Implementation of a Voluntary Hospitalist Service at a Community Teaching Hospital: Improved Clinical Efficiency and Patient Outcomes

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Background: **Previous investigations of the effect of the hospitalist model on resource use and patient outcomes have focused on academic medical centers or have used short follow-up periods.**

Objective: **To determine the effects of hospitalist care on resource use and patient outcomes and whether these effects change over time.**

Design: **Retrospective cohort study.**

Setting: **Community-based, urban teaching hospital.**

Patients: **5308 patients cared for by community or hospitalist physicians in the 2 years after implementation of a voluntary hospitalist service.**

Measurements: **Length of stay, costs, 10-day readmission rates, use of consultative services, in-hospital mortality rate, and mortality rate at 30 and 60 days.**

Results: **Patients of hospitalists were younger than those of community physicians (65 years vs. 74 years; $P < 0.001$) and were more likely to be of black than of white ethnicity (33.3% vs. 17.9%; $P < 0.001$), have Medicaid insurance (25.1% vs. 10.2%; $P < 0.001$), and receive intensive care (19.9% vs. 15.8%; $P < 0.001$). After adjustment in multivariable models, length of stay and costs were not different in the first year of the study. In year 2, patients of hospitalists had shorter stays (0.61 day shorter; $P = 0.002$) and lower costs ($822 lower; $P = 0.002$). Over the 2 years of this study, patients of hospitalists had lower risk for death in the hospital (adjusted relative hazard, 0.71 [95% CI, 0.54 to 0.93]) and at 30 and 60 days of follow-up.**

Conclusions: **A voluntary hospitalist service at a community-based teaching hospital produced reductions in length of stay and costs that became statistically significant in the second year of use. A mortality benefit extending beyond hospitalization was noted in both years. Future investigations are needed to understand the ways in which hospitalists increase clinical efficiency and appear to improve the quality of care.**

Ann Intern Med. 2002;137:859-865. www.annals.org
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See related article on pp 866-874 and editorial comment on pp 930-931.

The organization of inpatient services has been transformed with the development of the hospitalist (1). Traditionally, primary care physicians have cared for their own inpatients. In the hospitalist model, a hospitalist becomes the patient's attending physician during hospitalization and the outpatient physician resumes supervision of the patient after discharge (2).

Several studies have demonstrated improved clinical efficiency in the hospitalist model, but these studies have focused largely on academic centers or health maintenance organizations, or have not used concurrent controls or reported longer periods of follow-up (3–7). One published study examining a hospitalist system at a community-based teaching hospital suggested improvement in clinical efficiency and a reduction in readmissions (8). However, analytic limitations open these findings to many interpretations. To examine the effects of implementation of a hospitalist service on resource utilization and patient outcomes over time, we studied 5308 consecutive patients admitted to an urban community teaching hospital in San Francisco, California.

Methods

Study Site

Mount Zion Hospital (San Francisco, California) was a 280-bed community-based teaching hospital affiliated with University of California, San Francisco. Mount Zion's inpatient facilities were closed in November 1999 because of financial pressures. During the year before closure, all physicians were aware of the hospital's financial difficulties, but no individual or group was made a focus of efforts to improve clinical efficiency. Discussions about possible closure began 1 month after this study ended, and the hospital closed 5 months later.

Medical patients at Mount Zion Hospital were admitted to one of four medical teams composed of a resident, one to two interns, and zero to three medical students. Mount Zion medical teams cared for common inpatient diagnoses, as well as specialty-associated diagnoses such as cancer, acute myocardial infarction, and cerebrovascular accidents. Housestaff wrote all orders and provided 24-hour coverage to inpatients. Each team had a ward attending physician who before 1 July 1997 was a full-time faculty member serving in this role for 1 month each year. Community-based physicians remained the physician of record for most patients and worked with house officers in the care of their hospitalized patients.

On 1 July 1997, Mount Zion implemented a "voluntary" hospitalist service. Hospitalists, who were University of California, San Francisco, faculty based at Mount Zion, served as ward attendings 6 to 8 months per year and spent their remaining time in ambulatory practice or teaching. Hospitalists cared for patients without primary physicians, patients with faculty or house officer primary care physicians, and patients whose community-based physician chose to use the hospitalist service.

