

The Impact of Physician Practice Style on Medical Charges

*Klea D. Bertakis, MD, MPH; Rahman Azari, PhD; Edward J. Callahan, PhD; L. Jay Helms, PhD; and John A. Robbins, MD, MHS
Sacramento, California*

BACKGROUND. There are differences in styles of care among primary care physicians. The purpose of our study was to determine whether differences in physician practice styles and patient health status generate different medical charges.

METHODS. New adult patients (N = 509) were randomized to primary care physicians, and use of medical care services and associated charges were monitored for 1 year.

RESULTS. Controlling for baseline patient health status, a technically oriented style of care was associated with significantly higher specialty care, emergency department, diagnostic, and total charges. Some practice behaviors, however, were associated with lower charges; for example, a practice style emphasizing patient activation was associated with significantly lower primary care charges. Both a lower baseline patient health status and a health status that declined over the study period predicted higher charges.

CONCLUSIONS. Measurable differences in practice style are associated with differing medical care charges. Patients' health status was also an important determinant of medical charges and had implications for the assessment of physician utilization patterns.

KEY WORDS. Primary health care; physician's practice patterns; costs and cost analysis; health status. (*J Fam Pract* 1999; 48:31-36)

Understanding the process and outcomes of medical care is crucial, because managed care organizations are asking primary care physicians to provide quality, cost-efficient health care for their patients.¹ Research that examines the differences in the practice styles of primary care physicians is valuable in evaluating the strengths of health care delivery systems, especially if there is an association with patient outcomes and medical costs.

In a recently published study,² differences in practice style between family physicians and general internists and their impact on patient health outcomes were examined. Family practice physicians displayed greater emphasis on health behavior and counseling, while general internists employed a more technical style of care. There were no significantly different changes in self-reported patient health status or satisfaction between patients visiting family practice physicians and those seeing general internal medicine physicians during the study period; however, improved health status scores were predicted by a practice style emphasizing coun-

seling, while increased patient satisfaction was predicted by a physician style of care stressing patient activation. It was demonstrated that regardless of physician specialty, effective practice styles play an important role in improving patient health and satisfaction outcomes. It is also important to integrate such an analysis of practice style and health outcomes with the associated costs of care.

The purpose of our study was to determine if differences in practice style and patient health status generate different costs of care.

METHODS

STUDY POPULATION AND RANDOMIZATION

The study was conducted from 1990 to 1994. Subjects were recruited from new patients requesting an outpatient appointment at the University of California, Davis, Medical Center. From the first 956 nonpregnant adults having no preference for a specific physician or specialty, 821 patients (85%) agreed to participate during an initial telephone contact and were randomly assigned for primary care in either the family practice clinic or general medicine clinic. These clinics are adjacently located and have comparable physical environments. Three hundred twelve (38%) of those patients were excluded from the study because they canceled, did not keep the appointment, or could not be included for scheduling reasons. A total of 509 patients partici-

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From the Department of Family and Community Medicine, University of California, Davis, School of Medicine. Requests for reprints should be addressed to Klea D. Bertakis, MD, MPH, Department of Family and Community Medicine, University of California, Davis School of Medicine, 4860 Y Street, Suite 2300, Sacramento, CA 95817. E-mail: kdbertakis@ucdavis.edu

pated in the study, providing informed consent in compliance with protocols approved by the institutional human subjects review committee.

Medical care for these patients was monitored for 1 year. The patients were then contacted and asked to complete exit questionnaires. Completed exit questionnaires were collected on 420 (82.5%) of the study patients.

Care was provided by 26 family practice and 79 general internal medicine second- and third-year residents. These 105 primary care physicians each saw an average of 4.8 patients (standard deviation [SD] = 4.6 patients).

PROCEDURES AND MEASUREMENTS COLLECTED

Study participants were interviewed by a research assistant before their initial visit with a primary care provider and after 1 year of care. Data collected included sociodemographic information and self-reported health status using the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36). This questionnaire contains 8 scales: general health, physical function, physical role, mental role, social function, pain, energy, and mental health. A higher SF-36 score indicates better health status. Reliability and validity have been demonstrated using the SF-36 to assess self-reported health status.³

DIRECT OBSERVATION OF CLINICAL ENCOUNTERS

Initial clinical encounters with the primary care provider were videotaped in their entirety using wall-mounted equipment. Discreet placement of the equipment provided a natural environment for both physicians and patients. Videotapes were analyzed using the Davis Observation Code (DOC).⁴ The DOC is a reliable and valid method for examining physician practice styles and has detected practice style differences in various health care settings.^{2,5,6} Previous work using the DOC has indicated that patient health status¹⁰ and the presence of depressive symptoms^{11,12} influence physician practice styles.

