Is Patient Satisfaction Influenced by the Intensity of Medical Resource Use by Their Physicians?

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Objective: To determine whether patients' satisfaction with their primary care is related to providers' use of medical resources.

Study Design: Sixty-two practices serving 2805 patients enrolled in BlueCross BlueShield of Minnesota were analyzed using hierarchical regression models.

Methods: Three measures of satisfaction included patient satisfaction with overall healthcare, patient satisfaction with the time spent with a physician or other provider during a visit, and the likelihood that a patient would recommend the clinic to others.

Results: Patient satisfaction was found to be primarily a function of patient characteristics and not of practice characteristics. Providers' use of medical resources was not significantly related to patients' overall ratings of healthcare or to patients' willingness to recommend the practice to others. However, the time spent with a physician or other provider was significantly negatively related to patient satisfaction. Physician workload was significantly related to patient satisfaction.

Conclusions: To improve patient satisfaction, practices should focus on reducing physician workload. Valid measures of patient satisfaction must correct for the strong effects of patient characteristics.

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This study was designed to assess the relationships between patient satisfaction with the healthcare they receive from their medical group practice and the practice's intensity of resource use. It is well known that there are vast differences in the costs of care across regions in the United States and across practices within regions. A recent *Dartmouth Atlas of Healthcare* reports that adjusted per capita Medicare spending is twice as high in some geographic areas compared with others, most of which is accounted for by more physician visits, specialist consultations, and diagnostic tests.[1]

In the upper Midwest, Kralewski and colleagues[2] found a 30% difference in resource use among medical group practices caring for patients with hypertension. This line of research has assessed the relationships between costs and quality of care. Fisher et al[3] found that higher Medicare spending did not result in better quality of care, and Starfield and colleagues[4] found that in some cases quality is inversely related to costs among Medicaid enrollees in Maryland. Fisher and colleagues[5] also found that patient satisfaction was unrelated to Medicare spending levels. Nonetheless, the idea that additional resource use might be patient driven was compelling enough for Fisher[6] to write a *New York Times* editorial explaining that "More Medicine Is Not Better Medicine."

While most of these studies focused on adjusted patient-level costs, others have found that the amount paid to physicians per unit of services did not influence the quality of their work (JEK, unpublished data, 2005). Solberg et al,[7] in a study of 18 care systems in Minnesota, found that costs were not related to ambulatory care process measures. Both studies concluded that paying physicians more for their services does not buy higher quality of care. In most studies, quality of care has been specified in terms of technical quality such as compliance with clinical guidelines. However, patient satisfaction with the care they receive is increasingly being recognized as an important dimension of quality. Inclusion of patient satisfaction as a measure of quality may be a source of concern for some practitioners who are attempting to achieve cost-effective practice styles. Physicians may be particularly concerned when pay-for-performance programs include patient satisfaction measures and performance measures that reward more conservative use of medical resources.[8]

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THEORY

Our analysis is based on the theory that patient satisfaction is a measure of the discrepancy between a patient's expectation regarding an encounter with his or her physician or other healthcare provider and the patient's actual experience. These discrepancies can occur on multiple levels such as ease of getting an appointment, waiting time in the office, attentiveness and courtesy of the providers and other office personnel (including time spent with providers), prescribed treatments, and health outcomes.

In this study, we do not observe patient expectations directly. Instead, we observe a set of patient characteristics that proxy those expectations, including patient age, sex, education, and health status. A patient's actual experience in each of these dimensions is a function of inputs supplied by the physician's office. Our analysis focuses on the following 3 inputs: use of medical resources, employment of nurse practitioners, and physician workload (which affects the time spent with each patient).

Take-Away Points

Our study indicates that patient satisfaction, an increasingly important quality-of-care consideration, is not negatively affected by practices that use fewer resources. Moreover, the importance of patient characteristics as determinants of satisfaction suggests a need to risk adjust satisfaction scores for patient demographics.

- Physicians can adopt cost-effective practice styles that may result in fewer procedures without compromising patient satisfaction.
- External organizations (eg, public and private programs and health plans) reporting patient satisfaction with physicians or with physician groups (or organizations using such data for internal management purposes) should risk adjust scores to account for patient demographics.

NEW CONTRIBUTION

Our study builds on the work of others and focuses on the relationship between resource use and patient satisfaction by extending analysis to the medical group practice level. An important question addressed by our study is whether the lack of a relationship between patient satisfaction and medical resource use (proxied by Medicare spending) among hospital referral regions as reported by Fisher et al[3] holds true at the medical group practice level as well.