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Context

Many studies suggest that hospitalists reduce average length of stay and costs but have little or no effect on patient survival.

Contribution

This 2-year cohort study from a community-based urban teaching hospital found that patients cared for by faculty hospitalists rather than community physicians had shorter lengths of stay, lower costs, and better in-hospital and 1- and 2-month survival rates.

Implications

Length of stay and cost benefits were apparent only in year 2 of the study, which suggests that experience is an important aspect of successful care by hospitalists.

Cautions

The study was retrospective, was done in a single site, and involved only five hospitalists.

–The Editors

Rotating nonhospitalist faculty continued to provide some inpatient care after implementation of the hospitalist service. Patients were admitted to rotating faculty according to the same criteria used for hospitalist services. There were no differences in other inpatient care systems available to community, rotating, or hospitalist physicians (for example, level of housestaff coverage, computer systems, case managers, social workers, or nursing staff).

Patients

Between 1 July 1997 and 30 June 1999, 5907 patients 18 years of age or older were admitted to the medical service at Mount Zion Hospital. We excluded patients who were admitted for chemotherapy or as part of a research protocol ($n = 167$) and those for whom some data on primary diagnosis were missing ($n = 30$). The resulting cohort was composed of 5710 patients, of whom 3693 (65%) were cared for by community-based physicians, 1615 (28%) were cared for by hospitalists, and 402 (7%) were cared for by rotating faculty.

Data Management

At Mount Zion Hospital, data were drawn from TSI (Transition Systems, Inc., Boston, Massachusetts) administrative databases, a cost-accounting system that collects data abstracted from patient charts at discharge. These databases contain information on sociodemographic characteristics, principal diagnosis (in the form of International Classification of Diseases, 9th revision, codes), diagnosis-related group, length of stay, costs, number of consultations, and whether the patient was in an intensive care unit during hospitalization. Data were manually screened for validity of physician designation as hospitalist or community physician by using previously published definitions of hospitalist physician characteristics (1, 2). Discharge summaries of patients who died during hospitalization were examined to validate deaths. An additional 200 discharge summaries of randomly selected patients discharged alive were also reviewed, revealing no errors. Information regarding physician characteristics and board certification was obtained from hospital credentialing databases. Patient survival to points in time after hospitalization was determined by using data from the California State Death Index (for patients admitted before 1 January 1999) and Social Security death indexes (for patients admitted on or after 1 January 1999 and for those who did not reside in California).

Statistical Analysis

To satisfy normality requirements and stabilize variance of residuals, we explored two methods of transforming skewed data on cost and length of stay: logarithmic conversion and truncation at the mean + 3 SDs. Since both techniques yielded similar results, we chose to present results by using truncation, as has been done in previous studies of inpatient costs and utilization (4, 9–11). All costs were adjusted to 1999 U.S. dollars by using an annual inflation rate of 3% (4).

Primary analyses compared 5308 patients cared for by community or hospital-based physicians; we excluded the few patients cared for by rotating physicians from core analyses. This method was chosen to maximize our ability to discern differences in rare outcomes (such as death or readmission), to determine trends in frequent outcomes (such as length of stay), and to maintain focus on our primary question: hospitalist-directed versus community physician–directed inpatient care.

For bivariable comparisons, we used the Fisher exact test or the Wilcoxon rank-sum test. Unadjusted survival rates were estimated by using Kaplan–Meier product-limit methods. We then used multivariable models to determine the independent effect of hospitalist care on patient outcomes. Using automated forward and stepwise selection techniques along with manually entered variables, we fit multivariable linear regression models to determine the independent association of hospitalist care with length of stay and costs. Items were selected on the basis of the statistical significance of their association with the outcome or on observed confounding with other independent variables, or to maintain face validity of the model. Similar methods were used in fitting logistic models of readmission; use of consultations; and Cox proportional hazards models of survival to discharge, 30 days, and 60 days. All analyses were performed by using SAS software, version 8.0 for Windows (SAS Institute, Inc., Cary, North Carolina).

