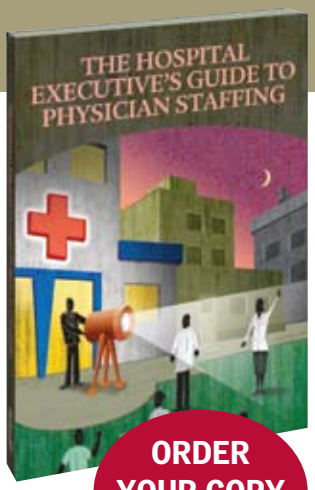
How Many Physicians Do You Need?



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CHAPTER 4

How Many Physicians Make a Health System?

As noted at the beginning of Chapter 3, determining community physician need is an important task for hospitals and health systems, especially those seeking to enhance clinical programs or dealing with current or anticipated physician shortages. However, there are many aspects of medical staff planning and development that are outside the scope of a community need analysis or require more detailed investigation.

This chapter describes the following additional quantitative analyses that help determine physician need for a hospital or health system:

1. Calculating effective service populations
2. Examining primary care need by subarea
3. Accounting for hospitalists
4. Determining need for subspecialists

5. Using activity levels to determine physician full-time equivalents (FTE)
6. Projecting future physician need and supply

Nonquantitative issues related to physician staffing are addressed later in the book. Chapter 5 describes strategies for attracting and retaining physicians and strengthening hospital-physician relationships. Chapter 6 describes successful physician recruitment strategies and includes sections on primary care and rural areas. Chapter 7 outlines five major initiatives that will be central to efforts by the Obama administration to reshape and reform the U.S. health-care system and discusses the probable effect of these initiatives on physicians, hospitals, and hospital-physician relationships.

Analysis #1: Calculating Effective Service Population

The primary service area (PSA) of a hospital is usually defined as the geographic area, often a cluster of ZIP codes or sometimes an entire county, from which the hospital draws 75%–80% of its patients. If strong mutual dependence exists between the hospital and the community or if there are no significant competitors nearby, the hospital may have an inpatient market share well in excess of 50% in its PSA, but this is typically not the case.

No hospital or health system provides 100% of the medical care required by the residents of the communities it serves. Hospitals located in metropolitan areas, whether in the urban core or in the surrounding suburbs, usually have several competitors, although hospital consolidation has reduced the number

of providers to as few as two large, multihospital systems in some markets. Many small cities have two hospitals that have been friendly competitors for decades. Even a hospital that is the only acute care facility in a county usually faces competition from outside the county from large, more sophisticated, and sometimes distant medical centers or university hospitals actively in search of additional patients for their tertiary-level programs and services.

The best way to account for competitive or shared markets is to calculate a hospital's effective service population for each primary care, medical, and surgical specialty. Effective service population is calculated using the hospital's market share within its PSA and the percentage of patients it draws from outside the PSA, referred to as out-of-area draw. For example, suppose there are 200,000 residents in the PSA, the hospital has a 50% market share in the PSA, and the hospital draws 20% of its patients from outside the PSA. In this case, the hospital has an effective service population of 125,000, calculated as follows:

(PSA population x market share) / (1 – out-of-area draw) or (200,000 x 0.5) / (1 – 0.2)	= 125,000

A hospitalwide effective service population based on the hospital's overall market share and out-of-area draw is typically used to determine the hospital's need for primary care and hospital-based physicians. It may also be used for specialties with little inpatient activity (e.g., allergy/immunology, dermatology, and ophthalmology). However, specialty-specific service populations should be used to determine physician need in most other medical and surgical specialties.

For example, assuming a PSA population of 200,000, a hospital has a market share of 60% and an out-of-area draw of 25% in cardiac surgery, but a market share of only 40% and an out-of-area draw of 20% in general surgery. The hospital will have an effective service population of 200,000 x 0.6 / (1 – 0.25) = 160,000 in cardiac surgery, but an effective service population of only 200,000 x 0.4 / (1 – 0.2) = 100,000 in general surgery.

Figure 4.1 illustrates how much variability there can be in effective service populations. The medical center illustrated in Figure 4.1 reported PSA market shares ranging from a low of 24% in endocrinology and infectious disease to a high of 62% in neurosurgery. The percentage of patients the medical center drew from outside the PSA ranged from a low of 13% in OB/GYN to a high of 31% in neurosurgery. In this case, the effective service population for neurosurgery (359,400) was more than triple the effective service population for endocrinology (115,400). It is also interesting to note that the medical center had an effective service population greater than 200,000 for seven of the 10 surgical specialties, but none of the primary care and medical specialties.