Data and Methods

Data for this study were obtained from the following 3 sources: (1) an organizational survey of the medical group practices in Minnesota conducted with the Minnesota Medical Association, (2) a BlueCross BlueShield of Minnesota (BCBSM) survey of patient satisfaction with their managed care plan (Blue Plus), and (3) BCBSM claims data. The surveys were conducted during 2002. The claims data are from 2001. Response rates for most survey items were in the 60% to 70% range.

The patient satisfaction survey used by BCBSM is identical to that used by health insurance plans in response to Health Employer Data and Information Set requirements (HEDIS requirements available at **www.NCQA.org**). BlueCross BlueShield of Minnesota matched the satisfaction data to our group practice data; patient identity was fully protected. We selected 3 measures of patient satisfaction that we believed would be the most sensitive to practice-level resource use. These included (1) patient satisfaction with overall healthcare, (2) patient satisfaction with the time spent with a physician or other provider during a visit, and (3) the likelihood that a patient would recommend the clinic to others. These capture overall satisfaction with the care received from the practice and satisfaction with an important specific element of care.

Patients enrolled in BCBSM had to choose a specific primary care practice to provide and manage their care. Therefore, there is a formal link between patients and primary care practices. These practices provided and managed the care for 5446 Blue Plus patients who were included in the satisfaction surveys. Some of these patients were enrolled in practices that were not in our organizational data set. Consequently, our full data set includes 62 practices with 2805 patients. Patients were drawn randomly from the entire membership of BCBSM; thus, the number of responses per medical group varied according to the number of enrollees in the practice.

We have no interest in estimating any result for an individual practice. Therefore, the number of responses per practice largely is irrelevant to our analysis. What matters is the variation and covariation of practice characteristics in our data. Our statistical power is increased as the number of practices and the variation in practice characteristics increase, but our analysis would be served well with even 1 patient per practice as long as the patient represented a random draw from that practice's patients.

We measured resource use in these practices by calculating a US dollar–weighted aggregate of all services adjusted for patient age, sex, and ambulatory care group. Specifically, we regressed the natural log of patient-level per-member per-month costs for patient age, sex, and ambulatory care group category. The measure of resource use for each practice was the mean of each practice's residuals from this regression equation. The method is identical to that used by Kralewski et al[9] and is described in greater detail in that article. The mean US dollar–weighted per-member per-month resource use for each practice was calculated by multiplying units of

Table 1. Variable Definitions and Descriptive Statistics

Variable	Definition	Mean (SD)
Satisfaction Measures		
Patient satisfaction with overall healthcare	0 = Worst healthcare possible, 6 = best healthcare possible	4.25 (1.52)
Patient satisfaction with the time spent with a physician or other provider during a visit	0 = Never, 1 = sometimes, 2 = usually, 3 = always	2.34 (0.74)
Likelihood that the patient would recommend the clinic to others	0 = Definitely would not, 1 = probably would not, 2 = probably would, 3 = definitely would	2.41 (0.66)
Patient Characteristics		
Age, y		
25-34	1 If age is 25-34 y, 0 otherwise (omitted category is 0-24 y)	0.21 (0.40)
35-44	1 If age is 35-44 y, 0 otherwise	0.30 (0.46)
45-54	1 If age is 45-54 y, 0 otherwise	0.22 (0.41)
55-64	1 If age is 55-64 y, 0 otherwise	0.13 (0.34)
65-74	1 If age is 65-74 y, 0 otherwise	0.04 (0.18)
≥75	1 If age is ≥75 y, 0 otherwise	0.02 (0.13)
Health		
Fair	1 If self-reported health status is fair, 0 otherwise (omitted category is "poor")	0.07 (0.25)
Good	1 If self-reported health status is good, 0 otherwise	0.26 (0.44)
Very good	1 If self-reported health status is very good, 0 otherwise	0.39 (0.49)
Excellent	1 If self-reported health status is excellent, 0 otherwise	0.26 (0.44)
Education		
Some high school	1 If respondent completed some high school, 0 otherwise (omitted category is "not a high school graduate")	0.04 (0.20)
High school graduate	1 If respondent is a high school graduate, 0 otherwise	0.29 (0.46)
Some college	1 If respondent completed some college, 0 otherwise	0.40 (0.49)
4-y College	1 If respondent has a 4-y college degree, 0 otherwise	0.14 (0.34)
>4-y College	1 If respondent has additional education beyond a 4-y college degree, 0 otherwise	0.11 (0.31)
Female sex	1 If female, 0 otherwise	0.72 (0.45)
Practice Characteristics		
Resource use	See text	–0.02 (0.07)
Workload	No. of patients scheduled per physician per hour of clinic time	3.74 (0.61)
Workload missing	1 If workload is missing, 0 otherwise	0.29 (0.46)
No. of physicians		
8-16	1 If practice has 8-16 physicians, 0 otherwise (omitted category is <8 physicians)	0.07 (0.25)
>16	1 If practice has >16 physicians, 0 otherwise	0.60 (0.49)
Nurse practitioners	1 If practice employs nurse practitioners, 0 otherwise	0.74 (0.44)