Multivariable models contained adjustment for patient age, sex, ethnicity, insurance type, source of admission (for example, emergency department), site of discharge, whether a cardiovascular procedure was performed during hospitalization, whether the patient received care in an intensive care unit during hospitalization, and case-mix measures. For case-mix measures, specific diagnoses were defined by using International Classification of Diseases, 9th revision, codes for pneumonia, asthma, congestive heart failure, acute myocardial infarction, angina, unstable angina, chest pain, cancer, gastrointestinal hemorrhage, HIV infection, and cerebrovascular accident. Models also contained a variable indexed to admission date to adjust for secular trends. Trends in adjusted outcomes were tested by using variables dummy-coded to indicate service and year of admission.

Because patients were not randomly assigned to hospitalists or community physicians, we performed secondary analyses using a propensity score (12, 13). In our analyses, the propensity score represents the likelihood that any given patient would be admitted to a hospitalist attending physician. The propensity score was calculated in a logistic regression model with attending designation (that is, hospitalist vs. community physician) as the dependent variable. The model contained all covariates in core models, as well as variables found to contribute to nonrandom allocation of patients to specialty care at a *P* value less than or equal to 0.20. The propensity score was then used in analyses of cost, length of stay, and mortality in two ways: 1) multivariable analyses stratified within tertiles of propensity score and 2) multivariable analyses using the score as a continuous adjustment variable.

RESULTS

Physician Characteristics

One hundred thirteen community physicians, 20 rotating physicians, and 5 hospitalist physicians admitted patients to Mount Zion Hospital during the 2 years of this study. The mean age was 34 years for hospitalists, 40 years for rotating faculty, and 51 years for community-based physicians. All hospitalists were board certified in internal medicine and had graduated from U.S. or Canadian medical schools. Of the rotating faculty, 16 (80%) were board certified and 19 (95%) graduated from U.S. medical schools. Of community-based physicians, 81 (72%) were board certified and 101 (89%) were U.S. graduates.

During these 2 years, community and rotating physicians admitted similar numbers of patients (mean number of admissions per physician, 29 vs. 43; $P = 0.10$). Both community and rotating physicians admitted far fewer patients than did hospitalists, who cared for a mean of 324 patients during the study period ($P < 0.001$ compared with nonhospitalists). Seventy-five (66%) community phy-

Table 1. **Characteristics of Patients Cared for by Community-Based Physicians and Hospitalists at Mount Zion Hospital***

Characteristic	Patients Cared for by Community Physicians (*n* = 3693)	Patients Cared for by Hospitalists (*n* = 1615)	*P* Value†
Median age (10th, 90th percentile), *y*	74 (45, 89)	65 (39, 87)	<0.001
Men, %	1779 (47.8)	755 (46.6)	>0.2
Ethnicity, *n (%)*			<0.001
White	2600 (70.4)	849 (52.6)	
Black	662 (17.9)	537 (33.3)	
Asian	309 (8.4)	149 (9.2)	
Other	130 (3.5)	80 (5.0)	
Insurance type, *n (%)*			<0.001
Capitated	1170 (31.7)	526 (32.6)	
Medicare	2081 (56.4)	623 (38.6)	
Medicaid	377 (10.2)	406 (25.1)	
Private	50 (1.4)	14 (0.9)	
Uninsured	14 (0.4)	43 (2.7)	
Admission source, *n (%)*			
Emergency department	2700 (73.1)	1421 (87.9)	
Referred for admission by physician or clinic	801 (21.7)	115 (7.1)	
Skilled nursing or rehabilitation	79 (2.1)	31 (1.9)	
Transferred from another facility	111 (3.0)	49 (3.0)	<0.001
Discharge disposition, *n (%)*			<0.001
Home	2653 (71.8)	1278 (79.1)	
Skilled nursing or rehabilitation	717 (19.4)	184 (11.4)	
Other facility	58 (1.6)	75 (4.6)	
Dead	265 (7.2)	77 (4.8)	
Intensive care unit stay during hospitalization, *n (%)*	582 (15.8)	321 (19.9)	<0.001
Case mix, *n (%)*			
Acute myocardial infarction	209 (5.7)	85 (5.3)	>0.2
Angina or unstable angina	343 (9.2)	121 (7.5)	0.04
Asthma	84 (2.3)	69 (4.3)	<0.001
Cancer	355 (9.6)	31 (1.9)	<0.001
Chest pain	150 (4.1)	116 (7.2)	<0.001
Gastrointestinal bleeding	74 (2.0)	46 (2.9)	0.06
HIV infection	56 (1.5)	32 (2.0)	>0.2
Pneumonia	240 (6.5)	125 (7.7)	0.10
Cardiovascular procedure during admission (DRG 116, 112, 110)	197 (5.3)	39 (2.4)	<0.001

