

A Comparison of Morbidity and Mortality for Family Physicians' and Internists' Admissions

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The quality of medical care delivered by physicians of different specialties has been the subject of debate for some time. Studies have suffered from a variety of flaws. This study used the MedisGroups comparative database to compare outcome measures in hospitalized patients aged 65 years and older treated either by the family physicians or internists as attending physicians. Using the 10 most common diagnostic related groups for internal medicine, 10,353 admissions to internists were compared with 5,473 admissions to family physicians. Patients admitted by family physicians had a significantly higher admission illness severity and were significantly older. There was no significant difference in morbidity and mortality. The lower average charges for patients admitted to family physicians were statistically significant.
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The quality of medical care is a fundamentally important, though inherently illusive, concept. As it is difficult to establish what constitutes quality, it is difficult to measure it.¹ Though still complicated, the costs of services are easier to define and measure, but unless the nature of the service provided is carefully considered, information about cost is not meaningful and may be misleading. Because it is difficult to define and measure quality and cost, it is difficult to compare these characteristics between groups or individual providers. Since quality is a function of both case mix and outcome, one must consider the patient's baseline characteristics to compare outcomes. These outcomes must then be considered in comparing costs.²

The quality and costs of medical care delivered by family physicians compared with other specialists have been subjects of investigation for years.³⁻⁶ Studies have suffered from a variety of flaws: uncertainty about the nature or equivalence of the training of the physicians being studied, sample size too small for meaningful comparisons, lack of comparability of patients, and subjective rather than objective outcome measures.⁷ A recent com-

parison of intensive care unit outcomes in patients attended by family physicians and internists avoided these problems and showed no difference, but conclusions must be limited to this special patient care setting.⁸ Thus far, no convincing evidence has been presented to suggest any difference between the quality of care delivered by family physicians and that delivered by any other group of physicians.⁷

A study was undertaken to determine whether the services rendered to a large number of comparable hospitalized patients by family physicians differed in cost or quality from those services rendered by internists. Comparability of case mix in this study was determined by diagnostic related groups (DRGs), severity of illness, and average age of the patients. Outcome was measured as morbidity and mortality. Cost was measured as charges generated by the accounting offices of those hospitals included in the study and is irrespective of payment source.

METHODS

The study used the MedisGroups quality assurance system, which compares data from any of the several hundred participating hospitals with the compiled data of the MedisGroups comparative database. Each participating hospital abstracts the chart of every admission. When these abstracts maintain the level of 95% accuracy for the

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TABLE 1. MEDISGROUP ADMISSION SEVERITY SCALE

Severity Group	Probability of Favorable Response to Treatment	Potential for Imminent Major Organ Failure	Examples of Key Clinical Findings
0	N/A	None	History of congestive heart failure (CHF)
1	High	Low	Diverticulitis
2	Moderate	Moderate	CHF on x-ray examination
3	Low	High	PCO ₂ > 9.3 kPa (70 mm Hg)
4	Very low	Present	Coma and blood pressure < 60 mm Hg

period of 1 year, they are included in the MedisGroup comparative database. Only those hospitals reviewing admissions from all hospital departments are included.

Severity of illness is defined in this system as the potential for major organ failure during the hospitalization. Severity scores are determined for each patient based on the condition at the time of admission as measured by indicators called key clinical findings and calculated by algorithm. The patients are then placed in admission severity groups 0 through 4, with scores of 4 given to those patients who are the most seriously ill. Examples of key clinical findings and their severity groups are listed on Table 1. Admission severity scores are determined retrospectively by chart review done on day 3 of the hospitalization to allow time for all admission diagnostic reports to return to the charts.

Outcome is measured by morbidity, major morbidity, and mortality. Morbidity and major morbidity are also determined by key clinical findings. Examples of these key clinical findings and their morbidity classifications are found in Table 2. The outcome categories are determined by chart review on designated days after admission, usually day 8. If the patient is discharged before day 8, no morbidity review is done. If the patient dies or is transferred to a higher level institution, a morbidity review is done regardless of when discharge occurred.

