BACK OF THE ENVELOPE

JON D. LURIE, MD, MS
Research Fellow

VA Outcomes Group
White River Junction, Vt

ROBERT M. WACHTER, MD
Associate Professor of Medicine and Epidemiology

Associate Chair

Department of Medicine
University of California
San Francisco, Calif

Hospitalist Staffing Requirements

CONTEXT. The use of hospitalists—physicians who spend a substantial portion of their time providing in-hospital care to the patients of primary care physicians—has been proposed as a way to decrease costs and increase the quality of inpatient care.

COUNT. Number of full-time hospitalists.

CALCULATIONS. Average daily census = annual admissions $\times$ length of stay $\div$ 365. Number of hospitalists = (average daily census $\div$ patients per hospitalist) + 1 extra hospitalist for night coverage.

DATA SOURCES. The average number of patients per hospitalist was obtained from a National Association of Inpatient Physicians membership survey. A low estimate of 10 patients per hospitalist was used to account for the extra manpower needed for coverage during vacations and other time off.

RESULTS. A hospital with 3000 admissions per year and an average length of stay of 5 days would have an average daily census of 41 patients and would need 5 full-time hospitalists. Hospitals with a lower patient volume would need fewer hospitalists and would probably need to find persons other than hospitalists to cover some nights and weekends.

CONCLUSIONS. Simple calculations based on hospital admissions and length of stay can estimate the number of hospitalists required for adequate staffing. Requirements will vary with the hospitalists' workload; the patient case complexity; and the duties other than inpatient care that are required of hospitalists, such as consultations, skilled nursing facility coverage, quality improvement work, teaching, and research.

Physicians are being asked to become more efficient in both the inpatient and outpatient settings. One approach to achieving this goal that has recently gained significant attention is the use of hospitalists. Hospitalists have been defined as physicians who spend at least 25% of their professional time serving as the physician of record for inpatients. During that time, the primary care physician "hands over" the hospitalized patient to the hospitalist, who then returns the patient to the primary care physician at discharge.[1]

Some preliminary data[2,3] suggest that hospitalist programs may shorten lengths of stay and decrease the costs of hospitalization without sacrificing quality of care. However, many physicians are concerned about the potential negative effects of hospitalist systems. Among these concerns are fears that the focus on efficiency, lack of continuity of care, intense schedules, and large patient loads will lead to cynicism and burnout among hospitalists.[4,5] Although it is unclear whether these problems will materialize in practice, anecdotal experience and common sense suggest that creating an appropriately sized group of hospitalists will be important to the success and sustainability of a hospitalist program.[4]

In this paper, we estimate the number of hospitalists needed in hospital practices of various sizes. We look at the effects created by varying workloads, and we explore some of the other factors that affect the number of hospitalists needed in various settings.

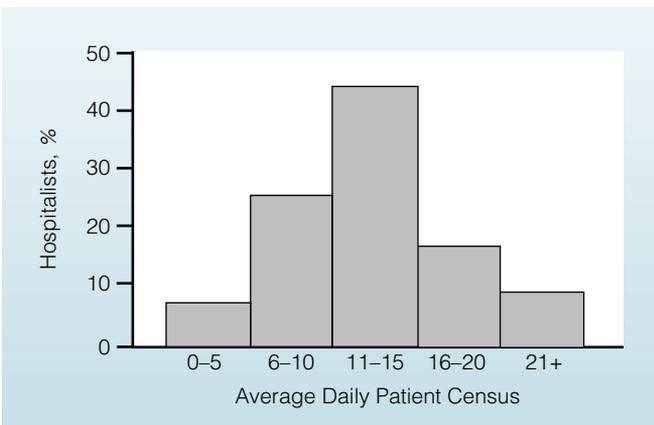*The abstract of this paper is available at ecp.acponline.org.*

Methods

Inputs

To estimate a reasonable workload for hospitalists, we used the results of a recent survey of the members of the National Association of Inpatient Physicians.[6] The average daily census reported by 372 self-identified hospitalists ranged from fewer than 5 patients to more than 20. As **Figure 1** shows, the census most often fell in the range of 11 to 15 patients; this range was both the mean and median.[7] The average number of admissions per admitting period was approximately 6. It is important to remember that these numbers represent the average workload of currently practicing hospitalists and not necessarily the optimal workload.