* Percentages may sum to greater than 100% because of rounding. DRG = diagnosis-related group.
† *P* value for comparisons of age was based on the Wilcoxon rank-sum test; *P* values for all other comparisons were based on chi-square tests.

Table 2. **Length of Stay, Cost, Consultation, Readmission, and in-Hospital Death for Patients Cared for by Community-Based Physicians and Hospitalists***

Variable	Patients Cared for by Community Physicians (*n* = 3693)	Patients Cared for by Hospitalists (*n* = 1615)	*P* Value for Unadjusted Difference†	Adjusted Difference, OR, or RH [95% CI]	*P* Value for Adjusted Difference†
Unadjusted median length of stay (10th, 90th percentile), *d*	4.0 (1, 12)	3.0 (1, 11)	<0.001	−0.33 [−0.64 to −0.02]‡	0.03
Unadjusted median costs (10th, 90th percentile), $	4982 (1761, 16 084)	3901 (1474, 14 281)	<0.001	−519 [−930 to −109]‡	0.02
Consultation, *n (%)*					
Patients receiving any consultation	1756 (47.6)	754 (46.7)	>0.2	0.96 [0.84 to 1.09]§	
Patients receiving more than one consultation‖	615 (35.0)	235 (31.2)	0.06	0.85 [0.70 to 1.04]§	
10-day readmission rate, %	191 (5.2)	72 (4.5)	>0.2	0.86 [0.64 to 1.17]§	
Mortality, %					
In-hospital death	264 (7.2)	77 (4.8)	0.03	0.71 [0.54 to 0.93]¶	
Death at 30 days	437 (11.9)	130 (8.1)	<0.001	0.75 [0.61 to 0.92]¶	
Death at 60 days	595 (16.1)	182 (11.3)	<0.001	0.79 [0.66 to 0.94]¶	

* Continuous variables are displayed as median values with the 10th and 90th percentile; categorical variables are displayed as the number and percentage of the total. OR = odds ratio; RH = relative hazard.
† *P* values for comparisons of continuous variables are based on the Wilcoxon rank-sum tests; *P* values for comparisons of categorical variables are based on chi-square tests; *P* values for survival are truncated at discharge, 30 days, and 60 days based on the log-rank test. The referent group for all comparisons is community physicians.
‡ Values given are differences.
§ Values given are ORs among patients of hospitalists.
‖ Among those receiving any consultation.
¶ Values given are RHs among patients of hospitalists.

sicians and 7 (35%) rotating faculty admitted fewer than 24 patients during the study; no hospitalist admitted fewer than 100 patients.

Patient Characteristics and Case Mix

Patients cared for by hospitalists ($n = 1615$) were younger and were more likely to be of black ethnicity than were patients of community physicians ($n = 3693$) (**Table 1**). Hospitalists' patients were more likely to have Medicaid insurance or no insurance and to be admitted from the emergency department rather than a physician's office. They were less likely to be discharged to a nursing home or rehabilitation facility. Patients of hospitalists were more likely to receive care in an intensive care unit during hospitalization.

Patients of hospitalists were more likely to be discharged with a principal diagnosis of pneumonia, asthma, or unspecified chest pain. Patients of community physicians were more likely to have a diagnosis of cancer or angina. No differences in rates of other discharge diagnoses were noted. Community physicians' patients were also more likely to undergo a cardiovascular procedure (coronary angiography or percutaneous transluminal coronary angioplasty).

