



Use of Hospitalists and Office-Based Primary Care Physicians' Productivity

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BACKGROUND: Growth in the care of hospitalized patients by hospitalists has the potential to increase the productivity of office-based primary care physicians (PCPs) by allowing them to focus on outpatient practice.

OBJECTIVE: Our aim was to examine the association between utilization of hospitalists and the productivity of office-based PCPs.

DESIGN/PARTICIPANTS: The cross-sectional study was conducted using the 2008 Health Tracking Physician Survey Restricted Use File linked to the Area Resource File. We analyzed a total of 1,158 office-based PCPs representing a weighted total of 97,355 physicians.

MAIN MEASURES: Utilization of hospitalists was defined as the percentage of a PCP's hospitalized patients treated by a hospitalist. The measures of PCPs' productivity were: (1) number of hospital visits per week, (2) number of office and outpatient clinic visits per week, and (3) direct patient care time per visit.

KEY RESULTS: We found that the use of hospitalists was significantly associated with a decreased number of hospital visits. The use of hospitalists was also associated with an increased number of office visits, but this was only significant for high users. Physicians who used hospitalists for more than three-quarters of their hospitalized patients had an extra 8.8 office visits per week on average ($p=0.05$), which was equivalent to a 10% increase in productivity over the predicted mean of 87 visits for physicians who did not use hospitalists. We did not find any significant differences in direct patient care time per visit.

CONCLUSIONS: Our study demonstrates that the increase in productivity for the one-third of PCPs who use hospitalists extensively may not be sufficient to offset the current loss of PCP workforce. However, our findings provide cautious optimism that if more PCPs effectively and efficiently used hospitalists, this could help mitigate a PCP shortage and improve access to primary care services.

KEY WORDS: hospitalists; primary care physician shortage; productivity.

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INTRODUCTION

The term *hospitalist* was first coined by Robert Wachter and Lee Goldman in a 1996 *New England Journal of Medicine* article to refer to physicians who specialize in delivering general medical care to hospitalized patients.¹ Since then, the number of hospitalists has grown rapidly, from a few thousand in the mid-1990s to more than 30,000 today.²

There are numerous hypothetical benefits and risks of the growing numbers of hospitalists. One widely discussed advantage is that hospitalists can contain hospital costs and improve inpatient efficiency.³ Several studies have shown that successful hospitalist programs improved inpatient efficiency without harmful effects on quality.^{4–7} Proponents contend that successful hospitalist programs have the potential to improve outpatient primary care physicians' (PCPs') productivity because hospitalists can reduce the need for PCPs to go to the hospital, allowing them to see more patients in the office than was previously possible.^{3,8–10}

A major risk of hospitalist models is poor communication and the potential discontinuity between inpatient and outpatient care.^{11–15} A systematic review documented that communication between hospitalists and PCPs occurred infrequently (3–20% of cases); the availability of a discharge summary at the first post discharge visit was low (12–34%) and remained poor at 4 weeks (51–77%); and poor communication affected the quality of care in approximately 25% of follow-up visits.¹²

Most importantly, the growth of hospitalists has introduced questions about the sustainability of the primary care workforce. According to the 2008 survey of the Society of Hospital Medicine, almost 85% of hospitalists are trained in general internal medicine.¹⁶ Physician survey data showed that about 9% of PCPs are hospitalists.¹⁷ The number is expected to grow as many younger physicians choose to practice in hospital inpatient settings.^{17,18} Given the similar education and training background, students and residents choosing hospital medicine over primary care may contribute to the primary care shortage.^{10,19} On one hand, growing numbers of hospitalists may exacerbate a perceived shortage of PCPs. On the other hand, growth in the care of hospitalized patients by hospitalists could increase the productivity of PCPs. Increased PCPs' productivity may or may not offset the potential loss to the PCP workforce, but this issue has never been empirically examined.

To provide insight into these issues, we first examined the characteristics of PCPs who use hospitalists. Then we examined whether the use of hospitalists improves PCPs' productivity. Our empirical analysis provides a valuable baseline for the relationship between utilization of hospitalists and PCPs' productivity.

METHODS

We analyzed a national stratified random sample of physicians from the 2008 Health Tracking Physician Survey Restricted Use File, which covered a wide variety of physician and practice dimensions, from basic demographics, practice organization and career satisfaction to insurance acceptance, compensation arrangements and charity care provision.²⁰ The survey data were linked to the Area Resource File to acquire county-level market characteristics. We focused on office-based PCPs (general internal medicine, family practice, general practice, general pediatrics, geriatric medicine) who practiced at least 20 h a week providing direct patient care. We further limited our sample to those who were not practicing hospitalists and had at least one patient admitted to a hospital. A total of 1,158 PCPs out of 4,720 respondents were analyzed. Accounting for the survey sample design yielded a weighted physician population of 97,355 physicians.

The utilization of hospitalists was measured as the percentage of hospitalized patients treated by a hospitalist, reported by each physician in answer to the question, "What percentage of your patients who were hospitalized last year had a hospitalist involved in their inpatient care?" Almost one-third of PCPs were not using hospitalists, but another one-third of PCPs reported that they used hospitalists for more than three-quarters of their hospitalized patients. We categorized this variable as 0 % (none), 1–25 % (low), 26–75 % (medium), and 76–100 % (high).

Our study examined three measures of productivity: (1) number of hospital visits per week (counted as one visit each time a patient was seen), (2) number of office and outpatient clinic visits per week, and (3) direct patient care time per visit (for all patient visits regardless of care settings). All three measures were recorded by physicians, in reference to their last complete week of work. We standardized the number of visits by the average direct patient care hours per week in our sample (mean=41 h) to account for physicians' different work hours.

The physician demographic characteristics included gender, race, and international medical graduate (IMG) status. The number of years in practice (1–10, 11–20, and 21+ years) was included instead of age, as those two variables were highly correlated. Time spent in email or phone conversation with other physicians was included to measure each physician's level of communication. Whether or not compensation was linked to productivity, daily malpractice concerns (feeling pressured by threat of malpractice suits and/or concern about

hospital medical errors), and patient health status (percent of patients having chronic conditions) were also included.

The practice covariates included type of practice, defined as solo or two physicians, group (≥ 3 physicians), health maintenance organization, medical school, hospital-based, and other; size of practice (≤ 100 , 101+ physicians); and use of information technology for exchanging clinical data and images with hospitals and laboratories. Source of practice revenue was also included and defined as the percentage of revenue from Medicare, Medicaid, and capitated or other prepaid payment models.

This study used three categories of market-level covariates: geographic locations, socioeconomic conditions, and health care resources and utilization. The two geographic variables were rural location and health professional shortage area designation. Socioeconomic conditions included median household income, percent of population uninsured, and population density. Health care resources and utilization measures included total hospitalists per 100,000 population, total admissions per 1,000 population, total emergency department visits per 1,000 population, total outpatient days per 1,000 population, and percent Medicare managed care penetration.