FIGURE 4.1

EFFECTIVE SERVICE POPULATION AND PHYSICIAN NEED BY SPECIALTY

Assuming Current Market Share and Out-of-Area Draw for Hospital with Service Area Population of 400,000

	PSA market share	Out-of-area draw	Effective service population	Physician-to-population ratio	Physician need
Primary care					
Family/general practice	35%	18%	170,700	27.7	47.3
Internal medicine	35%	18%	170,700	18.5	31.6
Hospitalist	35%	18%	170,700	4.0	6.8
Pediatrics	35%	18%	170,700	8.8	15.0
Medical specialties					
Allergy/immunology	35%	18%	170,700	0.6	1.0
Cardiology	33%	19%	163,000	6.5	10.6
Dermatology	25%	22%	128,200	2.6	3.3
Endocrinology	24%	17%	115,700	0.8	0.9
Gastroenterology	26%	19%	128,400	3.3	4.2
Hematology/oncology	40%	19%	197,500	2.6	5.1
Infectious disease	24%	22%	123,100	0.9	1.1
Nephrology	26%	19%	128,400	1.4	1.8
Neurology	35%	22%	179,500	2.9	5.2
Pulmonary medicine	33%	16%	157,100	3.2	5.0
Rheumatology	35%	18%	170,700	0.9	1.5
Surgical specialties					
Cardiovascular/cardiothoracic	50%	20%	250,000	1.6	4.0
General surgery	43%	26%	232,400	6.4	14.9
Neurosurgery	62%	31%	359,400	1.0	3.6
OB/GYN	41%	13%	188,500	8.2	15.5
Ophthalmology	40%	25%	213,300	4.7	10.0
Orthopedics	51%	22%	261,500	5.2	13.6
Otolaryngology	40%	22%	205,100	2.4	4.9
Plastic surgery	37%	25%	197,300	1.2	2.4
Urology	32%	15%	150,600	3.4	5.1
Vascular surgery	46%	21%	232,900	0.4	0.9

Source: Health Strategies & Solutions, Inc., 2008.

The physician-to-population ratio column illustrates how the adult primary care ratio was adapted to local market conditions. Eight percent of the overall need for 50.2 adult primary care physicians (PCP) per 100,000 population was assigned to the hospitalist category. Sixty percent of the remaining adult PCPs were allocated to family practice, and 40% to general internal medicine.

Analysis #2: Determining Primary Care Need by Subarea

The effective service population approach outlined on the previous pages is usually sufficient for nonprimary care specialties. This is true because most medical and surgical specialists are located in the immediate vicinity of hospitals and medical centers and because most patients are willing to travel from outlying communities to obtain specialty care. Therefore, the hospital must only know how many FTE cardiologists or FTE orthopedic surgeons it needs and not the geographic distribution of physicians in these specialties.

However, geographic accessibility is an important consideration for family practice, general internal medicine, and general pediatrics. Thus, many hospitals determine the need for PCPs by geographic subarea by dividing their primary or primary and secondary service area into directional subsets (e.g., southeast, northeast, central, and west). Other hospitals define a core service area smaller than a traditional PSA in the immediate vicinity of the hospital and a set of surrounding subareas that complete its primary or primary and secondary service area.

However it's defined, the hospital's effective service population for primary care in each geographic subarea is determined solely by its market share in the subarea. Out-of-area draw is no longer a concern because each subarea is presumed to be self-sufficient with respect to primary care, meaning that out-migration and in-migration for primary care are assumed to be in balance. At the same time, it is often appropriate to use two different PCP-to-population ratios—one for the core service area or the subarea in which the hospital is located and another for all remaining subareas.

The use of two primary care ratios seems counterintuitive because, ideally, access to primary care is uniform across all geographies. But general internists and pediatricians also have a mild tendency to cluster near hospitals and medical centers. Using a higher primary care ratio in the core service area reflects this reality and also provides a way to account for the in-migration to the core service area that contributes to the hospital's overall effective service population.

