Special Series: Practice Management in the Residency Setting

Comparison of a Family Practice Teaching Service and a Hospitalist Model: Costs, Charges, Length of Stay, and Mortality

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Background and Objectives: *One third of our nation's health care costs are incurred in the hospital. This study compares the inpatient outcomes between a family practice teaching service (FPTS) and a hospitalist group in the same suburban community hospital.* Methods: *All patients discharged by the hospitalist group or the FPTS between April 1998 and June 1999 were included for study if they had one of the 10 most frequent principal diagnoses on discharge. The outcomes compared between the groups were length of stay, mortality, total charges, laboratory charges, radiology charges, and direct costs. Student's* t *test, chi-square, and analysis of variance were used to compare the outcomes, after adjusting data for severity of illness.* Results: *Mean severity of illness for the FPTS patients was 2.42 and for the hospitalist patients was 2.26, with higher scores indicating greater severity of illness. After adjusting for severity of illness, there were no differences between the two groups of physicians for total charges, laboratory charges, radiology charges, direct costs, length of stay, or mortality rates.* Conclusions: *This study failed to demonstrate a statistically significant difference in the use of hospital resources between a family practice residency teaching service and a hospitalist team. Given the outcomes measured in this community teaching hospital, the residency teaching service appears to be a financially competitive model for delivery of inpatient care.*

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The high cost of medical care in the United States has fueled reform in health care delivery. In 1998, the national health care expense exceeded $1.14 trillion and represented 13.5% of the gross domestic product. Thirty-three percent of these health care costs were incurred in the hospital.[1]

The physician's role in hospital costs has been carefully studied. Physician age, years in practice, and specialty may all influence the cost of care for inpatients.[2] Residency-trained family physicians and general internists seem to provide hospital care at similar costs and with comparable outcomes.[3-5] Some studies suggest that these primary care physicians spend less money in caring for inpatients than their specialist colleagues.[6-9]

From the Baylor Family Practice Residency at Garland, Garland, Tex.

Hospitalists

In 1994, the Park Nicollet Clinic, a 380-physician multispecialty medical practice in Minnesota, implemented a new system for care of their hospital patients.[10] A team of family physicians and general internists was assigned to provide hospital care for all of the group patients. This change in the structure of inpatient care, with continuous hospital coverage by family physicians and internists, resulted in a 25% decrease in total charges for inpatient care. Additionally, this new approach to inpatient care resulted in a .6-day decrease in patients' length of stay (LOS). Studies by Diamond, the Harvard Vanguard Medical Associates, and Stein also reported declines in LOS and decreased costs with hospital care provided by hospital-based primary care physicians.[11-13] Wachter, an associate professor of medicine and epidemiology at the University of California, San Francisco, coined the term *hospitalist* in 1996 to describe this new role for the physician in hospital care.[14]

Attempts to determine the effect of hospitalists on academic medicine have only been reported in the last 2 years. Wachter reported the hospital resource use by an academic internal medicine teaching service in 1998, comparing a hospitalist model internal medicine inpatient teaching service with a traditional internal medicine inpatient teaching service. The study demonstrated mean cost savings of about $700 per admission and a .6-day decrease in LOS with the hospitalist approach. Mortality, readmission rate, and patient satisfaction were similar for both groups.[15]

In view of the evidence that the hospitalist model is effective, it is important to note that most academic programs in family practice and internal medicine continue to use a traditional structure for their teaching service. Faculty members in these programs may serve as the attending physician for only 1 month per year. As family medicine educators grapple with the implications of the hospitalist model for their teaching programs, many questions are raised. Do family practice teaching services (FPTS) deliver care with greater costs or at higher mortality rates then the hospitalist model? Do they yield similar lengths of stay and patient satisfaction? Will family physicians practice medicine in the hospital of the future?[16,17]

Comparison of an FPTS with a mature internal medicine hospitalist delivery system in the same facility has not been reported. In our community hospital study, we compare the financial and clinical outcomes of patient care provided by a hospitalist team and by an FPTS. The outcomes measured were direct costs, laboratory charges, radiology charges, total charges, LOS, and mortality.