Comparisons of Patient Outcomes for Each Service

For the entire study (1 July 1997 to 30 June 1999), patients of hospitalists had shorter unadjusted mean lengths of stay (3.0 days vs. 4.0 days; $P < 0.001$) and lower unadjusted hospital costs ($3901 vs. $4982; $P < 0.001$) (**Table 2**). After adjustment in multivariable models, differences in both length of stay (0.33 day shorter; $P = 0.03$) and costs ($505 lower; $P = 0.02$) remained. We noted no differences in unadjusted or adjusted rates of consultation or 10-day readmission rates.

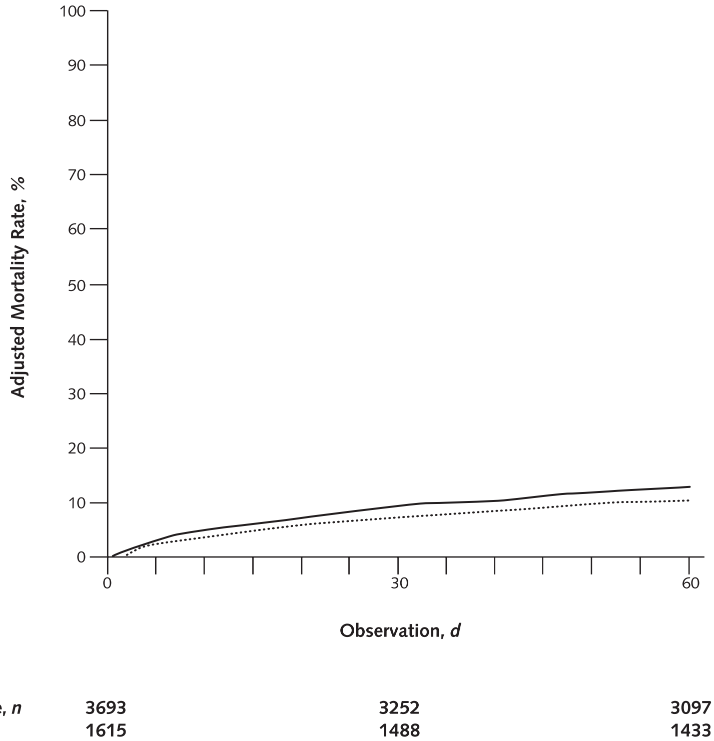
During this study, patients of hospitalists had lower rates of in-hospital death (4.8% vs. 7.2%; $P = 0.03$), corresponding to an unadjusted relative hazard for in-hospital death of 0.75 (95% CI, 0.58 to 0.97) among hospitalist patients. After adjustment in multivariable models, these patients continued to have lower odds of in-hospital death (adjusted relative hazard, 0.71 [CI, 0.54 to 0.93]). This dif-

Table 3. **Trends in Length of Stay and Costs in Years 1 and 2***

Variable	Year 1				
	Patients Cared for by Community Physicians (*n* = 1866)	Patients Cared for by Hospitalists (*n* = 735)	*P* Value for Unadjusted Difference	Adjusted Difference [95% CI]	*P* Value for Adjusted Difference
Unadjusted median length of stay (10th, 90th percentile), *d*	4 (1, 12)	3 (1, 12)	<0.001	0.05†	>0.2
Unadjusted median costs (10th, 90th percentile), $	5020 (1810, 16 022)	4042 (1587, 16 221)	<0.001	21 [−619 to 663]‡	>0.2

* *P* values for unadjusted comparisons of continuous variables are based on Wilcoxon rank-sum tests. The referent group for all comparisons is community physicians.
† $P = 0.002$ for comparison of adjusted length of stay in year 1 and year 2 among patients of hospitalists.
‡ $P = 0.01$ for comparison of adjusted costs in year 1 and year 2 among patients of hospitalists.

Figure. **Adjusted survival of patients admitted to Mount Zion Hospital who were cared for by hospitalists (*dotted line*) and community-based physicians (*solid line*), from Cox proportional hazards models.**



Numbers of patients alive at admission and at 30 and 60 days of follow-up are also displayed. Patients of hospitalists had statistically significantly lower adjusted mortality at both 30 days (2.0% lower; $P = 0.003$) and 60 days (2.6% lower; $P = 0.002$) of follow-up.

ference persisted at 30 and 60 days of follow-up. These relative hazards correspond to an adjusted absolute difference in survival of 2.0% at 30 days and 2.6% at 60 days (**Figure**), based on conservative estimates derived from the Cox model.

