

Payment Mechanism and Patterns of Use of Medical Services: The Example of Hypertension

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This study explores the relationship between the use of medical services by hypertensive patients and mechanisms for payment within a single primary care practice. Three payment mechanisms were explored: public assistance, a capitated health maintenance organization (HMO), and fee-for-service. Patterns were examined across reimbursement type for the following variables: age, sex, visit reason, number of visits, medications, tests ordered, referrals made, and recommendations for follow-up visits. Illness severity was controlled in two ways: (1) by the study being focused on one diagnosis—mild to moderate hypertension, and (2) by concurrent chronic illnesses being enumerated and included in the analysis. Medical visits to the physician

were examined over a 2-year period for 25 to 30 patients randomly sampled from each of the three payment mechanisms. Statistically significant differences were found for patient behaviors (total number of patient visits) and physician behaviors (number of medications and recommendations for revisits). The highest visit frequency was found for those on public assistance, followed closely by those covered by an HMO, and more distantly by those choosing fee-for-service. In a climate of cost consciousness, further study is needed to explore the impact of reimbursement mechanisms on the use of health care services. *J Fam Pract* 1991; 32:66-70.

Health maintenance organizations (HMOs) have emerged as a significant force in health care over the past decade. The existent literature has examined their performance, primarily relative to inpatient use. That HMOs survive and profit by limiting inpatient days and expenses has been well documented.¹⁻⁵ The ambulatory experience is less clearly defined. Both Wolinsky⁵ and Blumberg⁶ have identified increased use of ambulatory services in the HMO setting. The Rand Corporation data also suggest increased use of ambulatory services associated with decreased out-of-pocket expenditures.⁷⁻⁹ An increase in outpatient use is theoretically explained by an emphasis on preventive care in the HMO setting and by a preferential use of outpatient testing and therapy to minimize costs. Interestingly, Hulka and Wheat¹⁰ did not find increased ambulatory service use in their review.

Patients initiate contact with health care systems. Hulka and Wheat¹⁰ explored patients' utilization behav-

ior and found that the primary motive for services used was perceived medical need. Diehr et al,¹¹ however, found that there is less regard for need in prepaid systems. A number of factors could be responsible for this discrepancy, including an increased patient interest in health maintenance, physician emphasis on preventive care, a change in physician behavior favoring outpatient (less expensive) care, or, perhaps, a tendency for patients to take advantage of "free" care.

Physician behaviors, although not well studied, also have an impact on utilization. Once a patient has initiated an encounter, the physician assumes a major role in recommending the use of health care goods and services, including laboratory, radiologic consultation, and other ancillary services. The new gatekeeper role is for many physicians an uncomfortable one, but it is unlikely that this task will disappear.^{12,13}

Most studies of consumer behavior within prepaid settings are descriptive, delineating characteristics of patient visits over specified intervals of time.⁵ Studies comparing visit characteristics of patients enrolled in capitation programs with those of patients enrolled in fee-for-service practices have been more informative.^{5-9,11} Major drawbacks have been that these studies rely solely on patient recall, fail to control for the differences between

Submitted, revised, October 10, 1990.

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practice sites, neglect consideration of the unique practice styles of different physicians, and fail to include health status or diagnosis variables.

The present study was designed to compare ambulatory health services use behavior of hypertensive patients across three types of reimbursement categories within a single practice setting. Hypertension was selected for examination partly because it represents a chronic asymptomatic disease for which periodic physician visits are recommended. The reimbursement types included in the analysis are a capitated HMO, fee-for-service, and Medicaid. The study null hypotheses were (1) the number of patient visits in the ambulatory setting would not significantly differ among reimbursement mechanisms, and (2) physician behaviors, such as drug prescribing, test ordering, and follow-up recommendations, would not significantly vary among the reimbursement mechanisms.

Methods

The study was conducted at the Rockton Area Community Health Center of the University of Illinois College of Medicine at Rockford. This site is part of the ambulatory curriculum called the Primary Care Experience, which is described in detail elsewhere.¹⁴ At the time of the study, the clinic was staffed by five salaried faculty physicians. The physicians represented the primary care specialties of family practice (3), internal medicine (1), and pediatrics (1). The clinic serves small towns and rural areas in north central Illinois.