We first conducted an ordered logistic regression to examine the association between key physician-level, practice-level, and market-level characteristics described above and their levels of hospitalist use. Our response variable, use of hospitalists, was grouped into four categories based on the percentage of hospitalized patients treated by a hospitalist. This variable was treated as ordinal under the assumption that the levels of hospitalist use have a natural ordering (high, medium, low or none), but the distance between adjacent levels is unknown.

Our second analysis examined the association between the key independent variable (four categories of hospitalist use - high, medium, low or none) and each of the three productivity outcomes (number of hospital visits per week, number of office and outpatient clinic visits per week, and direct patient care time per visit), adjusting for all other physician-level, practice-level, and market-level confounders used in the first analysis. Separate regression models were created for each of the three productivity measures. Given the over-dispersed nature of count data, negative binomial regression was used to model the numbers of hospital and office visits. We examined the association between the utilization of hospitalists and direct patient care time per visit using ordinary least squares regression.

In addition to examining PCPs overall, we conducted subanalyses of the larger specialties of general internal medicine, family practice, and general pediatrics. All analyses were weighted to produce national-level estimates. The correct standard errors were obtained by accounting for the stratification, clustering and weighting used in the survey sample design. We used Stata software (version 12) for all analyses. This study was approved by the Institutional Review Board of the American Institutes for Research.

RESULTS

Table 1 presents descriptive statistics. The weighted sample size was 97,355 PCPs, of whom 37.6 % were family practitioners and 33.7 % were general internists. About 70 % of PCPs reported that they had at least one hospitalized patient seen by a hospitalist in the last year. The average numbers of hospital and office visits per week were 9.8 and 92.5, respectively. PCPs spent an average of 28.8 min per visit in direct patient care.

Odds ratios and 95 % confidence intervals for the factors associated with being in the highest hospitalist group (vs. the combined medium, low and nonusers) are presented in Table 2. Overall, male physicians, IMGs, and physicians with fewer years in practice were less likely to be in the highest hospitalist group. Physicians who spend more than 1 h a day on email or phone conversations with other physicians were 22 % less likely to be in the highest hospitalist group (95 % CI 0.62–0.99). However, the subanalyses showed that the general internal medicine subgroup appears to differ from other PCPs. The general internists who spend more time communicating with other physicians were 20 % more likely to be in the highest hospitalist group (95 % CI 0.78–1.84), but this result was not statistically significant. Each percentage point increase in the physician's patients with chronic conditions slightly increases the likelihood of being in the highest hospitalist group (OR=1.01, 95 % CI 1.00–1.01). A practice size of more than 100 physicians was also positively associated with being in the highest hospitalist group (OR=2.08, 95 % CI 1.35–3.20). Physicians practicing in a rural area were 40 % less likely to be in the highest hospitalist group (95 % CI 0.41–0.87). Physicians in areas with a greater number of hospitalists were slightly more likely to be in the highest hospitalist group (OR=1.04, 95 % CI 1.02–1.07). A one-percentage-point increase in managed care penetration was associated with 1.02 times the odds of being a high hospitalist user (95 % CI 1.01–1.03). Overall, the factors associated with being in the highest hospitalist group did not differ substantially by primary care specialty compared with the overall results.

Tables 3, 4 and 5 display our analysis of the association between the level of hospitalist use and PCPs' productivity for the three subgroups and PCPs overall. Not surprisingly, the use of hospitalists was statistically significantly negatively associated with number of hospital visits, regardless of specialty (Table 3). The incident rate ratio of hospital visits for low users was 0.71 times (95 % CI 0.59–0.84) that of nonusers and the IRR for high users was only 0.17 times (95 % CI 0.13–0.23) that of nonusers.

The effect of being high hospitalist users on the number of office and outpatient clinic visits was statistically significant, but there were no statistically significant differences between the medium or low users and nonusers (Table 4). Among all

PCPs, the office visit incidence rate for high users was 1.10 times (95 % CI 1.00–1.21) that of nonusers. The IRR of office visits for high users among general internists was greater and statistically significant (IRR=1.16, $p=0.04$), compared with that of the family practice subgroup (IRR=1.02, $p=0.77$) and general pediatrics subgroup (IRR=1.11, $p=0.15$).

Contrary to our expectation, we found a slight decline in direct patient care time per visit as hospitalist use increased, although such differences were not statistically significant (Table 5). Because the measure of direct patient care in this study includes seeing patients as well as time spent on patient record-keeping, patient-related office work and travel time, it does not differentiate between time spent in patient care and time spent in transportation.

For ease of interpretation, we present the predicted numbers of hospital and office visits at each level of hospitalist use (holding all other variables at their means) for all PCPs in Table 6. Compared to nonusers, the predicted number of hospital visits per week declines by 4.6 for low users (11–15.6), 9 for medium users (6.6–15.6), and 12.9 for high users (2.7–15.6), respectively. The high users had an extra 8.8 office visits per week (95.8–87.0), compared to nonusers. This translates to a 10 % increase in productivity and matches the IRR for high users in Table 4.

DISCUSSION

Despite the important workforce implications, relatively little research has assessed the differences in PCPs' productivity relative to the level of hospitalist use. We found that an increase in the care of hospitalized patients by hospitalists was positively associated with PCPs' productivity, at least for those with the highest hospitalist use.

PCPs with a high level of hospitalist use (76 % or more of their hospitalized patients treated by hospitalists) had 8.8 more office visits per week than the predicted mean of 87 office visits for nonusers. This represents a 10 % increase in productivity for high users. Estimates from the American Medical Association Masterfile indicate that there were 208,807 non-hospitalist practicing PCPs who provided office-based primary care in 2010.²¹ A back-of-the-envelope calculation indicates that the additional 8.8 outpatient visits per week provided by PCPs with the highest hospitalist use would generate the equivalent of an additional 6,970 PCPs in that year [$208,807 \times 0.33 \times (8.8/87)$]. This number is much lower than the estimated number of hospitalists who were trained as PCPs (approximately 21,100 to 22,900 in 2010).¹⁷ Thus, the increase in productivity for this fraction of PCPs may not be sufficient to offset the loss to the current PCP workforce. However, our findings suggest that, if all PCPs increased their use of hospitalists to the highest level, the resulting 10 % increase in productivity could yield the equivalent of more than 20,000 additional PCPs ($208,807 \times 0.1$), which is

Table 1. Characteristics of 2008 Health Tracking Physician Survey Sample According to Percentage of Hospitalized Patients Treated by a Hospitalist*