Trends in Length of Stay and Costs

Patients of hospitalists had shorter unadjusted length of stay and lower unadjusted costs in both year 1 (1 July 1997 to 30 June 1998) and year 2 (1 July 1998 to 30 June 1999) (**Table 3**). After adjustment in multivariable models, differences were not significant in year 1. In year 2, however, we found shorter adjusted length of stay (0.61 day shorter; $P = 0.002$) and lower adjusted costs ($822 lower; $P = 0.002$) among hospitalists' patients. The differences observed in year 2 were entirely due to reduced length of stay and costs in the hospitalist cohort. While no statistically significant change in length of stay (0.24 day shorter in year 2; $P = 0.15$) or costs ($228 lower in year 2; $P >$ 0.2) emerged in the community-physician cohort over time, patients of hospitalists showed significant decreases in length of stay (0.77 day shorter in year 2; $P = 0.002$) and

Table 3—**Continued**

Year 2				
Patients Cared for by Community Physicians ($n = 1827$)	Patients Cared for by Hospitalists ($n = 880$)	*P* Value for Unadjusted Difference	Adjusted Difference [95% CI]	*P* Value for Adjusted Difference
4 (1, 12)	3 (1, 10)	<0.001	−0.73 [−1.12, −0.35]†	0.002
4965 (1691, 16 186)	3800 (1226, 13 223)	<0.001	−943 [−1469 to 418]‡	0.002

costs ($818 lower in year 2; $P = 0.01$). There were no statistical differences in adjusted mean length of stay between hospitalists overall or in year-to-year changes, suggesting that no single hospitalist's practice was responsible for the differences observed.

Trends in Consultation, Readmission, and Mortality

We noted no statistically significant trends in consultation over the 2 years of this study. Odds for readmission among patients of hospitalists were lower in year 1 (adjusted odds ratio, 0.72 [CI, 0.45 to 1.17]) than in year 2 (adjusted odds ratio, 0.97 [CI, 0.65 to 1.43]), but this slight increase in odds was not significant ($P = 0.11$). Although confidence intervals are wider because of smaller sample sizes, the adjusted mortality of hospitalist patients was lower at all points of follow-up in both years and was similar to mortality estimates using the entire patient sample. These analyses revealed no within-group trends in patient mortality during the study period.

Comparison of Rotating Faculty to Hospitalist and Community Services

Additional analyses examined the small numbers of patients cared for by rotating faculty. Patients of rotating faculty were similar to those of hospitalists: They were younger, more often uninsured, and more often discharged with a diagnosis of unspecified chest pain than patients of community physicians.

Patients of rotating faculty had unadjusted and adjusted length of stay and costs that were not statistically different from those of patients of hospitalists, overall or in either year. Mortality among rotating physicians' patients was 6.5%, higher than for hospitalists' patients but lower than for patients of community-based physicians. After adjustment, rotating physicians' patients had no differences in relative hazard for in-hospital death.

Secondary Analyses

To explore the durability of our results, we performed many subset and stratified analyses. In models of cost limited to patients 65 years of age and older, hospitalists' patients had a difference in length of stay that was similar in magnitude to that in the entire cohort, although confidence intervals widened because there were fewer patients in this subset (0.33-day difference [CI, −0.76 to 0.06 day]). Similar in-hospital mortality differences were also observed (relative hazard for in-hospital death of hospitalists' patients, 0.66 [CI, 0.48 to 0.91]). When analyses excluded patients with cancer, the difference in length of stay among hospitalists' patients was 0.23 day (CI, −0.55 to 0.10 day); a similar mortality difference was also observed (relative hazard for in-hospital death, 0.79 [CI, 0.60 to 1.05]).

To allow for clustering due to physician-specific effects, we also performed analyses using mixed-effects and generalized estimating models. Analyses adjusting for elements of physician workload (that is, the total number of admissions to each physician during the study period) and specialty training revealed no association with our outcomes of interest, after additional adjustment for independent effects of hospitalist care and case mix.