The study encompassed a 2-year period from June 1, 1984, through May 30, 1986. Three groups of hypertensive patients were identified on the basis of means of payment: capitated HMO ($n = 45$), Illinois public assistance ($n = 31$), and fee-for-service ($n = 250$). Although 31 public aid patients were initially identified, only 25 were eligible for study inclusion. The primary reason for ineligibility was inaccurate diagnosis. Thirty HMO patients and 30 fee-for-service patients were selected at random for analysis.

Data were obtained for the independent variables of age, sex, family size, and number of chronic diseases. The latter consisted of an index in which the number of chronic diseases other than hypertension (eg, diabetes, obesity, hyperthyroidism, congestive heart failure) were tabulated for each patient. Dependent variables for which information was obtained included total number of visits to the health center, total laboratory tests ordered, total medications (prescription and nonprescription), and the number of revisits recommended in the 2-year study

period. Analysis included chi-square, one-way analysis of variance, and multiple regression.

Results

In terms of demographics, 55 (65%) of the sample patients were female. The mean age for the 85 subjects was 53.5 years ($SD = 10.7$ years). The mean family size was 2.5 ($SD = 1.6$). The average number of visits to the health center over the 2-year study period was 9.5 ($SD = 5.6$), with a range between 1 and 24 visits. Three variables that were more directly physician mediated or influenced were also examined: the mean number of medications prescribed for patients over the 2-year study period was 18.6 ($SD = 18.7$), the average number of laboratory tests was 6.2 ($SD = 6$) with a range from 0 to 26 tests, and average number of revisits recommended for follow-up was 6.8 ($SD = 4.1$). Finally, the mean number of chronic diseases was 1.4 ($SD = 1.2$).

Chi-square analysis was used to examine sex and reimbursement plan, and an F test was used to examine the variables of age and family size to determine whether there was a relationship between these independent variables and reimbursement mechanisms. Fifty percent of the study patients in the fee-for-service group were women, with 66.7% and 80%, respectively, in the HMO and public assistance groups. These differences were not statistically significant. Similarly, there were no significant differences between age and family size relative to the three reimbursement groups. Finally, there were no significant differences among groups with respect to mean number of chronic diseases.

An F test was also used to examine potential differences in patterns of use of services in relation to reimbursement plans. Results of this analysis are presented in Table 1. For each of the four dependent variables examined, the general trend was the same: fee-for-service patients demonstrated the lowest mean utilization, public aid the highest, and HMO patients in between. All observed differences were statistically significant at the $P = .05$ level or less. A test for repeated measures (Tukey) was performed to determine specifically which means in the analysis of variance were different from the others. As presented in the table, for number of patient visits a significant difference occurred between the fee-for-service and the public aid groups. This finding was also true of the differences in means related to both number of medications and number of laboratory tests. With regard to the number of return visits recommended, a statistically significant difference in mean values was found between the public aid group when compared with both the fee-for-service and the HMO

Table 1. Patient Use of Services as a Function of Reimbursement Plan: Hypertension

Utilization Variable*	Reimbursement Mechanism			P Value
	HMO Mean (SD)	Public Aid Mean (SD)	Fee-for-Service Mean (SD)	
Number of patient visits†	9.5 (5.2)	12.0 (6.1)	7.6 (4.9)	.012
Number of medications†	17.3 (15.9)	26.6 (24.5)	13.3 (13.1)	.026
Number of laboratory tests†	6.1 (5.7)	9.0 (7.5)	3.8 (3.6)	.006
Number of revisits recommended‡	6.6 (3.9)	9.1 (4.3)	5.0 (2.9)	.001

HMO = health maintenance organization, SD = standard deviation.

*Average values are for the 2-year study period.

†Difference according to the Tukey test was between public aid and fee-for-service.

‡Difference according to the Tukey test was between public aid and fee-for-service and between public aid and HMO.

groups. These findings appeared even though there were no statistically significant differences between the three groups as a function of sex, age, family size, or chronic disease index.