This concept is best illustrated by a recent primary care analysis carried out in central Massachusetts. The market was separated into seven subareas—the city of Worcester (the core area) and six surrounding ZIP code clusters east and west of Worcester, stretching from the southern to the northern border of the state. A ratio of approximately 80 PCPs per 100,000 population, based on an overall ratio of 240 physicians per 100,000 (excluding residents and fellows), was determined to be appropriate for the entire market.

A much higher ratio—approximately 120 PCPs per 100,000—was used to determine the need for PCPs in Worcester, home to the campuses of the

University of Massachusetts Medical Center and St. Vincent Hospital. A ratio of approximately 70 PCPs per 100,000, which was still well above the threshold ratio of 50 per 100,000, was used to determine the need for PCPs in each of the six surrounding subareas, home to several small to medium-sized community hospitals. The weighted average for the entire market was 79 PCPs per 100,000 population, as shown in Figure 4.2.

FIGURE 4.2

PRIMARY CARE PHYSICIAN NEED PER 100,000 POPULATION, 2008

City of Worcester and Surrounding Areas in Central Massachusetts Before and After Market Adjustments

	City of Worcester	Surrounding areas	Total market
	Before market adjustments		
Family/general practice	45	28	31
Internal medicine	54	31	35
Pediatrics	22	12	13
Total	120	70	79
	After market adjustments		
Family/general practice	27	18	19
Internal medicine	56	36	40
Hospitalists	16	5	7
Pediatrics	22	12	13
Total	120	70	79

Source: Health Strategies & Solutions, Inc., 2008.

Comparing the top and bottom halves of Figure 4.2 provides a second example of how to account for the contribution of hospitalists and adjust ratios for family practice and general internal medicine to reflect market conditions. The top half of Figure 4.2 reflects the national mix of general internists to family practice physicians and does not show a population-based need for hospitalists.

The bottom half of Figure 4.2 assumes that hospitalists account for 16% of adult PCPs in Worcester, where inpatient beds are concentrated, and 8% of adult PCPs in the six surrounding areas (both percentages reflect local practice patterns). To keep total primary care need at levels shown in the top half of Figure 4.2, the need for general internists and family practice physicians was reduced by the hospitalist contribution. A second adjustment was then made so that the physician-to-population ratio for general internal medicine would be twice the ratio for family practice physicians, reflecting state and regional practice patterns.

Analysis #3: Accounting for Hospitalists

The term "hospitalist" first appeared in an article in the *New England Journal of Medicine* in 1996.[1] The authors of that article said they "anticipate[d] the rapid growth of a new breed of physicians we call 'hospitalists'—specialists in internal medicine—who will be responsible for managing the care of hospitalized patients in the same way that PCPs are responsible for managing the care of outpatients." Many PCPs initially resisted having a hospital-based physician care for their patients because of concerns about discontinuity in patient care with the potential to result in lower patient and family satisfaction.

Proponents of the hospitalist model cite two major benefits: increased quality of care and greater efficiency. Hospitalists' use of evidenced-based medicine and established treatment protocols, greater understanding of acute disorders, focus on patient safety, and ability to see a patient up to three or four times per day contribute to increased quality of care. Greater efficiency results from earlier hospital discharge (i.e., shorter length of stay) and more appropriate use of other hospital services, such as laboratory and radiology.

Early studies regarding the effect of hospitalists on the quality and cost of care were primarily single-hospital studies with small patient samples. A recent retrospective study examined the care given to nearly 77,000 patients with one of seven primary diagnoses discharged from 45 hospitals throughout the United States from 2002 to 2005.[2] That study indicated that the hospitalist model was associated with a modest reduction in length of stay (0.4 days) compared to care given by general internists and family practice physicians. However, the study showed little evidence of lower costs and no effect on mortality rates or hospital readmission rates.