The DOC may be used to document the occurrence or nonoccurrence of 20 clinically significant behaviors during successive 15-second observation intervals. For each DOC code, the number of intervals in which a single behavior was observed was expressed as a fraction of the total sum of all recorded codes. Research assistants coded the videotapes; 20% of those tapes were reviewed by a second observer. The stratified kappa coefficient of agreement¹³ was 91.6%.

By evaluating the clinical and statistical relationships among the 20 DOC codes, 6 separate clusters of physician practice behaviors were identified. The 6 clusters were technical, health behavior, addiction, patient activation, preventive services, and counseling (Table 1). In all subsequent regression analyses, physician practice style behaviors in each cluster were expressed as the

percentage of the total DOC codes in the medical encounter.

RESOURCE UTILIZATION AND MEDICAL CHARGES

Charges were used as a proxy for comparative medical costs in this study. It is well known that charges diverge from true economic costs. However, our study employed data from clinics using a uniform billing system, making an assumption of a consistent cost-to-charge ratio more plausible than would generally be the case. With this assumption and a logarithmic transformation of observed charges, the proxy will differ from the ideal measure by a constant, leaving estimated regression coefficients unaffected. Moreover, the use of log-transformed charges as the dependent variable in the regression analysis allowed for the assessment of the proportional impacts of practice style and baseline health status on charges, while at the same time reducing the influence of outliers.

Charges for medical care were obtained from the billing unit used by both clinics and were assigned to 1 of 5 types of charges: primary care clinic, specialty care clinic, emergency department, hospital (including outpatient surgical), and diagnostic services (laboratory, diagnostic, and radiologic testing). The year-long total for these 5 types of charges was computed for each patient.

RESULTS

Of the 509 study patients, 37.9% were men. Ethnic backgrounds included white (62.7%), African American (22.2%), Hispanic (8.3%), Asian (3.5%), and Native American (3.3%). There was a mean age of 41.3 years and an education median of 12 years. There were no significant differences between patients assigned to the family practice clinic and the general internal medicine clinic in sociodemographic variables or average health status at the initial and exit interviews.

To determine if measurable differences in practice style generate different costs of care, regression equations were estimated for the entire study population to relate the logarithm of the 5 types of charges to the proportion of physician practice style behaviors falling into each of the 6 clusters, while controlling for health status. Practice style behaviors at the initial medical encounter were significantly associated with the level of medical charges incurred (Table 2).

The first regression equation shows that patients whose physicians emphasized patient activation behaviors and addiction issues had significantly lower charges for primary care services. For example, a 1% increase in the proportion of visit activity devoted to the patient activation cluster of behaviors resulted in a 10.82% reduction in charges that is clinically, as well as statistically, significant. The regression equation with specialty clinic charges as the dependent variable also demon-

TABLE 1

Six Clusters of Physician Practice Behaviors and the DOC Codes Included in Each Cluster

Cluster	Code	Definition of Code
Technical	Structuring interaction	Discussing what is to be accomplished in current interactions
	History taking	Physician inquiring about or patient describing details related to the current chief complaint or to prior illnesses
	Family information	Discussing family medical or social history, or current family functioning
	Physical examination	Any aspect of physical examination of the patient
	Evaluation feedback	Physician telling patient about results of history, physical, lab work
	Planning treatment	Physician prescribing a medication, diagnostic, or treatment plan
	Treatment effects	Physician inquiring about or patient describing result of ongoing therapeutic intervention
	Procedure	Any treatment or diagnostic procedure done in office
Health Behavior	Compliance	Discussing previously requested behavior
	Health education	Physician presenting information regarding health to patient
	Health promotion	Physician asking for change in patient's behavior in order to increase or promote health
	Nutrition	Any question or discussion about nutrition
	Exercise	Any question or discussion about exercise
Addiction	Substance use	Any question or discussion of drinking alcohol or use of other substances
	Smoking behavior	Any question about or discussion of smoking or other use of tobacco
Patient Activation	Health knowledge	Physician asking or patient spontaneously offering what patient knows or believes about health and disease
	Patient question	Patient asking question
	Chatting	Discussion of topics not related to current visit
Preventive Services	Preventive services	Physician discussing, planning, or performing any screening task associated with disease prevention
Counseling	Counseling	Physician discussing interpersonal relations or current emotional state of patient or patient's family

DOC denotes Davis Observation Code.

strated that practice styles influence the level of charges: A technical style of care predicted higher specialty charges for patients. In addition, from the equation focusing on the amount of charges for emergency department care, it appears that a technically oriented style of care was associated with significantly higher

emergency charges for patients.