	Overall	Percentage of hospitalized patients treated by a hospitalist			
		0 % (none)	1–25 % (low)	26–75 % (medium)	76–100 % (high)
	Weighted N=97,355	Weighted N=29,602	Weighted N=24,385	Weighted N=11,065	Weighted N=32,303
Specialty					
General internal medicine, N (%)	32,799 (33.7)	10,637 (36.6)	7,850 (32.2)	3,751 (33.9)	10,366 (32.1)
Family practice, N (%)	36,644 (37.6)	9,169 (31.6)	9,991 (41.0)	3,923 (35.5)	13,390 (41.5)
General practice, N (%)	3,145 (3.2)	793 (2.7)	1,066 (4.4)	152 (1.4)	1,118 (3.5)
General pediatrics, N (%)	22,986 (23.6)	8,233 (28.3)	4,975 (20.4)	3,043 (27.5)	6,577 (20.4)
Pediatric internal medicine, N (%)	506 (0.5)	0 (0.0)	237 (1.0)	108 (1.0)	158 (0.5)
Adolescent medicine, N (%)	224 (0.2)	73 (0.3)	80 (0.3)	0 (0.0)	68 (0.2)
Geriatric medicine, N (%)	1,061 (1.1)	157 (0.5)	190 (0.8)	89 (0.8)	627 (1.9)
Productivity					
Number of hospital visits per week, mean (SE)†	9.8 (0.5)	16.0 (1.0)	11.8 (0.9)	6.8 (1.1)	3.7 (0.7)
Number of office and outpatient clinic visits per week, mean (SE)†	92.5 (1.7)	90.1 (4.0)	89.7 (3.0)	90.7 (3.2)	97.3 (2.8)
Direct patient care time per visit, mean (SE)†, minutes	28.8 (0.7)	28.6 (1.4)	29.5 (1.6)	28.4 (1.1)	28.6 (0.8)
Physician characteristics					
Male, N (%)	64,096 (65.8)	19,409 (66.8)	17,729 (72.7)	6,840 (61.8)	19,757 (61.2)
White, non-Hispanic, N (%)	71,703 (73.7)	21,880 (75.3)	17,786 (72.9)	7,891 (71.3)	23,739 (73.5)
International medical graduates, N (%)	22,215 (22.8)	7,962 (27.4)	6,067 (24.9)	2,208 (20.0)	5,830 (18.0)
Years in practice					
1–10 years, N (%)	30,378 (31.2)	9,675 (33.3)	8,008 (32.8)	3,872 (35.0)	8,644 (26.8)
11–20 years, N (%)	31,910 (32.8)	9,819 (33.8)	7,021 (28.8)	3,012 (27.2)	11,875 (36.8)
21+ years, N (%)	35,066 (36.0)	9,568 (32.9)	9,356 (38.4)	4,182 (37.8)	11,783 (36.5)
Time spent on email or phone conversation with other physicians a day					
0–1 h, N (%)	62,697 (64.4)	18,662 (64.2)	15,199 (62.3)	7,438 (67.2)	21,051 (65.2)
1+ hour, N (%)	34,658 (35.6)	10,400 (35.8)	9,186 (37.7)	3,627 (32.8)	11,252 (34.8)
Compensation linked to productivity, N (%)	68,661 (70.5)	19,906 (68.5)	17,742 (72.8)	7,981 (72.1)	22,662 (70.2)
Malpractice concern, agree/agree strongly, N (%)	58,789 (60.4)	17,681 (60.8)	14,364 (58.9)	6,619 (59.8)	19,797 (61.3)
Percent of patients having chronic conditions, mean (SE)†	53.8 (0.9)	53.5 (1.6)	54.0 (1.6)	52.3 (2.6)	54.3 (1.5)
Practice characteristics					
Type					
Solo or 2 physicians, N (%)	34,013 (34.9)	10,905 (37.5)	9,243 (37.9)	4,350 (39.3)	9,313 (28.8)
Group ≥3 physicians, N (%)	44,270 (45.5)	13,692 (47.1)	10,882 (44.6)	4,041 (36.5)	15,400 (47.7)
HMO, N (%)	5,190 (5.3)	546 (1.9)	645 (2.6)	545 (4.9)	3,444 (10.7)
Medical school, N (%)	3,246 (3.3)	767 (2.6)	1,302 (5.3)	495 (4.5)	669 (2.1)
Hospital-based, N (%)	5,841 (6.0)	1,530 (5.3)	1,153 (4.7)	693 (6.3)	2,437 (7.5)
Other, N (%)	4,795 (4.9)	1,621 (5.6)	1,162 (4.8)	942 (8.5)	1,040 (3.2)
Size					
1–100 physicians, N (%)	86,142 (88.5)	27,481 (94.6)	22,765 (93.4)	9,494 (85.8)	25,892 (80.2)
101+ physicians, N (%)	11,213 (11.5)	1,581 (5.4)	1,620 (6.6)	1,571 (14.2)	6,411 (19.8)
Use of IT, %	47,469 (48.8)	13,121 (45.1)	11,995 (49.2)	5,661 (51.2)	16,449 (50.9)
Source of practice revenue					
Percent from Medicare, mean (SE)†	29.5 (0.7)	32.1 (1.3)	29.8 (1.3)	26.7 (2.1)	27.8 (1.2)
Percent from Medicaid, mean (SE)†	17.7 (0.6)	18.0 (1.2)	19.2 (1.2)	19.2 (2.1)	15.7 (1.2)
Percent from capitated or other prepaid basis, mean (SE)†	15.1 (0.7)	10.1 (1.0)	13.3 (1.3)	19.0 (2.3)	19.8 (1.5)
Market characteristics					
Geographic region					
Rural, %	16,465 (16.9)	7,988 (27.5)	5,375 (22.0)	867 (7.8)	2,086 (6.5)
HPSA, %	39,589 (40.7)	10,931 (37.6)	8,595 (35.2)	5,623 (50.8)	14,237 (44.1)
Socioeconomic					
Median household income, mean (SE)†, \$	55,399.5 (401.6)	52,661.5 (779.8)	54,192.7 (879.4)	55,125.3 (1,170.6)	58,913.4 (724.6)
Percent of uninsured, mean (SE)†	15.4 (0.1)	15.5 (0.3)	15.0 (0.3)	16.1 (0.5)	15.4 (0.3)
Population density, mean (SE)†, people/mi ²	2,290.0 (181.7)	1,477.2 (203.3)	2,452.0 (395.9)	3,199.5 (688.7)	2,601.1 (408.2)
Health care resources and utilization					
Total hospitalists per 100,000 population, mean (SE)†	6.0 (0.2)	4.8 (0.3)	5.6 (0.3)	7.7 (0.8)	6.7 (0.3)
Total admissions per 1,000 population, mean (SE)†	136.3 (2.3)	129.6 (3.3)	141.3 (4.7)	141.3 (6.2)	137.0 (4.9)
Total ED visits per 1,000 population, mean (SE)†	430.9 (7.2)	447.0 (8.8)	442.5 (12.6)	410.6 (14.6)	414.3 (17.6)
Total outpatient days per 1,000 population, mean (SE)†	2,510.7 (68.6)	2,544.1 (84.4)	2,506.9 (105.0)	2,436.8 (173.4)	2,508.3 (167.2)
Percent of Medicare managed care penetration, mean (SE)†	22.0 (0.4)	18.0 (0.6)	21.2 (0.8)	25.2 (1.2)	25.2 (0.6)

*Data Source: Center for Studying Health System Change, Health Tracking Physician Survey, 2008 Restricted Use Data File. All analyses were weighted to produce national population estimates. The total weighted population was 97,355 primary care physicians

†Mean reports include standard errors of national estimates based on complex sample design

HMOhealth maintenance organization; ITinformation technology; HPSAhealth professional shortage area; EDemergency department

comparable to the number of hospitalists who are lost to the PCP workforce (21,100–22,900 in 2010). We do not know

how many additional hospitalists might be needed if all PCPs increased their use of hospitalists to the highest level.