Finally, we performed analyses accounting for the likelihood of being admitted to a hospitalist physician, limited to patients in the middle tertile of the propensity score. All patients in this group had at least a 30% chance of being admitted to a hospitalist and a 70% chance of being admitted to a community physician. Among the 1878 patients in this middle tertile, the relative hazard was 0.69 (CI, 0.47 to 1.01) for in-hospital death and 0.73 (CI, 0.53 to 1.00) for death at 60 days, point estimates nearly identical to those found in the overall analysis, albeit with wider confidence intervals due to smaller sample sizes.

DISCUSSION

At this community-based teaching hospital, a "voluntary" hospitalist service resulted in reductions in length of stay and cost that became more marked 1 year after implementation. This reduction was due to improved clinical efficiency of hospitalists; efficiency of community physicians did not change. We also observed lower mortality rates among patients cared for by hospitalists both during hospitalization and up to 2 months after discharge.

Previous investigations have consistently demonstrated improved clinical efficiency in hospitalist systems, with no negative effect on patient outcomes (14). To date, no study has noted mortality differences in the hospitalist model (3–7, 14), although one study suggested reduced readmission rates (8). Our findings of improved efficiency over time may provide evidence of growing experience among hospitalists and are similar to those of previous investigations connecting greater volume of cases with better patient outcomes (15–20).

Trends in our cost findings suggest that hospitals should not prematurely judge the value of a hospitalist program. Mount Zion Hospital provided approximately $200 000 annually to support their program. When this amount was added to adjusted cost differences in each year, the program cost the hospital $237 000 in year 1 but saved $500 000 in year 2. However, such analyses, although powerful stimuli for adoption of hospitalist systems (21), do not completely account for its costs and benefits. Complete accounting should include changes in hospital revenues, costs shifted to the outpatient setting, patient and physician satisfaction, and quality-of-care measures more precise than mortality or readmission rates (22).

Because this was an observational study, our findings of lower mortality rates among patients cared for by hospitalists cannot be proven to be causal. The number of in-hospital deaths in our patient cohort was relatively small, and our power to detect differences in these events was limited. Despite many statistical approaches to account for confounding, baseline differences in patient characteristics may partly explain our results. However, our findings are similar to those observed in studies of intensivist management of patients in the intensive care unit, a model with theoretical similarities to the hospitalist model in that both increase the availability of physicians with specific expertise (23, 24). At the very least, our data strongly argue against an excess of deaths among patients of hospitalists, making it highly unlikely that the marked improvements in clinical efficiency came at the expense of quality of care.

This study has several limitations. It remains possible that unmeasured differences in our patient cohorts influenced our results. Our study used administrative data and may be subject to biases inherent in the diagnosis-coding process. However, it seems unlikely that such errors occurred preferentially in either group. Physicians at Mount Zion may have felt pressured to modify their practices and improve clinical efficiency, and such pressures may have changed clinical practice in subtle ways. Nevertheless, both groups of physicians practiced in the same environment, and our findings of stable efficiency and clinical outcome measures in the community physicians' cohort over time indicate that secular trends were not primarily responsible for our results. We also lack information on code status and on whether certain deaths were anticipated (that is, in patients admitted for comfort care). We did not collect cost data beyond hospitalization, but our findings of less frequent discharge to skilled nursing or rehabilitation facilities among patients of hospitalists do not suggest that substantial cost shifting took place (**Table 2**). Finally, although community-based teaching hospitals are widespread, our results may not apply to other settings.

This study adds to the literature suggesting that the hospitalist model increases efficiency of care for inpatients while maintaining or improving patient outcomes. The precise mechanisms by which the model achieves these improvements remain unclear. Larger studies with random allocation of patients will be required to determine the true effect of hospitalist care on mortality and precise measures of care quality.

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Acknowledgments: The authors thank Kenneth Woeber, MD, for assistance with planning this project; Linda Ono, BA, for work in assembling the database used in this study; Amy Markowitz, JD, for editorial assistance; and Kathleen Kerr, BA, for her efforts throughout the course of the study.

Potential Financial Conflicts of Interest: *Grants received:* L. Goldman.

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