Methods

Setting

This study was conducted at Baylor Garland Medical Center (BGMC) in Garland, Tex, between April 1, 1998, and June 30, 1999. BGMC is a member of the Baylor Health Care System in Dallas. Garland is a suburban community of 200,000 people, located on the northeast side of the Dallas metroplex. BGMC, a 205-bed community hospital, is the sponsoring institution for a family practice residency program and also employs a hospitalist group. The two inpatient teams, (ie, the residency faculty and the hospitalist) work in parallel. They neither share patients nor routinely consult one another.

The family practice residency teaching service consists of first-, second-, and third-year residents and an attending family physician faculty member. The family physician faculty rotates onto the teaching team for 2 weeks every 2 months. Students from a variety of medical schools serve electives as externs with the FPTS. The hospitalist group, by contrast, consists of five general internists. These internists have no teaching responsibility. During the time of this study, moonlighting internal medicine residents were occasionally employed to provide weekend coverage for the hospitalist team.

Both teams of physicians provide care in the following settings: intensive care unit, coronary care unit, general adult ward, and observation unit. In addition, both groups of physicians provide care with appropriate consultation to ventilator-dependent and other critically ill patients.

Subjects

Patients included in this study were adults discharged with one of the 10 most common diagnoses on both the FPTS and the hospitalist service between April 1, 1998, and June 30, 1999. Patients with the following primary discharge diagnoses (*International Classification of Diseases, Ninth Edition* [ICD-9] codes) were selected: pneumonia (486), congestive heart failure (428.0), acute pancreatitis (577.00), chronic obstructive pulmonary disease-exacerbation (491.21), hypovolemia (276.5), venous thrombosis (453.8), aspiration pneumonia (507.0), subendocardial myocardial infarction (410.71), cerebral arterial occlusion-stroke (434.91), and urinary tract infection (599.00). We excluded patients who were less than 16 years or pregnant.

Patients admitted to the two services were from several sources (Table 1). The majority were patients treated in the emergency room who had no admitting physician of record. Two unassigned patients were admitted to the hosptialist team for every one patient admitted to the FPTS.

Variables investigated for this study include: LOS, total hospital charges, laboratory charges, radiology charges, direct costs, mortality, and discharge status. The independent variables were the team assignment and the severity of the patient illness. Severity of illness was determined with the all patient refined-diagnosis related group (APR-DRG) severity scale. This research was submitted to and designated as exempt

Table 1

Patient Admission Sources

	FPTS	*Hospitalists*
Emergency room	144	273
Skilled nursing home	16	43
Physician referral	8	25
Clinic referral	4	11
Transfer other	2	3
Transfer hospital	0	1

FPTS—Family Practice Teaching Service

Patients: FPTS=174, hospitalists=355

from review by the Institutional Review Board of the Baylor Healthcare system.

Data Collection

We extracted data from the Trendstar software system, currently the most widely used information software and support service in the health care industry.[18] The data set did not contain severity scale scores for the cases. Instead, the BMCG information system forwards Trendstar data to the Dallas-Fort Worth Hospital Council Clearing House, which then uses the Texas Health Care Information Council (THCIC) to assign severity scores.

The THCIC uses the 3M Corporation APR-DRG software for assignment of severity scores. Twenty state health departments use the 3M APR-DRG system for health care data tracking and analysis. The 3M Corporation has, under contract with the Health Care Financing Administration, maintained and updated the Medicare DRG system. This widely used software formulates patient severity scores using principal diagnosis, comorbidities, age, and procedures. The range of severity scores is from 1 to 4, with 1 representing the least-severe patient category. This information was returned to BGMC as a separate data set.

Statistical Analysis

The data in Trendstar were combined with the APR-DRG data set in a Microsoft Excel® spreadsheet. The Microsoft Excel spreadsheet was then transferred to JMP version 3.2.1® for statistical analysis. Outliers of charge, cost, and LOS were truncated at three standard deviations (SDs) above the mean.