Table 2. Factors Associated with Being in the Highest Hospitalist Group, by Primary Care Specialty

	Overall		General Internal Medicine		Family Practice		General Pediatrics	
	OR [95 % CI]*	p value	OR [95 % CI]*	p value	OR [95 % CI]*	p value	OR [95 % CI]*	p value
Physician characteristics								
Male	0.79 [0.62, 1.02]	0.08	0.64 [0.38, 1.08]	0.09	0.80 [0.50, 1.27]	0.34	0.75 [0.45, 1.24]	0.26
White, non-Hispanic	0.97 [0.72, 1.30]	0.83	0.72 [0.44, 1.18]	0.20	1.94 [1.02, 3.67]	0.04	0.73 [0.40, 1.32]	0.29
International medical graduates	0.56 [0.41, 0.77]	< 0.001	0.64 [0.39, 1.03]	0.07	0.91 [0.45, 1.85]	0.80	0.47 [0.23, 0.96]	0.04
Years in practice								
1–10 years	0.63 [0.47, 0.83]	< 0.001	0.59 [0.33, 1.06]	0.08	0.60 [0.38, 0.97]	0.04	0.72 [0.39, 1.33]	0.30
11–20 years	0.84 [0.63, 1.11]	0.21	0.74 [0.44, 1.25]	0.26	0.83 [0.51, 1.36]	0.46	1.10 [0.63, 1.93]	0.74
21+ years	(ref)		(ref)		(ref)		(ref)	
Time spent on email or phone conversation with other physicians per day								
0–1 h	(ref)		(ref)		(ref)		(ref)	
1+ h	0.78 [0.62, 0.99]	0.04	1.20 [0.78, 1.84]	0.41	0.64 [0.42, 0.97]	0.04	0.68 [0.41, 1.13]	0.14
Compensation linked to productivity	1.07 [0.83, 1.38]	0.61	0.91 [0.57, 1.45]	0.69	1.16 [0.72, 1.85]	0.55	0.94 [0.55, 1.62]	0.84
Malpractice concern, agree/agree strongly	1.17 [0.93, 1.47]	0.19	1.23 [0.78, 1.95]	0.37	1.03 [0.69, 1.55]	0.87	1.01 [0.65, 1.59]	0.95
Percent of patients having chronic conditions	1.01 [1.00, 1.01]	0.01	1.00 [0.98, 1.01]	0.54	1.01 [1.00, 1.02]	0.07	1.00 [0.98, 1.02]	0.96
Practice characteristics								
Type								
Solo or 2 physicians	0.64 [0.31, 1.31]	0.22	0.35 [0.10, 1.18]	0.09	0.89 [0.24, 3.30]	0.86	0.75 [0.12, 4.70]	0.76
Group ≥ 3 physicians	0.66 [0.33, 1.31]	0.23	0.60 [0.18, 1.95]	0.39	0.75 [0.22, 2.57]	0.64	0.67 [0.11, 3.98]	0.66
HMO	(ref)		(ref)		(ref)		(ref)	
Medical school	0.39 [0.17, 0.88]	0.02	0.52 [0.14, 1.87]	0.32	0.12 [0.02, 0.62]	0.01	0.93 [0.07, 12.30]	0.95
Hospital-based	0.94 [0.41, 2.16]	0.89	1.07 [0.23, 5.07]	0.93	0.79 [0.17, 3.76]	0.77	1.41 [0.20, 10.11]	0.73
Other	0.55 [0.24, 1.28]	0.17	0.41 [0.08, 2.10]	0.28	0.73 [0.17, 3.05]	0.66	0.62 [0.09, 4.50]	0.64
Size								
1–100 physicians	(ref)		(ref)		(ref)		(ref)	
101+ physicians	2.08 [1.35, 3.20]	< 0.001	3.47 [1.67, 7.22]	< 0.001	1.34 [0.63, 2.84]	0.45	2.46 [0.98, 6.18]	0.06
Use of IT	0.97 [0.77, 1.23]	0.81	1.16 [0.75, 1.80]	0.51	0.86 [0.58, 1.27]	0.44	0.86 [0.52, 1.43]	0.57
Source of practice revenue								
Percent from Medicare	0.99 [0.99, 1.00]	0.05	0.99 [0.98, 1.00]	0.19	0.99 [0.98, 1.01]	0.26	1.00 [0.98, 1.02]	0.96
Percent from Medicaid	1.00 [1.00, 1.01]	0.56	1.01 [1.00, 1.02]	0.19	0.99 [0.98, 1.01]	0.22	1.01 [0.99, 1.02]	0.38
Percent from capitated or other prepaid basis	1.00 [1.00, 1.01]	0.10	1.00 [0.99, 1.01]	0.87	1.01 [1.00, 1.02]	0.01	1.00 [0.99, 1.01]	0.94
Market characteristics								
Geographic region								
Rural	0.60 [0.41, 0.87]	0.01	1.29 [0.58, 2.87]	0.54	0.33 [0.19, 0.59]	< 0.001	0.62 [0.23, 1.69]	0.35
HPSA	1.22 [0.96, 1.56]	0.11	1.40 [0.85, 2.28]	0.18	1.05 [0.70, 1.58]	0.82	1.26 [0.74, 2.17]	0.40
Socioeconomic								
Median household income, \$	1.00 [1.00, 1.00]	< 0.001	1.00 [1.00, 1.00]	0.03	1.00 [1.00, 1.00]	0.16	1.00 [1.00, 1.00]	< 0.001
Percent of uninsured	1.04 [1.02, 1.07]	< 0.001	1.01 [0.96, 1.05]	0.73	1.02 [0.98, 1.07]	0.24	1.06 [1.00, 1.12]	0.04
Population density, people/mi ²	1.00 [1.00, 1.00]	0.35	1.00 [1.00, 1.00]	0.64	1.00 [1.00, 1.00]	0.77	1.00 [1.00, 1.00]	0.51
Health care resources and utilization								
Total hospitalists per 100,000 population	1.04 [1.02, 1.07]	0.002	1.04 [1.00, 1.09]	0.05	1.05 [1.00, 1.11]	0.06	1.03 [0.99, 1.07]	0.13
Total admissions per 1,000 population	1.00 [1.00, 1.00]	0.77	1.00 [0.99, 1.01]	0.93	1.00 [1.00, 1.00]	0.97	1.00 [1.00, 1.01]	0.54
Total ED visits per 1,000 population	1.00 [1.00, 1.00]	0.73	1.00 [1.00, 1.00]	0.34	1.00 [1.00, 1.00]	0.63	1.00 [1.00, 1.00]	0.82
Total outpatient days per 1,000 population	1.00 [1.00, 1.00]	0.34	1.00 [1.00, 1.00]	0.57	1.00 [1.00, 1.00]	0.77	1.00 [1.00, 1.00]	0.90
Percent of Medicare managed care penetration	1.02 [1.01, 1.03]	< 0.001	1.03 [1.01, 1.05]	< 0.001	1.01 [0.99, 1.03]	0.30	1.02 [1.00, 1.04]	0.03

*Results from an ordered logistic regression. Our response variable, use of hospitalists, was treated as ordinal under the assumption that the levels of hospitalist use (percentage of hospitalized patients treated by a hospitalist) have a natural ordering—i.e., 0 % (none), 1–25 % (low), 26–75 % (medium), and 76–100 % (high)

HMO health maintenance organization; IT information technology; HPSA health professional shortage area; ED emergency department

These estimates are based on data obtained in 2008 and 2010, and the number of hospitalists continues to grow. Whether a 10 % increase in productivity by all PCPs is enough to offset the additional losses to the PCP workforce remains an open question. For the health care system to reach its full potential, ensuring an adequate supply of physicians is essential. Otherwise, new hospitalists may come at the expense of the existing or future primary care workforce.