resources used by each patient during the year by the BCBSM fee schedule amounts. The same fee schedule was applied to all practices and does not reflect discounts or other adjustments. Consequently, the resource use variable represents US dollar–weighted resource use rather than the actual cost of caring for the patients. This measure is based on the theory that patient satisfaction is more likely to respond to variation in the quantity of medical resources prescribed by the physician and used by the patient rather than variation in the level of actual expenditures on their care.

In addition to resource use, the following organizational variables were included in our analysis: number of patients scheduled per physician per hour of clinic time, practice size, and utilization of nurse practitioners. The organizational variables were developed and tested in previous research projects and are described by Kralewski et al.[9] We attempted to include additional characteristics of the practice, including proportion of physician compensation related to productivity as opposed to salary, use of practice guidelines, and number of support staff per physician. We also attempted to include various measures of practice culture.[10] In all cases, the additional variables resulted in high degrees of multicollinearity and in poor performance of the estimator.

In this study, the patient is the unit of analysis. We included patient age, sex, education, and health status as explanatory variables. However, many of our hypotheses, including the main hypothesis regarding medical resource use, concern variables that are measured at the practice level. In addition, our dependent variables are discrete and ordered. Consequently, we estimate a hierarchical ordered probit model using the GLLAMM (generalized linear latent and mixed models) procedure in STATA (StataCorp LP, College Station, TX).[11] The model is in the following form:

$$Y_{ij}^{*} = \beta_{0j} + \text{Patient Age}_i\,\beta_{AGE} + \text{Patient Sex (Female)}_i\,\beta_{SEX} + \text{Patient Education}_i\,\beta_{EDUCATION} + \text{Patient Health Status}_j\,\beta_{HEALTH\ STATUS} + u_{ij}$$

$$\beta_{0j} = \text{Physician Resource Use}_j\,\gamma_{RESOURCE\ USE} + \text{Physician Use of Nurse Practitioners}_j\,\gamma_{NURSE\ PRACTITIONERS} + \text{Physician Workload}_j\,\gamma_{WORKLOAD} + u_j,$$

where Y* is an underlying index of satisfaction and u is unobserved random error. Y* is converted into discrete levels of satisfaction beginning with the lowest category coded 0 (**Table 1**) by the following rule: $Y = 0$ if $Y^{*} < 0$; $Y = 1$ if $0 \le Y^{*} \le c_1$; $Y = 2$ if $c_1 \le Y^{*} \le c_2$, and so forth, where c represents threshold variables that are estimated as part of the ordered probit model. X is a vector of characteristics of the patient, and Z is a vector of characteristics of the practice. Willingness to recommend the practice to others and satisfaction with time spent per patient were coded as 0 through 3 (higher values correspond to a more positive response). Overall satisfaction with care was originally coded using 10 values, but sparse data in the lower ranges required collapsing the lower 4 categories into 1 category, for a total of 7 categories.

The response rate for some of the satisfaction and practice characteristic questions was lower than that for the entire patient-level data set. Consequently, the number of patient responses varies across the 3 analyses.

RESULTS

The variables in the analysis and their means and standard deviations (SDs) are given in Table 1. The respondents predominantly were nonelderly women in good health and with education beyond the high school level. Patients exhibited generally high levels of satisfaction with their primary care. Practices tend to have fewer than 8 or more than 16 physicians. Practices schedule 3.74 patients per physician per hour on average, and about three-quarters of the practices employ nurse practitioners.

The regression results are given in **Table 2**. The primary predictors of patient satisfaction in our data are patient characteristics. All satisfaction measures increase with patient age and generally decrease as patient education and health status increase. Women are more willing to recommend the practice to others but do not differ from men on the other measures.

More intensive medical resource use is not associated with higher patient satisfaction. In fact, high resource use is significantly negatively related to patient satisfaction with the time spent with the physician or other healthcare provider during a visit. We explored the possibility that physicians substitute resources (tests and procedures) for time with the patient. However, workload and resource use have a negative correlation (–0.33) in our data. Therefore, it seems that physicians who see more patients per hour also use fewer resources.