In contrast to the findings for primary care charges, an addiction style of care was associated with higher emergency charges. Diagnostic services charges were higher when a preventive service and technical style of care were practiced. No physician practice style was sta-

TABLE 2

Standardized Coefficients from Regression Equations in Which Health Care Charges (Log-Transformed Dollars) Are Explained by Patient Health Status at Entry and Physician Practice Style Behaviors at the Initial Medical Encounter (N=509)

Dependent Variable (Log of Charges)	Independent Variables (Patient Entry Health Status and Practice Styles)	Coefficient	P	R ²
Primary care	Entry health status	-0.1544	.0001	0.07
	Addiction	-0.1535	.0004	
	Patient activation	-0.1082	.0156	
	Health behavior	-0.0771	.0764	
Specialty clinics	Entry health status	-0.1018	.0237	0.05
	Technical	0.1668	.0002	
Emergency department	Entry health status	-0.1249	.0058	0.04
	Technical	0.1282	.0056	
	Addiction	0.0880	.0492	
Hospitalization	Entry health status	-0.1325	.0027	0.02
Diagnostic services	Entry health status	-0.2620	.0001	0.10
	Preventive service	0.1754	.0001	
	Technical	0.1094	.0141	
Total charges	Entry health status	-0.2267	.0001	0.11
	Technical	0.1379	.0052	
	Patient activation	-0.0730	.1342	

Note: This table includes explanatory variables with $P < .15$. Each row represents a regression equation.

tistically significant in regression equations having hospital charges as the dependent variable. Finally, a regression equation was estimated with total charges as the dependent variable. As was the case with specialty clinic, emergency department, and diagnostic services, higher total charges were associated with a technically oriented style of care. Eleven percent of the variation in log-transformed total charges was explained by patient health status at entry and the relative proportions of technical and patient activation activities in the physician-patient interaction.

To further explore the relationship of patient health status to medical charges, another set of regression equations was estimated. For this analysis, both baseline health status and the change in health status from the beginning to the end of the study were the independent variables. Those patients for whom the improvement in self-reported health status (based on the difference between the exit and entry SF-36 scores) exceeded the mean change by an SD greater than 1 were designated as having improved health status during the course of the study; those for whom the change in health status was below the mean by an SD greater than 1 were designated as having experienced worsened health status. A total of 420 patients completed exit questionnaires and were

included in these regression analyses.

Health care charges (log-transformed dollars) were explained by baseline health status at entry and dummy variables for health status that improved or worsened over the course of the study (Table 3).

Primary care, specialty care, emergency department, hospitalization, diagnostics, and total charges were all associated with the patient's baseline health status ($P < .0001$). A lower entry health status predicted higher charges for all categories and higher total charges. Higher charges of all types and higher total charges were associated with a patient health status that worsened during the study period. Similarly, an improvement in health status was related to lower charges for specialty care, diag-

nostic services, and total charges. Focusing on the regression equation that predicts total charges, exponentiation of the coefficients for the dummy variables for worsened and improved health status (.2648 and -.1050, respectively) indicate that those in the bottom quartile of health status change had 30.3% higher charges than those in the interquartile group. Those in the upper quartile of health status change had 10.0% lower charges than did the interquartile group (controlling for baseline health status). Eighteen percent of the variation in log-transformed total charges was explained by entry health status and change in health status during the study period.

DISCUSSION

Our study showed that measurable differences in practice style generate different costs of medical care, using charges as a proxy for costs. It was demonstrated that, controlling for baseline patient health status, a technically oriented style of care was associated with significantly higher total charges over 1 year of care. The cluster of technical behavior includes structuring the interaction, history taking, asking family information, performing a physical examination, giving evaluation feedback, planning treatment, discussing the effects of treat-

TABLE 3

Standardized Coefficients from Regression Equations in Which Health Care Charges (Log-Transformed Dollars) Are Explained by Patient Health Status at Entry and Changes in Health Status over the Study Period (N = 420)