In addition to workforce expansion, we also need to identify possible risks of using hospitalists and determine how to minimize them. As Meltzer and Chung²² suggest, the hospitalist model must balance the benefit of medical specialization with the cost of care coordination in order to maintain efficiency. Coordinated patient care is essential to the effective use of hospitalists, underlining the need to develop policies to mitigate potential discontinuity of care between the inpatient and outpatient settings.

Table 3. Use of Hospitalists and Office-Based Primary Care Physicians' Number of Hospital Visits Per Week, by Primary Care Specialty

	Overall		General Internal Medicine		Family Practice		General Pediatrics	
	IRR [95 % CI]*	p value	IRR [95 % CI]*	p value	IRR [95 % CI]*	p value	IRR [95 % CI]*	p value
Percentage of hospitalized patients treated by a hospitalist								
0 %	(ref)		(ref)		(ref)		(ref)	
1–25 % (low)	0.71 [0.59, 0.84]	< 0.001	0.57 [0.41, 0.80]	< 0.001	0.67 [0.47, 0.95]	0.02	0.97 [0.70, 1.34]	0.86
26–75 % (medium)	0.42 [0.31, 0.58]	< 0.001	0.36 [0.22, 0.61]	< 0.001	0.33 [0.17, 0.64]	< 0.001	0.49 [0.32, 0.75]	< 0.001
76–100 % (high)	0.17 [0.13, 0.23]	< 0.001	0.11 [0.07, 0.19]	< 0.001	0.06 [0.04, 0.10]	< 0.001	0.36 [0.24, 0.54]	< 0.001
Physician characteristics								
Male	1.46 [1.19, 1.78]	< 0.001	1.57 [1.15, 2.15]	0.01	1.39 [0.97, 2.00]	0.07	0.89 [0.67, 1.18]	0.41
White, non-Hispanic	1.02 [0.77, 1.34]	0.91	0.84 [0.58, 1.22]	0.37	1.04 [0.65, 1.67]	0.86	1.20 [0.83, 1.73]	0.34
International medical graduates	1.02 [0.79, 1.31]	0.88	0.96 [0.70, 1.33]	0.81	0.81 [0.47, 1.39]	0.44	0.97 [0.66, 1.45]	0.90
Years in practice								
1–10 years	1.18 [0.92, 1.51]	0.19	1.27 [0.86, 1.87]	0.23	0.67 [0.45, 1.02]	0.06	1.21 [0.87, 1.67]	0.25
11–20 years	1.17 [0.93, 1.48]	0.18	1.27 [0.89, 1.83]	0.19	1.28 [0.86, 1.90]	0.23	0.88 [0.62, 1.25]	0.48
21+ years	(ref)		(ref)		(ref)		(ref)	
Time spent on email or phone conversation with other physicians a day								
0–1 h	(ref)		(ref)		(ref)		(ref)	
1+ hour	1.34 [1.09, 1.65]	0.01	1.49 [1.07, 2.07]	0.02	1.14 [0.79, 1.63]	0.49	1.03 [0.77, 1.37]	0.84
Compensation linked to productivity	0.83 [0.66, 1.05]	0.12	1.03 [0.72, 1.49]	0.87	0.81 [0.53, 1.24]	0.33	1.07 [0.79, 1.45]	0.67
Malpractice concern, agree/agree strongly	0.98 [0.80, 1.19]	0.84	1.19 [0.89, 1.59]	0.25	0.92 [0.63, 1.32]	0.64	1.01 [0.76, 1.33]	0.97
Percent of patients having chronic conditions	1.00 [0.99, 1.00]	0.33	1.00 [0.99, 1.01]	0.81	1.01 [1.00, 1.02]	0.11	0.99 [0.98, 1.00]	0.14
Practice characteristics								
Type								
Solo or 2 physicians	1.04 [0.47, 2.29]	0.93	0.69 [0.23, 2.11]	0.52	1.10 [0.21, 5.81]	0.91	2.28 [0.78, 6.61]	0.13
Group ≥ 3 physicians	1.03 [0.47, 2.22]	0.95	0.79 [0.27, 2.28]	0.67	0.66 [0.13, 3.36]	0.62	3.46 [1.26, 9.44]	0.02
HMO	(ref)		(ref)		(ref)		(ref)	
Medical school	2.14 [0.71, 6.48]	0.18	0.79 [0.20, 3.20]	0.74	0.33 [0.05, 2.14]	0.25	42.52 [7.61, 237.57]	< 0.001
Hospital-based	1.32 [0.51, 3.43]	0.57	2.20 [0.59, 8.19]	0.24	0.40 [0.07, 2.27]	0.30	1.76 [0.40, 7.66]	0.45
Other	0.39 [0.16, 0.93]	0.04	0.25 [0.05, 1.32]	0.10	0.30 [0.05, 1.73]	0.18	2.44 [0.66, 9.03]	0.18
Size								
1–100 physicians	(ref)		(ref)		(ref)		(ref)	
101+ physicians	0.93 [0.58, 1.50]	0.76	0.73 [0.39, 1.38]	0.33	0.49 [0.26, 0.94]	0.03	1.02 [0.52, 1.98]	0.96
Use of IT	1.03 [0.85, 1.25]	0.75	1.22 [0.89, 1.67]	0.22	1.04 [0.75, 1.45]	0.80	1.18 [0.90, 1.55]	0.22
Source of practice revenue								
Percent from Medicare	1.01 [1.01, 1.02]	< 0.001	1.02 [1.01, 1.03]	< 0.001	1.01 [0.99, 1.02]	0.24	1.01 [0.99, 1.02]	0.38
Percent from Medicaid	1.01 [1.00, 1.02]	0.002	1.01 [1.00, 1.03]	0.12	1.01 [1.00, 1.03]	0.05	1.00 [1.00, 1.01]	0.72
Percent from capitated or other prepaid basis	1.00 [1.00, 1.01]	0.28	1.00 [0.99, 1.01]	0.43	1.00 [1.00, 1.01]	0.32	1.00 [1.00, 1.01]	0.47
Market characteristics								
Geographic region								
Rural	1.10 [0.83, 1.46]	0.50	1.05 [0.64, 1.73]	0.83	0.92 [0.59, 1.45]	0.73	0.86 [0.54, 1.38]	0.54
HPSA	1.05 [0.85, 1.29]	0.65	0.78 [0.56, 1.10]	0.16	1.20 [0.87, 1.64]	0.27	1.62 [1.15, 2.27]	0.01
Socioeconomic								
Median household income, \$	1.00 [1.00, 1.00]	0.91	1.00 [1.00, 1.00]	0.96	1.00 [1.00, 1.00]	0.17	1.00 [1.00, 1.00]	0.51
Percent of uninsured	1.02 [1.00, 1.04]	0.04	1.02 [0.99, 1.05]	0.23	1.00 [0.96, 1.03]	0.86	1.03 [1.00, 1.07]	0.04
Population density, people/mi ²	1.00 [1.00, 1.00]	0.73	1.00 [1.00, 1.00]	0.70	1.00 [1.00, 1.00]	1.00	1.00 [1.00, 1.00]	0.34
Health care resources and utilization								
Total hospitalists per 100,000 population	1.00 [0.98, 1.01]	0.57	1.01 [0.99, 1.03]	0.36	1.00 [0.95, 1.04]	0.94	0.97 [0.95, 0.99]	0.02
Total admissions per 1,000 population	1.00 [1.00, 1.00]	0.73	1.00 [1.00, 1.00]	0.87	1.00 [1.00, 1.00]	0.83	1.00 [0.99, 1.00]	0.05
Total ED visits per 1,000 population	1.00 [1.00, 1.00]	0.41	1.00 [1.00, 1.00]	0.69	1.00 [1.00, 1.00]	0.31	1.00 [1.00, 1.00]	0.20
Total outpatient days per 1,000 population	1.00 [1.00, 1.00]	0.40	1.00 [1.00, 1.00]	0.25	1.00 [1.00, 1.00]	0.52	1.00 [1.00, 1.00]	0.33
Percent of Medicare managed care penetration	1.01 [1.00, 1.02]	0.10	1.01 [1.00, 1.02]	0.08	1.01 [1.00, 1.03]	0.13	1.01 [1.00, 1.02]	0.20