The final stage of the analysis consisted of looking at the relationship between the independent variables (ie, sex, age, family size, and number of chronic diseases) and the type of reimbursement plan to determine their influence on utilization characteristics. Four separate multiple regression analyses were conducted in which number of patient visits, number of medications, number of laboratory tests, or number of recommended revisits were regressed on the five independent variables. In this analysis, the three-category independent variable of reimbursement was entered as a "dummy" variable, using the dichotomies public aid vs other mechanisms and HMO vs other mechanisms. The category of fee-for-service was suppressed and used as the basis of comparison with the other two categories. Results of this analysis are presented in Table 2.

The multiple *R* for the dependent variables as a function of the patients' background characteristics ranged from .49 to .544. Between 25% and 30% of the variance in the dependent variables was, therefore, accounted for by the variance in the independent variables of sex, age, family size, number of chronic diseases, and reimbursement plan. The effect of these independent factors is fairly constant over the four dependent variables. Number of chronic diseases is the most influential factor relative to each dependent variable (standardized beta ranged from .38 to .44). As the number of chronic diseases increased, the number of visits, medications, laboratory tests, and recommended revisits also increased. Public aid appeared second in explanatory power; the more likely the person was to pay for care through public aid rather than fee-for-service, the greater the number of visits, medications, laboratory tests, and revisits recommended. The influence of other variables was minimal; the relative influences of family size and age were quite low across the four analyses.

Table 2. Multiple Regression of Patient Use of Services by Patients' Background Characteristics

Dependent Variables	Independent Variables						P Value
	Sex*	Age	Family Size	Chronic Diseases	Public Aid†	HMO‡	
Number of patient visits Standardized beta <i>R</i> = .496 <i>R</i> ² = .246	-.21	.11	.07	.38§	.24	.02	.0004
Number of medications Standardized beta <i>R</i> = .490 <i>R</i> ² = .240	-.05	.07	.06	.44§	.22	.02	.0001
Number of laboratory tests Standardized beta <i>R</i> = .513 <i>R</i> ² = .264	-.21	.05	.04	.40§	.26§	.06	.0001
Number of revisits recommended Standardized beta <i>R</i> = .544 <i>R</i> ² = .296	-.06	.19	.01	.38§	.31§	.18	.0004

*Coded 1 = female, 2 = male.

†Coded 0 = all other payment, 1 = public aid.

‡Coded 0 = all other payment, 1 = HMO.

§*P* < .05.

Discussion

The results suggest that the reimbursement mechanism does relate to patient use of health services, with public aid patients and to some extent HMO patients tending to be heavier users of physician services.

The present study is unique in that it looks at utilization patterns by hypertensive patients from three different reimbursement mechanisms within the same facility and among the same group of physicians. A single practice setting decreases the possibility that the results are influenced by inability to select a comparable group of patients; by differences in availability, costs, and profit margin of various tests; and by differences in practice philosophy.

It is nonetheless important to acknowledge the limitations of the study. First, patient numbers were small but did include the entire eligible public aid population and a reasonable sampling of the other patient groups. The total number of patients identified as hypertensive over the 2-year study period was 410. Based on known demographic information, it would be expected that approximately 41 HMO patients, 67 public aid patients, and 212 third-party-payer patients would have the diagnosis of hypertension. The expected number of patients in each payment category compares favorably with the number of hypertensive patients identified for analysis. The largest discrepancy, that in the public aid group, may be explained by the large number of children in this particular population.

Second, confounding variables that may affect study results include severity of illness and race. A subsequent review of the patients studied revealed that with possibly one exception the patients would clearly be classified as having mild to moderate hypertension. The difficulty involved in attempting to measure health status has been addressed.¹⁵ The present study focused on subjects with one diagnosis and considered other possible confounding chronic diseases.

In terms of the potential influence of race in this setting, no systematic method exists for the retrospective identification of a patient's race in the chart system. A study conducted in 1985, which enrolled all patients using the community health centers in a period of 4 consecutive weeks, however, revealed that 96% of clinic patients were white. Thus it is unlikely that race is a major confounder.