We used analysis of variance (ANOVA) to compare outcomes while adjusting for differences in patient population severity. ANOVA was also performed for all charge and cost categories incorporating the patient severity score as an ordinal variable. The Student's *t* test was used to detect demographic differences and differences in severity scores between patients on the two teams, and chi-square was used to assess the difference in gender distribution between the two populations of patients and for comparison of mortality rates between patients on the two teams.

We performed a retrospective power analysis (.80, alpha=.05) and determined that 280 cases would be needed to detect a $1,000 difference in total charges. The number of cases needed to reveal a difference in LOS of one half day is 246.[19]

Results

There were 652 cases identified in the Trendstar data that had discharge diagnoses of one of the 10 most frequent ICD-9 diagnoses. Of these, 111 cases had no corresponding APR-DRG severity data, and these cases were omitted from further analysis. Truncation of outliers of charges, costs, and LOS eliminated 12 more cases; these 12 cases were evenly distributed among the two teams. A total of 529 cases were analysed in this study.

Subjects

Sources for patient admission to each hospital team were similar (Table 1). Eighty-three percent of patients admitted to the FPTS came from the emergency room. The hospitalist team admitted 77% of their patients from the emergency room. Direct physician referrals were greater for the hospitalist team (7%) than for the FPTS team (4%) in part because the hospitalist team provides direct admission services for a large number of private practicing physicians.

The sample population description is shown in Table 2. The hospitalist group contained a higher percentage of female patients (*P*=.03). There was no statistically significant difference in age (*P*=.745) between the two groups.

Severity Scores

The mean severity score for the FPTS patients was 2.42 (SD=±.90), and the mean severity score for the hospitalist patients was 2.26 (SD=±.78)(*P*=.01). Figure 1 shows the APR-DRG severities as a percentage of each team's population. The percentage of patients in severity classes 1, 3, and 4 was higher among the FPTS patients.

Outcomes

Table 3 shows the mean charges, LOS, and mortality rates between the two groups. None of the charged differences between the groups were statistically significant. Mean total, radiology, and laboratory charges were slightly higher for the FPTS team patients than for the hospitalist patients, but the differences were not

Table 2

Population Description

	FPTS	*Hospitalists*
Patients	174	355
Gender (% male)*	45	55
Age—mean**	64	68
Age—range	17–95	18–98
Severity score***	2.42	2.26

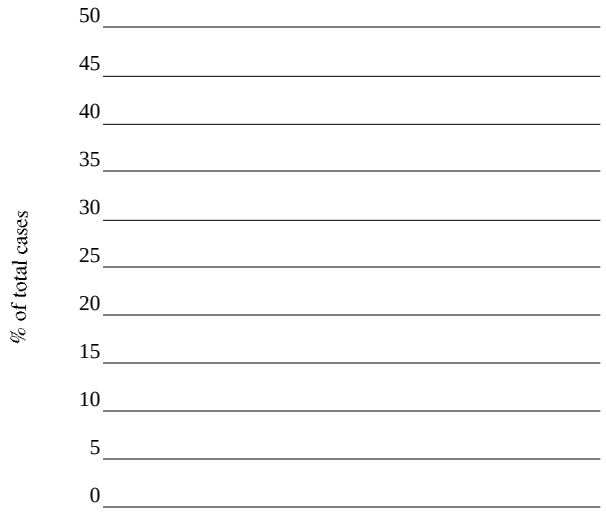
n=529

FPTS—Family Practice Teaching Service

* Chi-square—*P*=.03
** ANOVA—*P*=.74 adjusted/severity of illness
*** Student's *t* test—*P*=.01

Figure 1

Distribution of Severity



Means: Family Practice Teaching Service=2.42
Hospitalists=2.26
P=.01

All patient refined-diagnosis related group (APR-DRG) severity scores range from lowest severity=1 to highest severity of illness=4.