The belief that hospitalists increased the quality and efficiency of inpatient care contributed to the growth of the hospitalist movement. But economic pressures on PCPs had an even greater effect. Despite lingering concerns about continuity of care, PCPs eventually realized that using hospitalists meant less time traveling to the hospital and rounding on inpatients. That meant a PCP had more time to see patients in the office and could generate more income from his or her practice. According to the Society of Hospital Medicine

(SHM), "the average PCP has one or two hospitalized patients per week today versus 10–12 patients per week twenty years ago."[3]

All of these factors helped make hospitalists the fastest-growing physician specialty in the United States. According to the SHM, the number of hospitalists nationwide doubled from 1999 to 2001, increasing from 3,500 to 7,000. The supply doubled again in less than four years, reaching 16,400 in 2005. The SHM projects there will be 30,000 hospitalists nationwide by 2010, another near-doubling in just five years.[4]

Forty percent of hospitals in the United States employed hospitalists in 2006, according to the SHM, including 71% of hospitals with 500 or more beds and 55% of hospitals with 200 to 499 beds.[5] Thus, many hospitals now want to know how many hospitalists they need. One approach is to calculate hospitalist need as a percentage of adult primary care need, which is the approach used in the central Massachusetts analysis described previously.

According to the SHM, 86% of hospitalists are adult PCPs, with 82% in general internal medicine and 4% in family practice.[6] These figures suggest that hospitalists accounted for 6.9% of general internists and family practice physicians in 2005 (Figure 4.3). The percentage will increase to 11.6% in 2010 if the number of hospitalists reaches 30,000 as projected by the SHM and the number of adult PCPs grows at the same rate from 2005 to 2010 as it did from 2000 to 2005.

FIGURE 4.3
HOSPITALISTS AS PERCENT OF ADULT PRIMARY CARE PHYSICIANS

United States, 2005 and 2010 (Projected)

Specialty	**2005**	**2010**
Family medicine	80,809	90,516
General practice	11,049	6,888
Internal medicine (IM)	112,934	124,515
Total	204,792	221,919
Hospitalists	16,400	30,000
General internists	82.3%	82.3%
Family practice (FP)	3.7%	3.7%
Subtotal	86.0%	86.0%
IM/FP hospitalists	14,100	25,800
Ratio: IM/FP hospitalists to adult primary care	6.9%	11.6%

Source data obtained from: Society of Hospital Medicine, *2008 Media Kit,* (2008), *www.hospitalmedicine.org/AM/Template.cfm?Section=Media_Kit&Template=/CM?ContentDisplay.cfm&ContentID=17249*, (accessed October 30, 2008); Society of Hospital Medicine, Growth of Hospital Medicine Nationwide, (2007) *www.hospitalmedicine.org/Content/NavigationMenu/Media/GrowthofHospitalMedicineNationwide/Growth_of_Hospital_M.htm,* (accessed October 30, 2008); American Medical Association, Physician Characteristics and Distribution in the United States, 2007 Edition: Tables 4.1 and 5.16; United States Census Bureau.

A second approach for determining the required number of hospitalists is to estimate the total number of patients they will care for annually based on the number of admissions generated by PCPs who use hospitalists for inpatient care and the number of patients admitted through the emergency department (ED) who lack a PCP. The total number of patients is then divided by the number of patients an FTE hospitalist can manage in a year, including time spent for patient intake and discharge planning.

Analysis #4: Determining Need for Subspecialists

The specialties listed in Figure 4.1 provide sufficient detail for most hospitals and health systems. But larger institutions often want to know the need for physicians in several subspecialties. A practical approach is to estimate the demand for the unique services the subspecialists provide and then determine the number of FTE physicians required to meet that demand based on per-physician activity benchmarks. Figure 4.4 illustrates the use of this approach to determine the need for interventional cardiologists.

Assumptions similar to those in Figure 4.4 were used for a hospital serving a community with an overall need of 9.3 cardiologists per 100,000 population. The need for interventional cardiologists (2.3 per 100,000) and electrophysiologists—estimated to be 0.8 per 100,000—was carved out of this total, implying a need for 6.2 medical cardiologists per 100,000 population.

The hospital's effective service population was different for each subspecialty, and was largest for interventional cardiology and smallest for medical cardiology. Therefore, the identified need for medical cardiologists, interventional cardiologists, and electrophysiologists at the hospital was somewhat different than the mix implied by the physician-to-population ratios (64% medical cardiology, 25% interventional cardiology, and 9% electrophysiology). Different assumptions for the population-based demand for interventional cardiology services, average procedure times in the cath lab, benchmark activity levels per FTE physician, and effective service populations by subspecialty will yield different results in other settings.