The physicians are categorized according to the division within the hospital to which they belong, and information concerning their ages and board or subspecialty certification is not available. Patients are listed as being on the service to which they were admitted regardless of consultation or referral to other services later. Information linking the physician to hospital type or size was not available.

The 1988 MedisGroups comparative database, which was used in this study, consists of all of the admissions to a subset of 30 hospitals, balanced for geographical region, size, and type of hospital. Of the 30 hospitals, 28 are nonprofit. Four of the hospitals have fewer than 200 beds, 14 have between 200 and 400 beds, and 3 have more than 600 beds, with a range of 100 to 798 beds. There are eight teaching hospitals, which are hospitals approved to participate in residency training by the Accreditation Council for Graduate Medical Education. The hospitals are spread throughout the country, with 15 in the Middle Atlantic region, 8 in the Central region, 2 hospitals each in the New England, South Atlantic, and Mountain regions, and 1 hospital in the Pacific region. More detailed descriptions of this database can be found elsewhere.^{9,10}

This study examined admissions for the 10 most common DRGs for internists in patients aged 65 years or older. Raw data were analyzed for the number of admissions in each diagnostic category, number of patients in each severity group, and number of patients experiencing major morbidity and mortality. The means and corresponding standard deviations were used to compare average values for age, severity, charges, and length of stay with admissions data from patients admitted to the family practice service for the same 10 DRGs. The complete database was not available for more comprehensive analysis.

RESULTS

There were 10,353 internal medicine admissions accounted for by the top 10 diagnoses for this specialty.

TABLE 2. USE OF KEY CLINICAL FINDINGS FOR OUTCOME MORBIDITY CLASSIFICATION

Key Clinical Findings	Nonmorbid	Morbid	Major Morbid
Hematocrit	>24.9	24.9-10	<9.9
PCO ₂ , kPa (mm Hg)	<6.7 (50)	6.7-9.3 (50-70)	9.3-13.3 (71-100)
Positive blood culture	No	Yes	
Ventricular rhythm		Ventricular tachycardia	Asystole
Intraabdominal rupture			Present

TABLE 3. AVERAGE WEIGHTED ADMISSION SEVERITY AND PERCENTAGE OF POOR OUTCOME

Diagnosis	Patients' Average Weighted Admission Severity*		Percent Poor Outcome	
	Family Practice (n)	Internal Medicine (n)	Family Practice	Internal Medicine
Heart failure/shock	2.29† (1146)	2.33 (2220)	17.8	16.8
Cerebrovascular excluding transient ischemic attack	2.23† (811)	2.20 (1546)	24.7	22.7
Angina	1.34† (732)	1.22 (1417)	2.3	1.5
Pneumonia/pleurisy	2.27 (611)	2.28 (1034)	22.5	23.8
Gastroenteritis/functional disease	1.43† (465)	1.32 (913)	3.5	3.5
Transient ischemic attack and precerebral occlusion	1.40† (450)	1.46 (703)	1.1	1.7
Nutritional/metabolic	1.96 (379)	1.95 (725)	15.0	14.4
Arrhythmia/conduction disorder	1.79† (325)	1.74 (617)	9.6	8.9
Bronchitis/asthma	1.93† (300)	2.01 (630)	5.6	5.6
Chronic obstructive pulmonary disease	2.11† (254)	2.14 (548)	16.6	12.8

*For 4 diagnoses the severity score was higher for family practice patients than for internal medicine, and for 4 diagnoses the severity score was higher for internal medicine patients.
†P < .05.

Data from these charts were compared with data from 5473 admissions to family practice services for the same 10 conditions. There were approximately twice as many admissions to the internal medicine service, but the distribution of patients by diagnosis, the average weighted admission severity, and the percentage of patients experiencing poor outcome are all similar, as shown in Table 3.

The relationship between severity of illness and outcome is shown graphically in Figures 1 and 2. Figure 1 shows the relationship between severity and mortality for both groups. Figure 2 shows the relationship between severity and poor outcome, ie, major morbidity and mortality combined. More gravely ill patients were more likely to experience mortality or a poor outcome regardless of the specialty of the admitting physician.