*Results from a negative binomial regression

HMOhealth maintenance organization; ITinformation technology; HPSAhealth professional shortage area; EDemergency department

General concern about the hospitalist model revolves around the break in continuity of care, which ultimately affects quality of care, potentially resulting in medical errors, poor outcomes for patients, and high follow-up costs.^{23–26}

Enhanced communication between the hospitalist and the PCP is essential to optimum patient care. Advances in electronic data exchange can help facilitate this communication and reduce the risks associated with discontinuity of care

Table 4. Use of Hospitalists and Office-Based Primary Care Physicians' Number of Office and Outpatient Clinic Visits Per Week, by Primary Care Specialty

	Overall		General Internal Medicine		Family Practice		General Pediatrics	
	IRR [95 % CI]*	p value	IRR [95 % CI]*	p value	IRR [95 % CI]*	p value	IRR [95 % CI]*	p value
Percentage of hospitalized patients treated by a hospitalist	(ref)		(ref)		(ref)		(ref)	
0 %								
1–25 % (low)	1.02 [0.93, 1.12]	0.71	1.09 [0.95, 1.25]	0.22	0.93 [0.80, 1.07]	0.29	1.07 [0.93, 1.24]	0.34
26–75 % (medium)	1.04 [0.94, 1.15]	0.42	1.13 [0.97, 1.32]	0.12	1.00 [0.85, 1.19]	0.96	0.98 [0.86, 1.13]	0.83
76–100 % (high)	1.10 [1.00, 1.21]	0.05	1.16 [1.01, 1.33]	0.04	1.02 [0.87, 1.20]	0.77	1.11 [0.96, 1.28]	0.15
Physician characteristics								
Male	1.00 [0.92, 1.07]	0.91	1.02 [0.91, 1.14]	0.73	0.98 [0.86, 1.12]	0.78	1.04 [0.93, 1.18]	0.47
White, non-Hispanic	0.95 [0.86, 1.06]	0.36	1.01 [0.90, 1.13]	0.83	0.82 [0.69, 0.99]	0.03	0.97 [0.85, 1.10]	0.60
International medical graduates	0.96 [0.87, 1.06]	0.44	0.96 [0.86, 1.07]	0.47	0.75 [0.64, 0.88]	<0.001	1.00 [0.85, 1.18]	0.98
Years in practice								
1–10 years	0.98 [0.90, 1.06]	0.62	1.04 [0.91, 1.18]	0.61	0.92 [0.82, 1.04]	0.18	1.02 [0.89, 1.16]	0.81
11–20 years	1.05 [0.97, 1.15]	0.22	1.01 [0.90, 1.13]	0.85	1.01 [0.89, 1.14]	0.87	1.11 [0.96, 1.27]	0.15
21+ years	(ref)		(ref)		(ref)		(ref)	
Time spent on email or phone conversation with other physicians a day								
0–1 h	(ref)		(ref)		(ref)		(ref)	
1+ hour	0.93 [0.86, 1.00]	0.06	0.89 [0.80, 0.99]	0.03	0.88 [0.78, 0.99]	0.03	0.93 [0.84, 1.04]	0.23
Compensation linked to productivity	1.05 [0.96, 1.15]	0.25	1.15 [1.03, 1.28]	0.02	1.07 [0.93, 1.23]	0.35	1.06 [0.94, 1.19]	0.37
Malpractice concern, agree/agree strongly	1.01 [0.95, 1.08]	0.74	1.03 [0.94, 1.14]	0.52	0.98 [0.88, 1.10]	0.78	0.95 [0.85, 1.06]	0.36
Percent of patients having chronic conditions	1.00 [1.00, 1.00]	0.01	1.00 [0.99, 1.00]	0.01	1.00 [1.00, 1.00]	0.71	1.00 [0.99, 1.00]	0.35
Practice characteristics								
Type								
Solo or 2 physicians	1.03 [0.85, 1.26]	0.74	1.26 [0.99, 1.61]	0.06	0.95 [0.73, 1.23]	0.70	1.07 [0.81, 1.40]	0.65
Group ≥3 physicians	1.08 [0.89, 1.29]	0.44	1.27 [1.03, 1.58]	0.03	0.97 [0.77, 1.21]	0.77	1.15 [0.89, 1.49]	0.30
HMO	(ref)		(ref)		(ref)		(ref)	
Medical school	0.88 [0.62, 1.25]	0.49	1.06 [0.80, 1.38]	0.70	1.08 [0.58, 2.01]	0.81	0.55 [0.27, 1.12]	0.10
Hospital-based	0.84 [0.67, 1.05]	0.13	1.00 [0.69, 1.45]	0.99	0.79 [0.58, 1.09]	0.15	0.81 [0.59, 1.11]	0.19
Other	0.84 [0.65, 1.08]	0.17	1.08 [0.75, 1.55]	0.69	0.65 [0.44, 0.96]	0.03	1.21 [0.88, 1.66]	0.25
Size								
1–100 physicians	(ref)		(ref)		(ref)		(ref)	
101+ physicians	0.86 [0.77, 0.97]	0.01	0.89 [0.77, 1.03]	0.12	0.95 [0.82, 1.11]	0.51	0.93 [0.73, 1.17]	0.52
Use of IT	0.96 [0.89, 1.03]	0.24	0.93 [0.84, 1.03]	0.17	0.89 [0.80, 0.98]	0.02	0.94 [0.84, 1.04]	0.20
Source of practice revenue								
Percent from Medicare	1.00 [0.99, 1.00]	<0.001	1.00 [0.99, 1.00]	<0.001	1.00 [0.99, 1.00]	0.20	1.00 [1.00, 1.00]	0.76
Percent from Medicaid	1.00 [1.00, 1.00]	0.62	1.00 [0.99, 1.00]	0.24	1.00 [1.00, 1.01]	0.57	1.00 [1.00, 1.00]	0.29
Percent from capitated or other prepaid basis	1.00 [1.00, 1.00]	0.02	1.00 [1.00, 1.01]	0.03	1.00 [1.00, 1.00]	0.30	1.00 [1.00, 1.00]	0.31
Market characteristics								
Geographic region								
Rural	0.97 [0.85, 1.11]	0.70	1.11 [0.89, 1.38]	0.34	0.93 [0.79, 1.09]	0.36	0.93 [0.75, 1.15]	0.48
HPSA	1.06 [0.97, 1.15]	0.19	0.94 [0.85, 1.05]	0.31	1.08 [0.96, 1.22]	0.20	1.07 [0.96, 1.20]	0.22
Socioeconomic								
Median household income, \$	1.00 [1.00, 1.00]	0.04	1.00 [1.00, 1.00]	0.42	1.00 [1.00, 1.00]	0.11	1.00 [1.00, 1.00]	0.81
Percent of uninsured	1.00 [0.99, 1.00]	0.15	0.99 [0.98, 1.00]	0.25	0.99 [0.98, 1.00]	0.19	1.00 [0.99, 1.01]	0.66
Population density, people/mi ²	1.00 [1.00, 1.00]	0.04	1.00 [1.00, 1.00]	0.77	1.00 [1.00, 1.00]	0.88	1.00 [1.00, 1.00]	0.05
Health care resources and utilization								
Total hospitalists per 100,000 population	1.00 [0.99, 1.00]	0.13	0.99 [0.99, 1.00]	0.04	0.99 [0.99, 1.00]	0.12	1.00 [1.00, 1.01]	0.37
Total admissions per 1,000 population	1.00 [1.00, 1.00]	0.26	1.00 [1.00, 1.00]	0.82	1.00 [1.00, 1.00]	0.11	1.00 [1.00, 1.00]	0.37
Total ED visits per 1,000 population	1.00 [1.00, 1.00]	0.63	1.00 [1.00, 1.00]	0.70	1.00 [1.00, 1.00]	0.92	1.00 [1.00, 1.00]	0.93
Total outpatient days per 1,000 population	1.00 [1.00, 1.00]	0.15	1.00 [1.00, 1.00]	0.52	1.00 [1.00, 1.00]	0.21	1.00 [1.00, 1.00]	0.46
Percent of Medicare managed care penetration	1.00 [1.00, 1.00]	0.36	1.00 [1.00, 1.00]	0.63	1.00 [1.00, 1.00]	0.69	1.00 [0.99, 1.00]	0.05

