonymous, we could not determine which hospitals or geographic regions were represented.

Three hundred and twenty-five of the 425 hospitalists who completed the survey (77%) reported that they delivered care in the ICU. Of these 325 hospitalists, 45 served only as consultants, while the remaining 280 (66% of the total sample) served as the primary attending physician in the ICU. Among these primary providers of care in the ICU, 60 (21%) practiced in rural settings and 220 (79%) practiced in nonrural settings (Figure 1).

The demographics of our respondents were similar to those of the SHM annual survey,¹³ in which 66% of respondents delivered ICU care. Forty-one percent of our respondents worked in critical access or small community hospitals, 24% in academic medical centers, and 34% in large community centers with an academic affiliation. The SHM annual survey cohort included more physicians from nonteaching hospitals (58.7%) and fewer from academic medical centers (14.8%).¹³

Hospitalists' presence in the ICU varied by practice setting (Table 1). Seventy-eight percent of respondents practicing outside of academic medical centers served as primary ICU physicians, compared with less than 30% of hospitalists practicing at an academic medical center. Hospitalists reported substantial variability in their volumes of ICU procedures (eg, central lines, intubation), the number of mechanically ventilated patients for whom they delivered care, and who was responsible for making ventilator management decisions (Table 1).

Hospitalists were significantly more prevalent in rural ICUs than in nonrural settings (96% vs 73%; Table 2). Rural hospitalists were also more likely to serve as primary physicians for ICU patients (85% vs 62%) and were more likely to deliver all critical care services (55% vs 10%). Seventy-five percent of respondents from rural settings reported that hospitalists manage all or most ICU patients in their hospital as opposed to 36% for nonrural respondents. The associations between hospitalist roles in the ICU care and practice setting were significantly different for rural and nonrural hospitalists (χ^2 *P* value for association <.001). Intensivist availability (measured both in hours per day and by perception of whether such support was sufficient) was significantly lower in rural ICUs (Table 2).

We found similar results when comparing academic hospitalists (those working in an academic medical center or academic-affiliated hospital) with nonacademic hospitalists (those working in critical access or small community centers). Specifically, hospitalists in nonacademic settings were significantly more prevalent in ICUs (90% vs 67%; Table 2), more likely to serve as the primary attending (81% vs 55%), and more likely to deliver all critical care services (64% vs 25%). Sixty-four percent of respondents from nonacademic settings reported that hospitalists manage all or most ICU patients in their hospital as opposed to 25% for academic respondents (χ^2 *P* value for association <.001). Intensivist availability was also significantly lower in nonacademic ICUs (Table 2).

We also sought to determine whether the ability to transfer critically ill patients to higher levels of care effectively mitigated shortfalls in intensivist staffing. When restricted to hospitalists who served as primary providers for ICU patients, 28% of all respondents and 51% of rural hospitalists reported transferring patients to a higher level of care.

TABLE 1. Practice Setting and Specialty Management Practices for Hospitalist Respondents

Practice Setting ^a		Primary Physician in the ICU			
		Number (%) of Respondents from that Setting			
Critical access		11 (84.6)			
Small community		131 (80.4)			
Large community		108 (74.0)			
AMC		30 (29.1)			
Specialty Patient ^b		Care for Subspecialty Patients in the ICU			
		Number (%) of all HM in the ICU			
Cardiology/cardiac surgery		163 (50.2)			
General surgery		163 (50.2)			
Neurology/neurosurgery		159 (48.9)			
Orthopedic/trauma		130 (40.0)			
No specialty patients		92 (28.3)			
		Average Procedures per Month ^b			
		Number (%) of all HM in the ICU			
Procedure	0	1-5	6-10	11-20	>20
CVC insertion	172 (52.9)	69 (21.2)	28 (8.6)	15 (4.6)	41 (12.6)
Paracentesis	203 (62.5)	66 (20.3)	27 (8.3)	14 (4.3)	15 (4.6)
Arterial line insertion	205 (63.1)	67 (20.6)	18 (5.5)	15 (4.6)	20 (6.2)
Intubation	207 (63.7)	54 (16.6)	28 (8.6)	14 (4.3)	22 (6.8)
Thoracentesis	229 (70.5)	52 (16.0)	18 (5.5)	13 (4.0)	13 (4.0)
Diagnostic ultrasound	242 (74.5)	31 (9.5)	16 (4.9)	8 (2.5)	28 (8.6)
Chest tube	286 (88.0)	25 (7.7)	4 (1.2)	4 (1.2)	6 (1.9)
Flexible bronchoscopy	311 (95.7)	5 (1.5)	3 (0.9)	2 (0.6)	4 (1.2)
		Average Ventilated Patients ^b			
		Number (%) of all HM in the ICU			
0-1	2	3	4	5 or more	
159 (48.9)	69 (21.2)	40 (12.3)	22 (6.8)	35 (10.80000)	
		Ventilator Management Decisions ^c			
		Number (%) of all HM in the ICU			
RT independently managed ventilators	BCI manage all ventilators	Hospitalists manage some ventilators, BCI manage complex or prolonged cases	Only hospitalists with specialized interest and/or training manage vents	Hospitalists manage all ventilators	
9 (2.9)	151 (49.0)	73 (23.7)	23 (7.5)	52 (16.9)	