FIGURE 4.4
DETERMINING NEED FOR INTERVENTIONAL CARDIOLOGISTS

Population-based demand for diagnostic cardiac catheterizations (Dx cath) and percutaneous coronary interventions (PCI)	
Dx caths per 1,000 population	12.0
PCIs per 1,000 population	4.0
PCIs performed in conjunction with Dx caths	75%
Dx caths only per 1,000 population	9.0
PCI only per 1,000 population	1.0
PCI and Dx caths per 1,000 population	3.0
Use of cardiac catheterization laboratory	
Cath lab hours per procedure – Dx cath only	1.5
Cath lab hours per procedure – PCI only	2.0
Cath lab hours per procedure – PCI and Dx cath	2.5
Cath lab hours per 1,000 population	23.0
Cath lab hours per 100,000 population	2,300
Benchmark activity level for interventional cardiologist	
Cath lab hours per FTE interventional cardiologist	1,000
FTE interventional cardiologist need per 100,000 population	2.3

Source: Health Strategies & Solutions, Inc., 2008.

A similar approach could be used for spine surgery, using estimates of the population-based demand for discectomies, spinal fusions, and laminectomies, and a benchmark for the number of such surgeries performed annually by an FTE spine surgeon. However, because spine surgery is performed by neurosurgeons and orthopedic surgeons, a slightly different approach, illustrated in Figure 4.5, is recommended.

The approach outlined in Figure 4.5 was used for a health system studying the feasibility of developing a spine center of excellence. The assumptions represented a blend of market data and internal hospital statistics. National data on spine surgery volume (approximately 575,000 discharges with a principal procedure of laminectomy or spinal fusion in 2006)[7] suggested a population-based rate of approximately 195 spine surgeries per 100,000 population. This estimate of population-based demand for spine surgery confirmed the reasonableness of the calculated need for 1.17 spine surgeons per 100,000 population, as comparing the two ratios implied an average of about 165 spine procedures per spine surgeon per year.

FIGURE 4.5
DETERMINING NEED FOR SPINE SURGEONS

Discharges in neurosurgery diagnostic-related groups (DRG)	2,772
Discharges in DRGs for spine surgery	2,143
Discharges in spine surgery DRGs by orthopedic surgeons	631
Discharges in spine surgery DRGs by neurosurgeons	1,512
Discharges in nonspine surgery neurosurgery DRGs by neurosurgeons	629
Discharges by neurosurgeons	2,141
Spine surgeries as percent of discharges by neurosurgeons	71%
Neurosurgery need full-time equivalents (FTE) per 100,000 population	1.2
Need for spine surgeons (FTEs) per 100,000 population based on need for neurosurgeons	0.85
Discharges in orthopedic DRGs	6,009
Percent discharges by orthopedic surgeons	86%
Discharges in orthopedic DRGs by orthopedic surgeons	5,159
Discharges in spine surgery DRGs by orthopedic surgeons	631
Total inpatient surgeries by orthopedic surgeons	5,790
Percent of orthopedic surgery performed on inpatients	45%
Total surgeries performed by orthopedic surgeons	10,527
Spine surgery as percent of surgeries by orthopedic surgeons	6%
Orthopedic need (FTEs) per 100,000 population	5.4
Need for spine surgeons (FTEs) per 100,000 population based on need for orthopedic surgeons	0.32
Total need for spine surgeons (FTEs) per 100,000 population	1.17

Source: Health Strategies & Solutions, Inc., 2008

Analysis #5: Using Activity Levels to Calculate Physician FTEs

Chapter 3 presented a very simple approach for converting physician head count into physician FTEs at the community level. This formula assumes that the average office-based physician represents 0.9 FTEs and that rural physicians represent 1 FTE. Hospital-based physicians are counted as 1 FTE, except for residents and fellows, who represent partial FTEs, the ratio varying by year of residency. This approach appears to work well in most communities and is consistent with the results of the annual physician work force study in New York State.[8]

Further, it is impractical, if not impossible, to gather data for every physician in the community to estimate each physician's FTE contribution. However, it is possible, albeit time-consuming, for most hospitals to gather activity data, such as admissions, inpatient and outpatient surgeries, in-hospital consultations, and referrals for outpatient services for each of the physicians on their active medical staff.