Basic Calculation

We calculated the number of hospitalists needed on the basis of annual admissions and average lengths of stay because these variables are commonly collected and reported. We first converted numbers of admissions and lengths of stay into an average daily census by using the following formula: census = annual admissions $\times$ length of stay $\div$ 365. The number of hospitalists needed was calculated by dividing the average daily census by the number of patients per hospitalist. The number of hospitalists was rounded to the nearest full-time clinical hospitalist.

A sample calculation is shown in **Figure 2**. With 3000 admissions per year and an average length of stay of 5 days, the average daily census is 41 patients. With 10 patients per hospitalist and 1 additional hospitalist to help with night and weekend coverage, this predicts a need for 5 full-time hospitalists. We chose a base case of 10 patients per hospitalist to represent the typical hospitalist workload of 11 to 15 patients (average, 13 patients), weighted downward to account for vacations, sick days, time spent at conferences, and other time off.

Admissions: 3000/year
Average LOS: 5 days
Average census: 3000 x 5/365
= 41 patients/day

10 patients per hospitalist = 4 hospitalists

+1 to help with night and weekend coverage
= 5 full-time hospitalists

FIGURE 2. Back-of-the-envelope calculation of hospitalist staffing requirements. LOS = length of stay.

An alternate approach is to divide by a higher average daily census and then account for the necessary time off. The two methods yield similar results. In the example described above, using 13 patients per hospitalist yields a need for approximately 3.2 full-time hospitalists. Adjusting for vacation and other time off (e.g., 6 weeks per hospitalist) adds an additional 0.5 full-time hospitalist, for a total of 3.7 full-time hospitalists. Accounting for 1 additional hospitalist to provide night and weekend coverage yields a total of 4.7 full-time hospitalists.

Adjustment for Night and Weekend Coverage

Night and weekend coverage is an important consideration for hospitalists because the hospital setting demands around-the-clock coverage. The need for full night and weekend coverage puts more demands on a hospitalist group than can be easily accounted for in a simple assessment of patient census. Many different coverage models are used by hospitalists, ranging from shift work to each hospitalist covering his or her own patients during the day and then rotating admissions and night coverage. Each model has unique scheduling details that are beyond the scope of this paper. In general, however, we estimate that approximately one additional hospitalist would be needed to help cover nights. The assumption of fixed manpower for night coverage incorporates the intuitive notion that the demands of night coverage

FIGURE 1. Workload as reported by 372 practicing hospitalists. (Adapted, with permission, from Lurie and colleagues [7]).

constitute a larger proportion of manpower needs when the hospitalist group is small and a smaller proportion of manpower needs when the group is large.

Minimum Group Size

Even if we account for the additional requirements of night and weekend coverage, the frequency of night and weekend call remains a critical factor in the sustainability of a hospitalist's work schedule. We assume that groups of fewer than three full-time hospitalists would need to find an additional source of night and weekend coverage to make the schedule sustainable. Increasing the number of hospitalists in the group, having ambulatory care physicians cover shifts on a rotating basis, using nonphysician clinicians, or using "moonlighters" or "house physicians" might help provide the extra coverage.

Results

Table 1 shows the results of our calculations with varying admission rates, lengths of stay, and hospitalist workloads. In general, with a workload of 10 patients per hospitalist, at least 1500 admissions per year are needed to require a hospitalist group large enough to be self-sustaining (three or more).

These calculations are for full-time clinical hospitalists. In academic settings, hospitalist groups are often made up of part-time hospitalists. If a group is to be composed of physicians spending 25% of their time as hospitalists, the number of part-time hospitalists needed would be 4 times the number of full-time hospitalists needed. However, because part-time hospitalists can assist with night and weekend coverage during their "off" months, the minimum group size may be smaller than the three full-time hospitalists assumed in our calculations.

Discussion

On average, hospitalists care for 10 to 15 inpatients at a time.[6] We estimate the staffing requirements for hospitalists by calculating the average daily patient census, dividing by 10, and adding 1. When the number of hospitalists in a group is fewer than 3, additional sources of night and weekend coverage will be needed.