Dependent Variable (Log of Charges)	Independent Variables (Patient Entry Health Status and Practice Styles)	Coefficient	P	R ²
Primary care	Entry health status	-0.2877	.0001	0.09
	Health status worsens	0.1461	.0022	
	Health status improves	-0.0492	.3155	
Specialty clinics	Entry health status	-0.2198	.0001	0.07
	Health status worsens	0.1674	.0005	
	Health status improves	-0.1061	.0325	
Emergency department	Entry health status	-0.2048	.0001	0.06
	Health status worsens	0.1482	.0023	
	Health status improves	-0.0459	.3578	
Hospitalization	Entry health status	-0.1867	.0001	0.09
	Health status worsens	0.2500	.0001	
	Health status improves	-0.0693	.1577	
Diagnostic services	Entry health status	-0.3279	.0001	0.12
	Health status worsens	0.1623	.0006	
	Health status improve	-0.0994	.0398	
Total charges	Entry health status	-0.3630	.0001	0.18
	Health status worsens	0.2648	.0001	
	Health status improves	-0.1050	.0245	

Note: Each row represents a regression equation.

ment, and performing in-office procedures. Caring for sicker patients often calls for a more technical style of care; training physicians to use such a style for all patients, however, appears to be expensive and possibly unnecessary. Educational interventions in medical school and residency training, as well as continuing medical education programs, should emphasize the importance of individualizing patient evaluation and management plans in the ambulatory setting.

Some practice styles, however, were found to be associated with decreased costs of medical care. Lower primary care charges were associated with a practice style emphasizing patient activation. Such visits are characterized by greater discussion of health knowledge, asking questions, and chatting about nonmedical topics. Moreover, there is an increasing number of empirical studies demonstrating that patients who are encouraged by their physicians to participate more actively in the treatment decisions have more favorable health outcomes than those who do not.¹⁴⁻¹⁶

Medical costs are also associated with differences in patient health variables. Higher charges of all types (primary care, specialty care, emergency department, hospitalization, and diagnostic services) and total charges were associated with a patient health status that worsened during the 1 year of care. An improvement in health status, however, was related to lower charges for specialty care and diagnostic services, in addition to total charges; that is, those who got sicker cost more, and those who got better cost less to care for over the study period. Conventional wisdom holds that patients who are chronically ill tend to have a worsening health status over time. Physicians caring for such patients may consume more health resources in an effort to make the correct diagnosis and provide a treatment plan that reflects state-of-the-art medicine. The fact that a lower entry health status predicted higher charges for all categories and higher total charges supports this theory. It also emphasizes the financial expediency of the "cherry-picking" procedures some health care organizations employ in selecting the healthiest new members for their health plans in an effort to control the costs of care.

Another result of the recent interest in managing medical care is the emergence of reporting systems rating health care providers. Although most physicians generally favor evaluations of technical care, including disease-specific measures of the process of care, they are extremely concerned that there be an appropriate adjustment for case-mix and severity-of-illness indicators. The results of this study justify their concern. If use of medical resources is to be the criterion for physician report card grades, then the baseline health status of the patients who are assigned to their care must be taken into consideration.

LIMITATIONS

Our study has a number of limitations that affect the generalizability of its findings. The primary care physicians in the study were senior residents in their second or third year of training. The practice styles of physicians practicing in the community may be different and have varying associations with medical costs. There was a 38% loss of patients from enrollment to care and an 18% loss to follow-up after 1 year of care. These drop-out

rates were comparable to similar randomized clinical trials and should not significantly bias the results. The health status of study patients was assessed by self-report using the SF-36. Although this reliable and valid instrument is widely used, no other measures of biomedical comorbidity were employed to assess the relationship of patient health status and medical costs. Likewise, the use of the institutional billing unit data did not capture charges measured at other institutions. While little out-of-plan use by patients was anticipated over the 1-year study period, this limitation must be recognized. Finally, the R^2 values in regression equations may seem relatively low, and other factors may be relevant in determining medical cost. Nonetheless, physician practice style and patient health status variables appear to have an impact on medical costs that is both clinically and statistically significant.

CONCLUSIONS

As the health care system focuses on the control of medical expenditures, primary care physicians are being challenged to provide quality care at reduced costs. In our study, certain practice behaviors were found to be associated with different costs of medical care. These findings, though preliminary, may be valuable in identifying cost-efficient practice styles. The baseline health status of new patients seen by these physicians was also significant in medical care delivery costs, which has implications for the assessment of physician utilization patterns.

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