Comparing activity data to preestablished benchmarks for each specialty (e.g., 75 admissions per year per FTE family practice physician and 250 surgeries per year per FTE orthopedic surgeon) allows the hospital to estimate the FTE contribution of each physician on its active medical staff. This approach is particularly valuable when physicians are known to split their practice among two or three institutions. As simple as this approach seems, it is fraught with practical limitations. Consider the following:

- Physicians carry out more diagnostic tests and perform more procedures in their offices or nonhospital facilities every year, so hospital-based outpatient statistics are becoming less reliable indicators of how busy individual physicians are.

- There are many practice styles within an individual specialty. In some hospitals, cardiologists average 150–175 admissions per year, in which case, admissions are a useful measure of physician activity. In other hospitals, cardiologists act primarily as consultants, averaging as many as 1,000 inpatient consults per year, but frequently fewer than 50 admissions per year. In this case, consults are the better measure of physician activity.

- In some settings, multiple practice styles are evident, with some physicians in a specialty having high admission levels and low outpatient activity and others low admission levels and high outpatient activity. Different benchmarks should be used for different physicians in this situation.

- Some PCPs who are an important source of direct admissions to the hospital via a hospitalist program or an important source of referrals to medical and surgical specialists will have little or no hospital-based activity. The contribution of these physicians could be greatly underestimated if the hospital's information system does not routinely or accurately capture each patient's PCP upon intake.

- Further investigation is required when a physician has activity levels that are double or triple the benchmark in his or her specialty. Suppose a general internist generates 400 admissions in a hospital in which the benchmark is 125 admissions per year. Is the physician the medical director at a nearby nursing home? Is the physician getting a disproportionate percentage of unassigned admissions through the ED? In either case, the FTE contribution of the physician should be modified to reflect the institutional aspect of his or her practice.
- Once an initial set of FTE estimates has been developed using the activity benchmark approach, it is important that one or more persons familiar with all or most members of the active medical staff (e.g., the chief medical officer, the director of physician outreach services, and the chiefs of medicine and surgery) review the results, physician by physician. Adjustments should be made to the initial estimates, as needed, to correct for cases in which the recorded activity levels fail to provide a reasonable estimate of an individual physician's FTE contribution.

Analysis #6: Projecting Future Physician Need and Supply

It is common practice to develop two estimates of physician need and supply: one current and one five years into the future. The following factors may contribute to changes in hospital physician need:

- Aging of the population, which will affect physician-to-population ratios in the hospital's service area

- Changes in physician practice patterns (e.g., greater use of nonphysician practitioners), which may also affect physician-to-population ratios
- Projected growth or decline in the resident population in the service area, which will cause a proportional change in the effective service population for each specialty
- Targeted market share growth in selected specialties, reflecting the hospital's current or future clinical program priorities, often the primary driver of significant changes in physician need

The following factors may contribute to projected changes in physician supply:

- Retirement of physicians on the active medical staff
- Declining activity levels of physicians who are approaching retirement or who elect to devote less time to patient care
- Higher activity levels of young physicians who are still in the practice-building stage of their careers
- Increases or decreases in the FTE contribution of individual physicians who change the way they split their practice among two or more hospitals
- Recruitment of physicians new to the community
- Recruitment of physicians who are active in the community but who practice only at other institutions

Anticipated changes in physician supply due to retirement, reduced levels of clinical activity, or expected practice growth should be estimated physician by physician, based on personal knowledge of likely changes in each physician's practice. Another approach for estimating retirement effects is to apply the same rule of thumb used in a community need analysis, which is to assume that all physicians currently aged 60 and older will retire within five years.

Shifts in physician commitment and physician recruitment goals should be excluded from the baseline estimate of future physician supply unless such events are almost certain to occur within a limited period of time.

Ultimately, the difference between projected physician need and the baseline estimate of physician supply in each specialty identifies and quantifies future recruitment targets for the hospital or health system.

Endnotes

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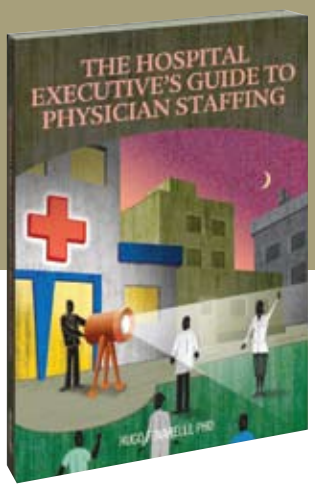

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