Table 2 shows the characteristics of some hospitalist practices, reported in the literature, that allow for comparisons with our calculations. In general, agreement between our calculations and these actual practices is good. However, these practices differ from each other in many ways that could relate to the differing staffing patterns.

Many factors other than simple patient volume will affect the number of hospitalists needed in a particular setting. The most obvious factor is patient case complexity. We used average workload estimates derived from a

TABLE 1

Number of Full-Time Hospitalists Needed To Cover Inpatient Services of Different Sizes

ADMISSIONS PER YEAR, n	AVERAGE LENGTH OF STAY, d	WORKLOAD 1 (5 PATIENTS PER HOSPITALIST)	WORKLOAD 2 (10 PATIENTS PER HOSPITALIST)	WORKLOAD 3 (15 PATIENTS PER HOSPITALIST)	WORKLOAD 4 (20 PATIENTS PER HOSPITALIST)
1500	3	3			
1500	4	4	3	Insufficient Workload	
1500	5	5	3		
1500	6	6	3	3	
3000	3	6	3	3	
3000	4	8	4	3	3
3000	5	9	5	4	3
3000	6	11	6	4	3
5000	3	9	5	4	3
5000	4	12	6	5	4
5000	5	15	8	6	4
5000	6	17	9	6	5

TABLE 2

Number of Hospitalists in Practices Reported in the Literature

SITE AND REFERENCE	ANNUAL ADMISSIONS, n	MEAN LENGTH OF STAY, d	CALCULATED FULL-TIME HOSPITALISTS (10 PATIENTS PER HOSPITALIST), n	ACTUAL FULL-TIME HOSPITALISTS, n	COMMENTS
Kaiser Permanente Santa Clara, CA[8]	5364	3.4	6	10	Short length of stay may increase manpower needs above those calculated solely from census
Moffit-Long Hospital San Francisco, CA[3]	800	4	2+	2+	14 attending physicians on a monthly rotation
Western Pennsylvania Hospital Pittsburgh, PA[2]	1600	5	3	2+	Night and weekend call shared by general internal medicine faculty
University of Massachusetts Medical Center Worcester, MA[9]	2500	4*	4	2+	2 physicians, 10 nurse practitioners; night admissions performed by residents

Estimated from number of admissions and reported average census of 23.

survey of hospitalists. This average incorporated a broad range of patients and patient case complexity. Of the survey respondents, 83% had some clinical responsibility for patients in the intensive care unit and 46% had some clinical responsibility for patients in a skilled nursing facility.[6] However, as patient case complexity varies in specific settings, the manageable workload for hospitalists also varies. Hospitalist groups caring for patients with particularly complex disorders will need more hospitalists than our calculations show, and those caring for patients with less complex disorders will need fewer hospitalists.

The other responsibilities assigned to hospitalists will also affect the number of hospitalists needed. One perceived advantage of the hospitalist model of care is that having a small group of physicians who are deeply invested in the inpatient setting will allow these physicians to become actively involved in quality improvement efforts and other important nonclinical hospital work.[10] Hospitalists are also responsible for clinical work other than inpatient care. Of the survey respondents,[6] 90% performed medical consultations, 82% were responsible for preoperative evaluations, 43% supervised nonmedical patients, 53% had responsibilities in quality assurance and utilization review, 46% had responsibilities in practice guideline development, 23% had administrative responsibilities, and 22% had responsibilities in medical information system development. These other activities (assuming that funds can be found to support them) suggest ways in which a group that needs fewer than three hospitalists according to workload calculations such as ours can

productively expand its size to better accommodate sustainable call schedules. Settings in which hospitalists have significant teaching and research duties will also require more hospitalists than we have calculated.

In addition, our workload calculations do not specifically account for the role of other providers. In a teaching setting, interns and residents can allow the hospitalist to spend less time managing the patient's medical issues and can theoretically decrease the number of hospitalists needed. However, the teaching responsibilities and the patient complexity associated with an academic setting may counterbalance this effect. The use of nonphysician care providers may decrease the number of hospitalists needed in some settings.

A final aspect of our calculation that warrants discussion is the role of length of stay in the number of hospitalists needed. Because our calculations are based on patient census, the calculated number of hospitalists needed decreases as length of stay decreases. However, as length of stay decreases, the census becomes a less important driver of workload and admissions become more important.