^aPercentages indicate percent of respondents from each practice setting.^bPercentages indicate percent of the 325 respondents who have a role in delivering ICU care.^cPercentages indicate percent of the 308 respondents who have a role in delivering ICU care who completed this item.

NOTE: Values shown are number of respondents. Abbreviations: AMC, academic medical center; BCI, board-certified intensivist; CVC, central venous catheter; HM, hospital medicine; ICU, intensive care unit; RT, respiratory therapy.

TABLE 2. Comparison of Rural and Nonrural Responses Related to Practice Role

Responses	Rural	Nonrural	Nonacademic	Academic
Do you manage ICU patients?				
No, I do not have a role in the ICU	4.2%	27.4%	10.2%	32.9%
Yes, as a consultant only for selected medical issues	11.3%	10.5%	9.1%	11.6%
Yes, as the attending of record or primary physician during the hospitalization	84.5%	62.1%	80.7%	55.4%
What role do BCIs play in managing ICU patients in your hospital?				
Hospitalists provide all critical care services without on-site intensivist input (telemedicine excepted)	54.7%	9.5%	33.1%	5.1%
Intensivists are primarily consultants; hospitalist make major decisions throughout the day	25.0%	33.3%	31.1%	32.1%
Major decisions are made by an intensivist during daytime only; hospitalists provide the majority of care after hours	9.4%	30.9%	21.2%	31.4%
All major decisions are made by an intensivist 24:7	10.9%	26.3%	14.6%	31.4%
How many hours per day are board-certified intensivists immediately available (physically present in the ICU or nearby, not in clinic or out of the hospital)?				
0-4 hours	62.5%	19.3%	46.4%	10.9%
5-8 hours	10.9%	22.2%	19.2%	20.5%
9-14 hours	10.9%	26.7%	17.2%	29.5%
15-23 hours	3.1%	3.3%	3.3%	3.2%
24 hours	12.5%	28.4%	13.9%	35.9%

NOTE: *P* values (χ^2 or Fisher exact tests) for associations comparing rural versus nonrural and nonacademic versus academic were $<.001$ for all items shown. Abbreviations: BCI, board-certified intensivists; ICU, intensive care unit.

Sixty-seven percent of hospitalists who served as primary physicians for ICU patients in any setting reported at least moderate difficulty arranging transfers to higher levels of care.

Objective 2: Identifying the Practice Gap

Hospitalists' perceptions of practicing critical care beyond their skill level and without sufficient board-certified intensivist support varied by both practice location and practice type (Table 3). In marked contrast to nonrural hospitalists, 43% of rural hospitalists reported feeling expected to practice beyond their perceived scope of expertise at least some of the time, and 31% reported never having sufficient board-certified intensivist support. Both these results were statistically significantly different when compared with nonrural hospitalists. When restricted to rural hospitalists who are primary providers for ICU patients, 90% reported that board-certified intensivist support was at least occasionally insufficient.

There were similar discrepancies between academic and nonacademic respondents. Forty-two percent of respondents practicing in nonacademic settings reported being expected to practice beyond their scope at least some of the time, and 18% reported that intensivist support was never sufficient. This contrasts with academic hospitalists, of whom 35% reported feeling expected to practice outside their scope, and less than 4% reported the available support from intensivists was never sufficient. For comparisons of academic and nonacademic respondents, only perceptions of sufficient board-certified intensivist support reached statistical significance (Table 3).

The role of intensivists in making management decisions and the strategy for ventilator management decisions correlated significantly with perception of intensivist support ($P<.001$) but not with the perception of practicing beyond one's scope.

The number of ventilated patients did not correlate significantly with either perception of intensivist support or of being expected to practice beyond scope.

