

# Practice Characteristics and HMO Enrollee Satisfaction with Specialty Care: An Analysis of Patients with Glaucoma and Diabetic Retinopathy

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**Background.** The specialist's role in caring for managed care patients is likely to grow. Thus, assessing the correlates of patient satisfaction with specialty care is essential.

**Objective.** To examine the association between characteristics of eye care practices and satisfaction with eye care among working age patients with open-angle glaucoma (OAG) or diabetic retinopathy (DR).

**Subjects/Study Setting.** A total of 913 working age patients with OAG or DR enrolled in six commercial managed care health plans. The patients were treated in 144 different eye care practices.

**Study Design.** We used a patient survey to obtain information on patient characteristics and satisfaction with eye care, measured by scores on satisfaction subscales of the 18-item Patient Satisfaction Questionnaire. We used a survey of eye care practices to obtain information on practice characteristics, including provider specialties, practice organization, financial features, and utilization and quality management systems. We estimated logistic regression models to assess the association of patient and practice characteristics with high levels of patient satisfaction.

**Principal Findings.** Treatment in a practice with a glaucoma specialist (for OAG patients) or a retina specialist (for DR patients) was associated with higher satisfaction, whereas treatment in a practice that obtained a high proportion of its revenues from capitation payments or in a group practice where providers obtained a high proportion of their incomes from bonuses was associated with lower satisfaction.

**Conclusions.** Many eye care patients prefer to be treated by specialists with expertise in their conditions. Financial arrangement features of eye care practices also are associated with patient satisfaction with care. The most likely mechanisms underlying these associations are effects on provider behavior and satisfaction, which in turn influence patient satisfaction. Managed care plans and provider groups should aim to minimize the negative impact of managed care features on patient satisfaction.

**Key Words.** Satisfaction, quality of care, managed care, financial incentives

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Patient satisfaction with medical care is an important component in assessing the quality of care. Studies have found that satisfaction is associated with patient compliance with provider recommendations, willingness to initiate malpractice litigation, switching providers and health plans, and medical care utilization (Sherbourne et al. 1992; Vaccarino 1977; Marquis, Davies, and Ware 1983; Newcomer, Preston, and Harrington 1996; Zastowny, Roghmann, and Cafferata 1989).

Much of the recent work on patient satisfaction has focused on patients' assessments of the quality care of care and customer service offered by health plans (e.g., Crofton, Lubalin, and Darby 1999; Zaslavsky et al. 2000). The goal of this work is to help purchasers and consumers select the health plans that best suit their needs. However, compliance with provider recommendations and other clinical outcomes for individual patients are more likely to depend on their satisfaction with the providers who treat them than on their assessments of their health plans. Satisfaction with providers may vary substantially across patients and providers in the same plan.

The published literature suggests that practice characteristics, including practice size, provider capitation, and certain forms of utilization review, are associated with patient satisfaction with primary care (Rubin et al. 1993; Kyes et al. 1999; Kerr et al. 1999). However, three trends indicate that the proportion of patients cared for by specialists is likely to rise: growing realization that specialists provide better quality of care for certain chronic conditions (Solomon et al. 1997; Ayanian et al. 1994; Vollmer et al. 1997; Chin, Zhang, and Merrell 2000), easing of restrictions on access to specialists in many managed care plans (e.g., Felt-Lisk and Mays 2002), and increasing numbers of young physicians entering specialties (Pugno et al. 2000). In this health care environment, assessing the correlates of patient satisfaction with specialty care is essential.

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This study examines the association between the characteristics of eye care practices and satisfaction with eye care among working age patients with primary open-angle glaucoma (OAG) or diabetic retinopathy (DR). Diabetic retinopathy is the leading cause of blindness among working age Americans (National Diabetes Data Group 1985), while OAG is the second most important cause of blindness in the United States, and the leading cause among African Americans (Tielsch et al. 1991). The study focuses on the roles of provider specialty, practice organization, financial features, and utilization and quality management systems, all of which are potentially modifiable. The findings of the study shed light on the factors associated with patient satisfaction with specialty care, and provide information on how to enhance satisfaction to managed care plans and provider groups.

## METHODS

### *Setting*

The patients in the study were enrollees of six managed care health plans that are geographically distributed across the United States. The study health plans are independent practice association (IPA)-model HMOs affiliated with a large managed care organization. One plan is located in the Northeast, three in the Midwest, one in the South, and one in the West. Each plan offers two commercial products: HMO and HMO-Plus. Members in the HMO product are not required to identify a primary care physician or to obtain referrals for specialty care within the plan's network, but they are not covered for out-of-network use. The HMO-Plus product offers out-of-network coverage subject to higher cost sharing than for in-network service. Both products include pharmacy benefits subject to cost sharing. Each study plan selectively contracts with ophthalmologists and optometrists in the community. Contracting eye care providers practice in every type of setting, including solo practices, small and large eye care groups, and multispecialty groups.

The study plans maintain a variety of administrative data files. Enrollment files contain demographic and enrollment information for each plan enrollee, including age, sex, and dates of enrollment. Provider files contain information for each provider, including specialty and practice location. Claims files contain detailed service-level information on all services provided to plan enrollees, including the provider of the service, the type of service, and the patient's diagnoses. The administrative data were used in selecting the study sample, as described below.

### *Data Sources*

The main sources of data for the study were a patient survey and a practice survey.