The practice characteristic having the most consistent relationship with patient satisfaction is physician workload. Not surprisingly, higher workloads are negatively related to patient satisfaction with provider time spent with the patient, but that dissatisfaction extends to the patient's likelihood to recommend the practice to others as well. However, physician workload did not significantly affect the overall satisfaction level of patients.

Practices that employ nurse practitioners have significantly lower recommendation rates and less satisfaction with time spent with providers. However, the use of nurse practitioners did not influence the overall satisfaction with care among patients.

DISCUSSION

Our study provides an important additional dimension to the literature related to healthcare resource use and to patient satisfaction with their care. Several studies[3-7] have demonstrated that overall cost of care is not associated with technical quality. Our data indicate that intensity of medical resource use is not associated with patient satisfaction and may negatively affect satisfaction if resource use serves as a substitute for time the physician spends with the patient.

Table 2. Regression Results

Variable	Patient Satisfaction With Overall Healthcare (n = 1530)		Patient Satisfaction With the Time Spent With a Physician or Other Provider During a Visit (n = 2380)		Likelihood That the Patient Would Recommend the Clinic to Others (n = 2805)	
No. of practices	57		60		62	
Log likelihood	–2469.90		–2401.40		–2532.20	
	Coefficient	***t* Statistic**	**Coefficient**	***t* Statistic**	**Coefficient**	***t* Statistic**
Patient Characteristics						
Age, y						
25-34	0.0647	0.55	–0.0135	–0.14	0.0251	0.28
35-44	0.0873	0.79	0.1446	1.61	0.0318	0.38
45-54	0.2085	1.88	0.2561	2.74[a]	0.2175	2.47[b]
55-64	0.6150	5.14[c]	0.5236	5.08[c]	0.4359	4.51[c]
65-74	0.6971	4.07[c]	0.5650	3.65[c]	0.4775	3.33[a]
≥75	1.2288	2.28[b]	0.7703	2.85[a]	0.6143	2.68[a]
Health						
Fair	–0.4091	–5.54[c]	–0.3928	–6.25[c]	–0.3362	–5.80[c]
Good	–0.7013	–8.62[c]	–0.6463	–9.15[c]	–0.5181	–7.90[c]
Very good	–0.8526	–6.91[c]	–0.9520	–8.97[c]	–0.7780	–7.83[c]
Excellent	–0.9302	–3.46[c]	–0.8680	–4.17[c]	–0.2501	–1.16
Education						
Some high school	0.9978	2.75[a]	0.4997	1.99[b]	0.3877	1.84[b]
High school graduate	0.8325	4.21[c]	0.3641	2.42[b]	0.3351	2.44
Some college	0.3491	3.95[c]	0.2495	3.08[a]	0.0597	0.77
4-y College	0.3256	3.98[c]	0.1730	2.30[b]	0.1128	1.54
>4-y College	0.2351	2.35[b]	0.0885	0.99	0.1107	1.26
Female sex	0.0284	0.46	–0.0133	–0.24	0.1143	2.27[b]
Practice Characteristics						
Resource use	–0.7434	–1.17	–0.9268	–2.01[b]	–0.1741	–0.32
Workload	–0.1179	–1.35	–0.157	–2.39[b]	–0.1560	–1.96[b]
No. of physicians						
8-16	–0.0330	–0.19	–0.2095	–1.86	–0.0490	–0.35
>16	–0.0301	–0.21	0.0709	0.65	0.0157	0.13
Nurse practitioners	–0.1853	–1.35	–0.2498	–2.52[b]	–0.2115	–2.10[b]

[a] $P = .01$.
[b] $P = .05$.
[c] $P < .001$.

The finding that practices employing nurse practitioners have significantly lower recommendation rates and less satisfaction with time spent with providers is difficult to explain. Patients may perceive that time spent with a nurse practitioner is not equivalent to time spent with a physician. An alternative explanation might be that employing nurse practitioners is correlated with some unobserved clinic variable that negatively influences this aspect of patient satisfaction.

The importance of patient demographic characteristics as determinants of satisfaction suggests a need to understand these causal linkages in greater detail and to "risk adjust" satisfaction scores for patient demographics. However, the

issue is complex. If one group of patients simply reports higher satisfaction levels, holding all objective aspects of care constant, then risk adjusting for patient age would be important. However, if a specific group of patients comprise the most discerning evaluators of physician performance, then one might want to give greater weight to their scoring of physician practices. This is an area that requires further research.

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