*Results from a negative binomial regression

HMOhealth maintenance organization; ITinformation technology; HPSAhealth professional shortage area; EDemergency department

inherent in the hospitalist model. Some experts suggest that having hospitalists treat patients in the immediate post-discharge period before the hand-off to PCPs (bridging clinic sessions) would help improve coordination at transitions upon

hospital discharge.^{11,27} Others believe that both patients and physicians may benefit if primary physicians visit patients (continuity visits) during hospitalizations when a hospitalist is the physician-of-record.²⁸

Table 5. Use of Hospitalists and Office-Based Primary Care Physicians' Direct Patient Care Time Per Week, By Primary Care Specialty

	Overall		General Internal Medicine		Family Practice		General Pediatrics	
	Coefficient (SE)*	p value	Coefficient (SE)*	p value	Coefficient (SE)*	p value	Coefficient (SE)*	p value
Percentage of hospitalized patients treated by a hospitalist								
0 %	(ref)		(ref)		(ref)		(ref)	
1–25 % (low)	0.41 (2.07)	0.84	2.71 (4.26)	0.53	0.45 (1.41)	0.75	1.38 (2.47)	0.58
26–75 % (medium)	–1.41 (2.02)	0.48	–2.69 (4.02)	0.50	0.51 (2.02)	0.80	3.57 (2.66)	0.18
76–100 % (high)	–0.87 (1.93)	0.65	–2.32 (4.53)	0.61	0.32 (1.38)	0.82	–1.16 (2.01)	0.56
Physician characteristics								
Male	–2.80 (1.86)	0.13	–8.47 (5.64)	0.13	–1.60 (1.27)	0.21	–0.14 (1.75)	0.94
White, non-Hispanic	1.36 (1.36)	0.32	4.35 (3.01)	0.15	3.54 (1.53)	0.02	0.03 (2.55)	0.99
International medical graduates	0.45 (1.34)	0.74	–3.64 (2.37)	0.13	4.59 (2.05)	0.03	2.10 (2.95)	0.48
Years in practice								
1–10 years	0.08 (1.67)	0.96	5.14 (4.28)	0.23	0.16 (1.35)	0.90	–2.76 (2.42)	0.25
11–20 years	–1.90 (1.24)	0.13	2.77 (3.47)	0.42	–1.54 (1.23)	0.21	–5.82 (1.87)	< 0.001
21+ years	(ref)		(ref)		(ref)		(ref)	
Time spent on email or phone conversation with other physicians a day								
0–1 h	(ref)		(ref)		(ref)		(ref)	
1+ hour	3.27 (1.78)	0.07	10.68 (5.31)	0.05	1.18 (1.07)	0.27	1.99 (1.80)	0.27
Compensation linked to productivity	–0.92 (1.04)	0.38	0.79 (3.05)	0.80	–2.07 (1.33)	0.12	–1.91 (1.66)	0.25
Malpractice concern, agree/agree strongly	–0.80 (1.17)	0.49	2.14 (3.05)	0.48	–1.82 (1.23)	0.14	0.91 (1.67)	0.59
Percent of patients having chronic conditions	0.09 (0.04)	0.02	0.08 (0.12)	0.48	0.0031 (0.0288)	0.92	0.10 (0.06)	0.12
Practice characteristics								
Type								
Solo or 2 physicians	–1.09 (3.05)	0.72	–7.94 (6.38)	0.21	1.12 (3.15)	0.72	2.56 (4.64)	0.58
Group ≥3 physicians	–3.16 (2.73)	0.25	–9.01 (5.13)	0.08	1.14 (2.99)	0.70	–1.04 (4.03)	0.80
HMO	(ref)		(ref)		(ref)		(ref)	
Medical school	0.60 (4.06)	0.88	–17.18 (10.76)	0.11	6.74 (5.74)	0.24	7.02 (7.82)	0.37
Hospital-based	–0.33 (3.36)	0.92	–8.27 (5.97)	0.17	2.12 (3.38)	0.53	6.26 (6.44)	0.33
Other	0.98 (3.44)	0.78	–14.39 (8.93)	0.11	7.65 (4.11)	0.06	–6.50 (4.56)	0.16
Size								
1–100 physicians	(ref)		(ref)		(ref)		(ref)	
101+ physicians	0.97 (1.88)	0.61	–0.85 (3.70)	0.82	2.30 (2.15)	0.29	1.47 (2.89)	0.61
Use of IT	1.50 (1.36)	0.27	–1.49 (3.12)	0.63	1.66 (1.04)	0.11	3.40 (1.88)	0.07
Source of practice revenue								
Percent from Medicare	–0.03 (0.04)	0.51	–0.13 (0.13)	0.32	–0.06 (0.04)	0.09	0.02 (0.09)	0.83
Percent from Medicaid	0.0044 (0.0399)	0.91	–0.0017 (0.0699)	0.98	–0.0025 (0.0457)	0.96	0.06 (0.04)	0.09
Percent from capitated or other prepaid basis	–0.02 (0.03)	0.46	–0.06 (0.05)	0.30	–0.04 (0.03)	0.27	0.0015 (0.0387)	0.97
Market characteristics								
Geographic region								
Rural	–0.07 (1.97)	0.97	–2.59 (4.77)	0.59	1.58 (1.60)	0.32	4.87 (3.88)	0.21
HPSA	0.82 (1.39)	0.55	1.37 (2.88)	0.63	0.38 (1.10)	0.73	–2.15 (1.69)	0.20
Socioeconomic								
Median household income, \$	0.000022 (0.000067)	0.75	–0.00028 (0.00021)	0.17	0.000136 (0.000049)	0.01	–0.000037 (0.000075)	0.62
Percent of uninsured	–0.10 (0.14)	0.47	–0.46 (0.36)	0.20	0.08 (0.10)	0.41	–0.01 (0.17)	0.96
Population density, people/mi ²	0.00016 (0.00012)	0.18	0.000039 (0.000179)	0.83	–0.0000098 (0.0001198)	0.94	0.00022 (0.00017)	0.19
Health care resources and utilization								
Total hospitalists per 100,000 population	0.10 (0.10)	0.28	0.28 (0.21)	0.18	0.03 (0.07)	0.70	–0.12 (0.12)	0.30
Total admissions per 1,000 population	0.01 (0.02)	0.74	0.08 (0.07)	0.24	–0.01 (0.01)	0.27	–0.01 (0.02)	0.53
Total ED visits per 1,000 population	–0.0066 (0.0059)	0.26	–0.04 (0.02)	0.08	0.00017 (0.00281)	0.95	0.0032 (0.0008)	0.69
Total outpatient days per 1,000 population	0.00049 (0.00036)	0.17	0.0014 (0.0009)	0.12	0.00046 (0.0003)	0.12	–0.000056 (0.000665)	0.93
Percent of Medicare managed care penetration	–0.04 (0.04)	0.43	–0.20 (0.13)	0.12	–0.0013 (0.0464)	0.98	0.10 (0.06)	0.10