Difficulty transferring patients to a higher level of care was the only attribute that significantly correlated with hospitalists' perceptions of having to practice beyond their skill level ($P<.05$; Table 3). Difficulty of transfer was also significantly associated with perceived adequacy of board-certified intensivist support ($P<.001$). Total hours of intensivist coverage, intensivist role in decision making, and ventilator management arrangements also correlated significantly with the perceived adequacy of board-certified intensivist support ($P<.001$ for all; Table 3).

Objective 3: Assessing Interest in Critical Care Education

More than 85% of respondents indicated interest in obtaining additional critical care training and some form of certification short of fellowship training. Preferred modes of content delivery included courses or precourses at national meetings, academies, or online modules. Hospitalists in smaller communities indicated preference for online resources.

DISCUSSION

This survey of a large national cohort of hospitalists from diverse practice settings validates previous studies suggesting that hospitalists deliver critical care services, most notably in community and rural hospitals.¹³ A substantial subset of our respondents represented rural practice settings, which allowed us to compare rural and nonrural hospitalists as well as those practicing in academic and nonacademic settings. In assessing both the objective services that hospitalists provided as

TABLE 3. **Factors Associated with Feeling Expected to Practice out of Scope and Sufficiency of Intensivist Support**

Factors	I feel I am expected to practice beyond my scope of expertise when caring for ICU patients:					The intensity of board-certified intensivist support in my hospital is sufficient to support my care of ICU patients:				
	Never	Rarely	Sometimes	Most times	All of the time	Never	Rarely	Sometimes	Most times	All of the time
Practice setting	NS					P value for association <.001				
Rural	16.4%	41.0%	39.3%	3.3%	0%	31.1%	4.9%	16.4%	36.1%	11.5%
Nonrural	22.0%	40.5%	26.3%	6.5%	4.7%	5.2%	4.3%	15.5%	44.0%	31.0%
Practice type	NS					P value for association <.001				
Nonacademic	17.9%	40.0%	33.1%	6.9%	2.1%	17.9%	5.5%	17.2%	39.3%	20.0%
Academic	23.6%	41.2%	25.0%	4.7%	5.4%	3.4%	3.4%	14.2%	45.3%	33.8%
Intensivist hours per day	NS					P value for association <.001				
0-4 hours	15.3%	19%	17.1%	37.5%	30.6%	32.9%	4.7%	22.4%	30.6%	9.4%
5-8 hours	19.0%	41.4%	25.9%	5.2%	8.6%	1.7%	5.2%	17.2%	51.7%	24.1%
9-14 hours	17.1%	44.3%	28.6%	7.1%	2.9%	0%	2.9%	21.4%	50.0%	25.7%
15-23 hours	37.5%	50.0%	12.5%	0%	0%	12.5%	0%	0%	75.0%	12.5%
All 24 hours	30.6%	34.7%	22.2%	8.3%	4.2%	1.4%	5.6%	2.8%	37.5%	52.8%
Intensivist management decisions	NS					P value for association <.001				
No on-site intensivist	25.5%	35.4%	63.4%	3.6%	0%	50.9%	7.3%	9.1%	21.8%	10.9%
Intensivist are primarily consultants, hospitalists make major decisions	19.1%	42.6%	29.8%	4.3%	4.3%	1.1%	6.4%	23.4%	45.7%	23.4%
Major decisions made by intensivist during daytime; hospitalists provide care after hours	15.6%	42.9%	32.5%	5.2%	3.9%	1.3%	3.9%	18.2%	55.8%	20.8%
All major decisions by intensivists 24:7	24.5%	40.3%	17.9%	10.4%	6.0%	1.5%	0%	7.5%	38.8%	52.2%
Ventilator management	NS					P value for association <.001				
RT independently manage vents	37.5%	37.5%	25.0%	0%	0%	50.0%	0%	0%	50.0%	0%
BCI manage all vents	24.1%	43.3%	24.8%	4.3%	3.5%	2.1%	2.1%	13.5%	47.5%	34.8%
Hospitalists manage some vents	18.1%	38.9%	30.6%	11.1%	1.4%	1.4%	4.2%	26.4%	47.2%	20.8%
Only hospitalist with specialized interest and/or training manage vents	21.7%	39.1%	30.4%	4.3%	4.3%	13.0%	4.3%	21.7%	39.1%	21.7%
Hospitalists manage all ventilators	12.2%	36.7%	38.8%	4.1%	8.2%	40.8%	12.2%	6.1%	20.4%	20.4%
Difficulty of transfer	P value for association =.039					P value for association <.001				
Easy	17.8%	53.3%	24.4%	4.4%	0%	11.1%	0%	4.4%	48.9%	35.6%
Moderately difficult	16.2%	35.3%	38.2%	5.9%	4.4%	17.6%	8.8%	25.0%	33.8%	14.7%
Difficult	8.3%	25.0%	41.7%	12.5%	12.5%	16.7%	12.5%	25%	33.3%	12.5%