The pattern of distribution of patients by admission severity was examined in the same way. Most of the

patients are in the middle or third severity group, with the fewest patients in both the highest and lowest severity groups. This severity distribution was also the same for both specialties. Figure 3 shows a graph of this distribution for both family practice and internal medicine.

The admission severity scores and ages for all patients admitted to each specialty across all 10 diagnostic groups were averaged and compared using the two-tailed Student's *t* test for independent samples. Family physicians' patients had a significantly higher illness severity and were older.

The outcome measures used were mortality and a combination of mortality and major morbidity, called poor outcome. Comparison of outcome variables with a test for difference of proportions revealed no statistically significant differences.

Costs were measured as charges billed by the hospital

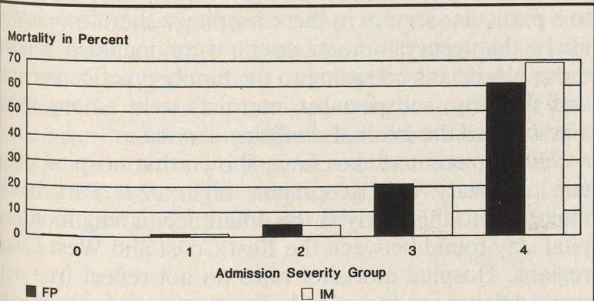


Figure 1. Mortality rate and admission severity, family practice (FP) and internal medicine (IM).

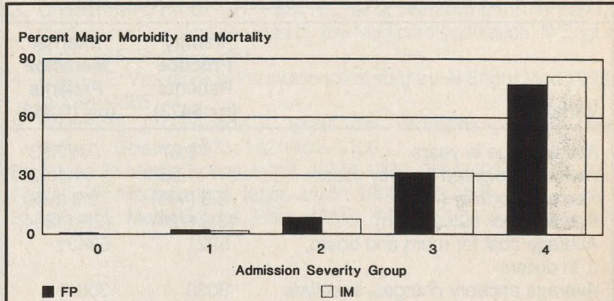
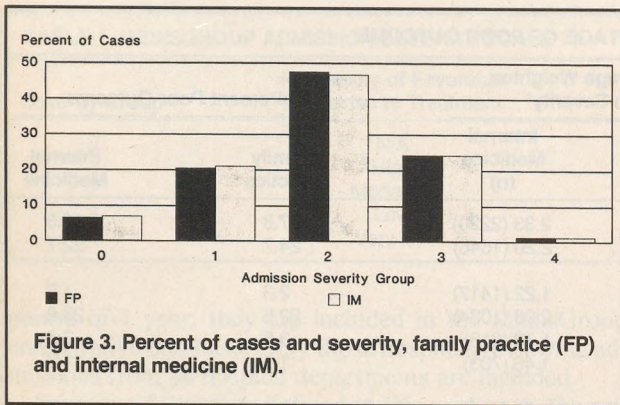


Figure 2. Poor outcome and admission severity, family practice (FP) and internal medicine (IM).



for room and board, ancillary charges (which were all other charges billed by the hospital), and length of stay. Physician charges were not included. Averages were calculated across all 10 diagnostic groups and the differences compared using the *t* test for independent means. Family practice patients generated significantly less costs per admission than patients on the internal medicine service. The results of all the above comparisons are presented in Table 4.

DISCUSSION

In summary, there was not a significant difference in outcome between these two groups even though the patients of family physicians were more severely ill and older, and generated lower charges for their hospital stay.

The large number of cases included in this study is enough to make almost any small difference between groups statistically significant. Each difference, then, must be evaluated carefully for clinical significance. Since the extent to which the difference of 0.03 in the average

admission severity score would change the risk for morbidity and mortality is not known, the clinical significance of this difference is uncertain.

Other studies have found that increasing age increases the odds ratio for dying by 2% to 6% per year of age in patients older than 65 years.^{8,11} It seems reasonable, then, to attribute some importance to the 0.54-year difference in average age between the patients in these two groups. Simply because of their age, the patients of family physicians may be at higher risk for death at the time of their admission to the hospital than the patients of internists. This age difference would explain the slight, though not significant, increase in mortality for patients of family physicians.