*Results from an ordinary least squares regression
HMOhealth maintenance organization; ITinformation technology; HPSAhealth professional shortage area; EDemergency department

Under the current payment system (primarily fee-for-service), PCPs may or may not gain financial reward by divesting hospital responsibilities due to the higher reimbursement rates for hospitalized patients. If PCPs' use

of hospitalists were increased to promote outpatient productivity, the health care system would need to ensure that financial incentives align with this goal. Payment reforms could offer incentives for those physicians to

Table 6. Predicted Numbers of Hospital and Office Visits per Week at Each Level of Hospitalist Use (Weighted N=97,355)

Percentage of hospitalized patients treated by a hospitalist	Number of hospital visits per week			Number of office and outpatient clinic visits per week		
	Predicted mean*	Difference†	p value	Predicted mean*	Difference†	p value
0 %	15.58	(ref)		86.98	(ref)	
1–25 % (low)	10.99	–4.59	< 0.001	88.52	1.54	0.71
26–75 % (medium)	6.58	–9.00	< 0.001	90.64	3.66	0.42
76–100 % (high)	2.71	–12.88	< 0.001	95.82	8.84	0.05

*We calculated the predicted numbers of hospital and office visits at each level of hospitalist use by holding all other variables at their means

†Over the predicted mean number of visits for physicians who did not use hospitalists (0 %)

more actively coordinate care with inpatient providers. Under the 2013 physician payment rule, the Centers for Medicare & Medicaid Services (CMS) adopted new transitional care management services codes that provide payments to physicians for managing patients' transition back to the community after discharge from an acute care setting.²⁹ The payment covers both face-to-face and other work of the physician who accepts the care of the patient during the 30 days after discharge and takes responsibility for a timely follow-up and evaluation. CMS took an important step in emphasizing primary care and care coordination services that encourage a change in the structure and process of delivery. Alternatively, payment policy could impose a penalty for outcomes that result from fragmented care. Broad payment reform such as bundled payments may generate shared reimbursement incentives, further encouraging collaboration between inpatient and outpatient care.

Expanding the role of hospitalists in care coordination is also important. Initially, hospitalists engaged primarily in traditional care for medical inpatients, but they should move beyond the role of managing inpatient care to a new role of physician-of-record as new care delivery and payment models evolve. These competencies also highlight the central role of the hospitalist in facilitating the continuity of care, and provide a key link between the patient and the PCP.

Our study has important limitations. First, this is a cross-sectional study and causality cannot be inferred. A second limitation relates to our inability to assess patient preference and the severity of illness for hospitalized patients. Third, we could not control for hospitals' and insurers' policies on the use of hospitalists. Fourth, we are unable to directly measure inpatient volume, which is a measure of the overall incentives for PCPs to see their patients when they are hospitalized. Fifth, we are unable to examine the effects on patient satisfaction, outcomes and costs related to hospitalists, which must rely on future research. Lastly, our findings may be overestimated as we did not address the time needed by physicians to engage in activities to improve care coordination. Despite these limitations, this study is the first to provide valuable quantitative estimates of the extent to which PCPs' productivity could be improved by using hospitalists.

The number of hospitalists is expected to grow and the role and responsibilities of hospitalists will become more important as health delivery transformations, such as ACOs, engage

hospitalists to reduce unnecessary (re) hospitalizations and to enhance care transitions.³⁰ However, the increasing number of hospitalists raises concerns about a potential drain on the number of PCPs who might otherwise practice in outpatient settings. Our study demonstrates that the use of hospitalists can have a positive impact on PCPs' productivity, at least for those with the highest hospitalist use. Our findings provide cautious optimism that if more PCPs effectively and efficiently used hospitalists, this could help mitigate a PCP shortage and improve access to primary care services.

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