NOTE: P values are χ^2 Fisher exact test for associations. Abbreviations: BCI, board-certified intensivists; ICU, intensive care unit; NS, not significant; RT, respiratory therapists.

well as their subjective perceptions of how they practiced, we could correlate factors associated with the sense of practicing beyond one's skill or feeling inadequately supported by board-certified intensivists.

More than a third of responding hospitalists who practiced in the ICU reported that they practiced beyond their self-perceived skill level, and almost three-fourths indicated that they practiced without consistent or adequate board-certified inten-

sivist support. Rural and nonacademic hospitalists were far more likely to report delivering critical care beyond their comfort level and having insufficient board-certified intensivist support.

Calls for board-certified intensivists to deliver critical care to all critically ill patients do not reflect the reality in many American hospitals and, either by intent or by default, hospitalists have become the major and often sole providers of critical care services in many hospitals without robust intensivist support. We suspect that this phenomenon has been consistently underreported in the literature because academic hospitalists generally do not practice critical care.¹⁵

Many potential solutions to the intensivist shortage have been explored. Prior efforts in the United States have focused largely on care standardization and the recruitment of more trainees into existing critical care training pathways.¹⁶ Other countries have created multidisciplinary critical care training pathways that delink critical care from specific subspecialty training programs.¹⁷ Another potential solution to ensure that critically ill patients receive care from board-certified intensivists is to regionalize critical care such that the sickest patients are consistently transferred to referral centers with robust intensivist staffing.^{1,18} While such an approach has been effectively implemented for trauma patients⁷, it has yet to materialize on a systemic basis for other critically ill cohorts. Moreover, our data suggest that hospitalists who attempt to transfer patients to higher levels of critical care find doing so burdensome and difficult.

Our surveyed hospitalists overwhelmingly expressed interest in augmenting their critical care skills and knowledge. However, most existing critical care educational offerings are not optimized for hospitalists, either focusing on very specific skills or knowledge (eg, procedural techniques or point-of-care ultrasound) or providing entry-level or very foundational education. None of these offerings provide comprehensive, structured training schemas for hospitalists who need to evolve beyond basic critical care skills to manage critically ill patients competently and consistently for extended periods of time.

Our study has several limitations. First, we estimate that about 10% of invited participants responded to this survey, but as respondents could forward the survey via professional networks, this is only an estimate. It is possible but unlikely that some respondents could have completed the survey more than once. Second, because our analysis identified only associations, we cannot infer causality for any of our findings. Third, the questionnaire was not designed to capture the acuity threshold at which point each respondent would prefer to transfer their patients into an ICU setting or to another institution for assistance in critical care management. We recognize that definitions and perceptions of patient acuity vary markedly from one hospital to the next, and a patient who can be comfortably managed in a floor setting in one hospital may require ICU care in a smaller or less well-resourced hospital. Practice patterns relating to acuity thresholds could have a substantial impact both on critical care patient volumes and on provider perceptions and, as such, warrant further study.

Finally, as respondents participated voluntarily, our sample may have overrepresented hospitalists who practice or are in-

terested in critical care, thereby overestimating the scope of the problem and hospitalists' interest in nonfellowship critical care training and certification. However, this seems unlikely given that, relative to SHM's annual survey, we overrepresented hospitalists from academic and large community medical centers who generally provide less critical care than other hospitalists.¹³ Provided that roughly 85% of the estimated 50,000 American hospitalists practice outside of academic medical centers,¹³ perhaps as many as 37,000 hospitalists regularly deliver care to critically ill patients in ICUs. In light of the evolving intensivist shortage,^{4,5} this number seems likely to continue to grow. Whatever biases may exist in our sample, it is evident that a substantial number of ICU patients are managed by hospitalists who feel unprepared and undersupported to perform the task.

Without a massive and sustained increase in the number of board-certified intensivists or a systemic national plan to regionalize critical care delivery, hospitalists will continue to practice critical care, frequently with inadequate knowledge, skills, or intensivist support. Fortunately, these same hospitalists appear to be highly interested in augmenting their skills to care for their critically ill patients. The HM and critical care communities must rise to this challenge and help these providers deliver safe, appropriate, and high-quality care to their critically ill patients.

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