Table 3

Comparison of Mean Charges, Length of Stay, and Mortality Rates

Outcomes Measured	*FPTS Mean (SD)*	*Hospitalists Mean (SD)*	*ANOVA** P *Value*
Total charges	$12,218 (±$11,022)	$11,683 (±$9,884)	.997
Laboratory charges	$1,953 (±$1,372)	$1,570 (±$1,144)	.932
Radiology charges	$427 (±$381)	$361 (±$517)	.793
Direct costs	$2,906 (±$2,568)	$2,934 (±$2,536)	.811
Length of stay	4.13 days (±2.8)	5.4 days (±3.8)	.298
Mortality **	6.5/100	5.8/100	.764

* ANOVA incorporated patients' APR-DRG severity score
** Mortality data was analyzed with chi-square.

FPTS—Family Practice Teaching Service
APR-DRG—all patient refined-diagnosis related group

significantly different. Means for LOS and direct cost were, on the other hand, lower for the FPTS, but when adjusted for severity scores in the two populations, differences were not significant. The mortality rate was 5.8/100 among the hospitalist team patients and 6.5/100 among the FPTS patients. When adjusted for severity, these differences were not significant (*P*=.764).

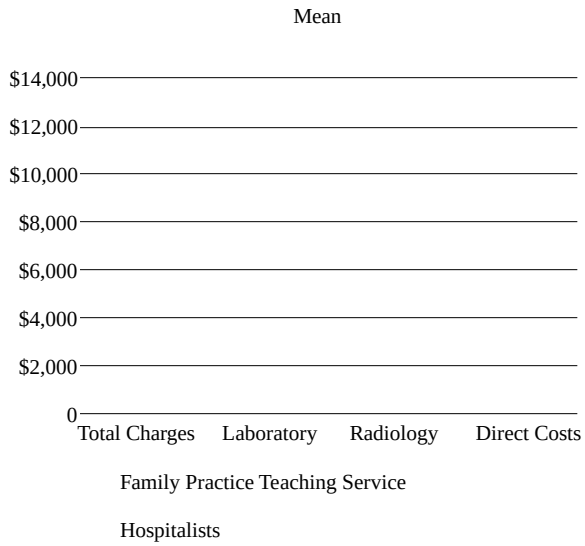
Discussion

Since it represents nearly one third of our national health expense, the cost of hospital care is under continuous scrutiny. The benefits of the hospitalist model have been repeatedly demonstrated.[10-13,20] To our knowledge, ours is the first study to compare the performance of an internal medicine hospitalist team with a family practice residency inpatient teaching service in the same hospital. We were unable to demonstrate a statistically significant difference in resource use or outcomes between the two teams of physicians in the study. Though future studies will undoubtedly expand the number of outcomes measured and include long-term outcomes, this initial comparison of a family practice inpatient service and a hospitalist team provides encouragement for family medicine educators.

We believe our findings are sound because we adjusted our analysis on the basis of severity of illness. The comparable distribution of severity across both populations of patients, albeit slightly higher in the FPTS population, contributes to the internal validity of our study.

Figure 2

Charges and Direct Costs



We also exceeded the necessary sample size to detect a $1,000 difference in total charges, as well as the sample size needed to detect a half-day difference in LOS. Thus, our inability to demonstrate differences in these variables is not because our strategy lacked power. We acknowledge that differences of less than $1,000 in total charges per case may still be considered economically significant.

Limitations

The limitations of this study include the inability to obtain severity data on all cases for which cost and charge data was available. This forced the elimination of 112 cases from analysis. The power of the study was also diminished by the large SDs in charges that reflect the broad range of clinical complexity in the population. We made the decision to truncate the data that fell beyond three SDs above the mean for total charges. This step eliminated the outlier cases for both teams of physicians studied.

The observed difference in the age and gender of the patients could also have influenced the results. Adjustment for severity, however, which incorporated age and gender, tended to offset this effect. Further, this study did not measure patient satisfaction or disease outcome other than mortality. Finally, our study was carried out in only one community-based hospital, and the results may not be applicable to all settings for patient care.

Conclusions

The measures used in this study to estimate hospital resource use failed to demonstrate a statistically significant difference between the family practice residency teaching service and the hospitalist team. If future studies confirm our findings, institutional sponsors of family practice training programs should be more likely to recognize family practice residencies for cost-effective care with similar outcomes.

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