Other patient characteristics that might alter risk for death, such as sex, race, and socioeconomic status, were not available for comparison, so conclusions about patient comparability must be cautious.

The importance of the difference in charges is a subject for debate. While the \$180 difference for each admission may seem small, when this sum is multiplied by the number of internal medicine admissions included in this study, the difference becomes \$1.8 million, which is an important overall savings to the cohort of 200 hospitals in this study. The difference in hospital charges in these patients was 2% of the total. If one were to propose cutting the Medicare costs for hospital admissions in any given year by 2%, that amount, too, would represent a meaningful difference to the health care system.

The conclusions of this study must be weighed with the following weaknesses in mind. First, the cases were not randomly selected. Patients may choose to obtain their health care from either a family physician or an internist. Likewise, the hospitals participating in this database at the time of this study did so on a voluntary basis, making the study sample not representative of the total population of patients, physicians, or hospitals.

The specialty training of the physicians studied is not known. The patients were categorized by their admission to a particular service in these hospitals; therefore, it was likely that general practitioners were included among those physicians admitting to the family practice service, and similarly, subspecialist internists were among those admitting to the internal medicine service.

Several recent studies have shown that hospital practice may vary with geographic region.¹²⁻¹⁵ Particularly important to this study is the difference in length of hospital stay found between the East Coast and West Coast regions. Hospital mortality rates do not reflect true outcome differences if terminally ill patients are discharged to other institutions to die.¹¹ As the family physicians and internists included in this study came from the same hospitals, such a bias is of minimal importance to this inves-

TABLE 4. COMPARISON OF CASE MIX AND OUTCOME

Variable	Family Practice Patients (n=5473)	Internal Medicine Patients (n=10,353)
Average age in years	78.07	77.53*
Average weighted severity score	1.95	1.92*
Percent mortality (n)	8.5 (465)	8.0 (829)
Percent poor outcome (n)	13.3 (727)	12.6 (1304)
Average cost for room and board, in dollars	5221	5343†
Average ancillary charges, in dollars	3023	3081†
Average length of stay, in days	8.3	8.3

*P < .01.
†P < .001.

tigation. The conclusions would be stronger, however, if longer term mortality rates were available for comparison.

The size and type of hospital in which the physicians practice could affect the conclusions of this study. The severity weights are highly influenced by the use of specialized diagnostic technologies.¹⁰ Thus, patients admitted to large or teaching hospitals could appear more ill than those admitted to smaller or nonteaching hospitals.¹⁶ If family physicians are more likely to practice in smaller hospitals, the patients might appear to be less severely ill when compared with the patients of internists, thus masking an even larger difference between the two patient groups. On the other hand, smaller hospitals may charge less and offer less of the expensive technologies than larger and teaching hospitals. As a result, costs would be lower for patients admitted to these smaller hospitals. If family physicians are more likely to practice in small hospitals, the difference in hospital size alone might account for the difference in cost found here. Since the size and type of hospital are not available for comparison by physician specialty, the extent to which they may have contributed to these results is not known.

Fundamental to the value of this study is the validity of the severity scoring system. In assessing this system, several factors should be considered. The system is proprietary, and the complete algorithm is not available for unrestricted, independent clinical scrutiny. Many key clinical findings are procedural in nature, and the system measures immediate severity rather than the extent of underlying disease. In addition, the system will miss morbidity that occurs in patients who are discharged alive before 8 days to an equal or lower level of care. It is, however, a system that was designed to compare quality of care. Based on the logical premise that increasing severity parallels increasing potential for major organ failure, this system has been shown to predict morbidity and mortality, with 60% of patients admitted with the highest score dying compared with only 1% of patients with the lowest two scores.¹⁰ The system is still under scrutiny, and more information will be available in the future.¹⁶⁻¹⁸

Despite these weaknesses, this study contributes important information to the question of variations in care between family physicians and internists. It shows no difference by physician specialty using an objective outcome measure for a large number of hospitalized elderly patients with the same diagnoses and comparable illness severity throughout the country. It does show that the family physicians in this study delivered this comparable

medical care to patients at a lower cost than internists. If the amount of this difference is considered important, the source of this difference will be an interesting question for further investigation.

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