The present study suggests a number of insights into the relationship between reimbursement and utilization. It is interesting to look at the impact of chronic diseases in light of the earlier bivariate analysis. In the two-by-two comparisons, there were no significant differences in number of chronic diseases relative to reimbursement

category. On the other hand, the variable was obviously important in predicting patients' utilization characteristics, as evidenced in the regression analysis. While there is some relationship between the use of services and the payment mechanism, this association appeared to be secondary to use as a function of severity of illness.

Physician's behavior appears to be affected by the payment mechanism, as suggested by the number of medications prescribed, number of laboratory studies ordered, and the number of recommended revisits. Higher use by HMO patients is counter to the expectation that capitation would constrain use. Still, it is difficult to isolate the importance of patient attitudes and beliefs from the impact of physician recommendations in the observed use patterns.

The standard of care for ambulatory treatment of hypertension in the educational setting studied is assumed to be fairly uniform and consistent with a university curriculum. Physician bias toward the reimbursement mechanism would be expected to have minimal effect. The faculty in this setting are salaried with no incentives to either increase or decrease services utilization.

In comparing the results with those of Blumberg, these findings support the view that patients who do not pay out of pocket (fee-for-service) have the highest number of visits per year.⁶ On the other hand, the contention that the prepaid group has the highest percentage of people with at least one visit in a 1-year period could not be addressed. The work of Shapiro et al¹⁶ has shown that high users tend to consistently and persistently use health care services heavily. The subjects in that study were stratified by age, but no attempt was made to control for the severity of illness or diagnosis (with the exception of those receiving prenatal care). This study was able to show a quantitative difference in utilization among the three reimbursement mechanisms studied, controlling for diagnosis and severity of illness. It would be interesting to follow this longitudinally to see whether the findings of Shapiro et al would be further substantiated.

The present study also explored how payment mechanisms might be influencing physician practices regarding testing, follow-up, and physician initiated referrals. Epstein and his group¹⁷ also looked at ambulatory testing in hypertensive patients. They found that physicians in fee-for-service practices ordered more electrocardiograms and chest x-ray examinations, and concluded that the physicians associated these tests with higher profit. The results of the present study are strikingly different. This study showed an increased utilization of laboratory tests for both HMO and Illinois public assistance patients when compared with fee-for-service payment patients.

There are other unique features presented by the educational setting used. At the site studied, patients are assigned to students rather than physicians, although all patients are also seen by a faculty member at each visit. Most patients are seen by each of the faculty physicians at one time or another. There are few data on the impact of medical students or the educational environment in general on ordering practices and the cost of medical care. The focus of the Rockton Area Community Health Center is to provide medical students with an opportunity to experience, first hand, ambulatory primary care as it would be in a typical group practice. Further study is needed to define the utilization differences between the educational setting and the private practice.

Overall, a relationship is substantiated between ambulatory use patterns (and by implication, cost) and reimbursement plan. This relationship must be further analyzed, however, in relation to such factors as severity of illness and educational level of the patient. The effect of reimbursement plan on use must be further documented with an eye toward understanding both (1) the relationship between the organization of health care delivery and the health-related behavior and characteristics of patients as consumers, and (2) the impact of the reimbursement mechanism on physician behavior and decision making.

The business approach to health care raises a number of questions and poses some new problems. How should a physician deal with the potential conflict of interest that arises from assuming responsibility for both the patient and fiscal restraint? What potential effect on the patient-physician relationship is there from the physician holding the "purse strings"? What impact does this arrangement have on health (both outcome and patient perception)? Will physicians potentially be rewarded for doing less for patients? What strategies do physicians use, both intentionally and unintentionally, to meet expectations for cost containment?

These are the kinds of questions that need to be addressed in a climate of cost consciousness. It is important to understand how the methods of payment of

medical bills is related to use patterns and, ultimately, to the overall cost of receiving medical care. Thus, the results of the present study can be compared with findings from other studies that explore the use of health care uses and reimbursement methods.

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