Hospitalists may become overextended by too large a census, too many new admissions, or both factors. The simplest way to illustrate this is to assume that each hospitalist has a workload "cap." We used an average daily census of 13 patients and an average number of 6 admissions as theoretical workload caps. **Figure 3** shows the relation between daily census and admissions for different average lengths of stay. When the average length of stay is 3 days, the census cap of 13 patients is reached with slightly more than 4
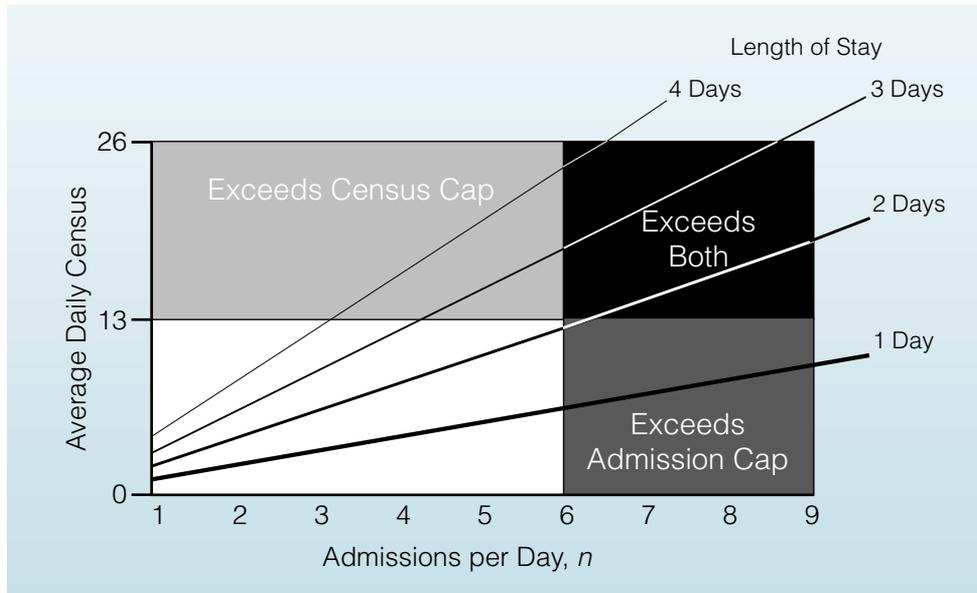
FIGURE 3. The effects of length of stay in determining whether the inpatient census or the number of admissions is the limiting factor in determining a hospitalist's workload. Assume that a hospitalist has a maximum workload cap of 13 inpatients or 6 admissions per day. When the length of stay exceeds 3 days, the hospitalist will exceed the census cap first. When the length of stay is 2 days or fewer, the hospitalist will exceed the admissions cap first.

admissions per day and is the limiting factor for the hospitalist's workload. However, when the average length of stay is 2 days, the admissions cap of 6 new admissions per day is reached when the average daily census is only 12 patients. At this point, admissions become the limiting factor.

This example is, of course, greatly simplified. The effect of workload is not a strict cap, nor is there any sharp threshold at which either census or admissions become the main determinant of workload. In addition, a hospitalist's workload includes factors other than admissions and census, such as serving on committees and performing administrative duties. Nevertheless, in planning for a hospitalist workforce at both the local and national levels, it is important to appreciate that the intensity of clinical work is not evenly distributed over the course of a hospitalization but is concentrated at admission and discharge. As a result, if length of stay decreases and patient turnover increases, the sustainable inpatient census for hospitalists will decrease.

Take-Home Points

- **Hospitalists are physicians who spend a substantial amount of professional time providing in-hospital care for the patients of primary care physicians.**

- **The number of hospitalists needed by a group is a function of the average daily inpatient census and the number of patients that can be cared for by each hospitalist.**

- **Given the hospitalist's current average workload, a practice with 3000 admissions per year and an average length of stay of 5 days would need 5 full-time hospitalists.**

- **The required number of hospitalists varies with expected workload, patient case complexity, and other duties that hospitalists are expected to perform.**

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Correspondence

Jon D. Lurie, MD, MS, Outcomes Group (111B), VA Medical Center, White River Junction, VT 05009; 802-296-5178; fax: 802-296-6325; e-mail: jon.d.lurie@dartmouth.edu.