### *Patient Survey*

The patient survey contained modules on: (1) demographics, (2) visual functioning, (3) visual symptoms, (4) ocular comorbidities, (5) self-rated general health and generic health-related quality of life (HRQOL), (6) medical conditions, and (7) satisfaction with eye care. The module on demographics elicited information on age, sex, race and ethnicity, education, marital status, and income. Visual functioning was measured using the National Eye Institute 25-Item Visual Function Questionnaire (VFQ-25), which assesses patients' perception of visual disability and limitations in the performance of visual activities (Mangione et al. 1998; Mangione et al. 2001). The VFQ-25 yields an overall visual function score that ranges from 0 (worst) to 100 (best). The module on visual symptoms asked patients whether they had blurry vision, sore or tired eyes, eye pain, excessive tearing, difficulty seeing in the dark, and other symptoms (Lee et al. 1998). The module on ocular comorbidities asked patients whether they had a history of cataracts, macular degeneration, retinal detachment, or other ocular conditions. Subjects self-rated their general health as excellent, very good, good, fair, or poor, and generic HRQOL was assessed using the Medical Outcomes Study 12-Item Short-Form Health Survey (SF-12) (Ware, Kosinski, and Keller 1996). The SF-12 yields summary measures of physical health (Physical Component Score, or PCS) and mental health (Mental Component Score, or MCS) that range from 0 to 100. The module on medical conditions asked patients whether they had a history of hypertension, diabetes, lung disease, heart disease, arthritis, cancer, or other medical conditions.

Finally, satisfaction with eye care was measured using the 18-Item Patient Satisfaction Questionnaire (PSQ-18) (Marshall et al. 1993; Marshall and Hays 1994). The PSQ-18 assesses seven dimensions of satisfaction with care, including general satisfaction (two items) and satisfaction with six specific aspects of care: technical quality (four items), interpersonal manner (two items), communication (two items), time spent with the doctor (two items), accessibility and convenience (four items), and financial aspects (two items). In addition, the ten items in the technical quality, interpersonal manner, communication, and time with doctor subscales can be combined to produce a measure of satisfaction with physician care (Marshall and Hays 1994). For this study, we

adapted item wording to make it specific to patients' experiences with eye care (see Appendix), and we instructed patients to refer in their responses to their "main" eye care provider who provided most of their eye care.

Responses to the PSQ-18 were on a 5-point scale that ranged from "Strongly Agree" to "Strongly Disagree," and each item was scored from 1 to 5, with higher scores reflecting greater satisfaction. Subscale scores for the seven satisfaction dimensions and for satisfaction with physician care were obtained by averaging the items within each subscale. In the patient sample used to develop the PSQ-18, subscale scores ranged from 3.34 for communication to 4.09 for interpersonal manner (Marshall and Hays 1994).

### *Practice Survey*

The practice survey was developed for this study and contained modules on: (1) practice structure, (2) financial arrangements, (3) utilization management, and (4) quality management (Solomon et al. 2002). The module on practice structure elicited information on the number and types of providers in the practice, including optometrists, general ophthalmologists, and specialist ophthalmologists. The module on financial arrangements assessed the sources of practice revenues and the mechanisms by which practice revenues were distributed to individual ophthalmologists and optometrists as income. In particular, the survey reminded respondents that practices often receive payments from insurance companies and other payers and then pay their individual providers in a completely different manner. The survey asked for the percent of practice revenues from capitation payments, fee-for-service payments, and out-of-pocket payments and other sources. The survey also asked for the percent of individual provider incomes based on a fee for each service provided (fee-for-service), a fixed amount per patient per month (capitation), and salary. Last, the survey for group practices asked for the percent of individual provider incomes, if any, based on bonuses, withholds, or other performance incentives.<sup>1</sup>

The module on utilization management assessed the practices' experience with utilization review. The module on quality management assessed the practice's experience with clinical guidelines and use of computerized information systems.

### *Selection of Study Sample*

We selected the sample of patients for the study in three steps. First, we used administrative data from the study plans to identify patients who were continuously enrolled in a study plan and had at least one claim for OAG or

DR from an ophthalmologist or optometrist between January 1, 1997, and June 30, 1998. We assigned each patient to a main eye care practice based on the ophthalmologists and optometrists responsible for the majority of the patient's claims.<sup>2</sup> We sampled practices using an algorithm that assigned higher probabilities of being sampled to practices with more patients. We then sampled patients within practices using an algorithm that assigned a higher probability of being sampled to patients treated in practices with fewer patients. The aim of this approach was to ensure that large practices were well represented in the data while preventing the patients in those practices from dominating the sample. The initial sample that resulted consisted of 1,585 patients.<sup>3</sup>

Second, we administered the patient survey described in the preceding section by telephone between February and May 1999. Of the 1,585 patients, 95 were ineligible because they denied having either OAG or DR or because they had disenrolled from the study plan. Of the remaining 1,490 patients, 1,100 responded to the survey, yielding a response rate of 74 percent. Respondents and nonrespondents were similar in age and sex distribution, but DR patients were slightly more likely than OAG patients to respond. The 1,100 respondents included 553 patients with OAG, 501 with DR, and 46 with both conditions; they were treated in 182 different eye care practices.

Third, we administered the practice survey to these 182 practices between November 1999 and June 2000. Of the 182 practices, 7 could not be reached and 5 had closed or relocated. Of the remaining 170 practices, 144 responded to the survey, yielding a response rate of 85 percent. Responding and nonresponding practices were similar in geographical distribution and cared for similar numbers of study plan members.

The sample of patients for this study consisted of the 913 patients who responded to the patient survey and whose main eye care practice where they were treated responded to the practice survey. These 913 patients were similar to respondents to the patient survey whose eye care practices did not respond to the practice survey in age, sex, ocular conditions, self-rated general health, PCS score, MCS score, and VFQ-25 score. The study sample included 469 patients with OAG, 406 with DR, and 38 with both conditions.

### *Statistical Analysis*

We estimated multivariate logistic regression models using the pooled study sample of OAG and DR patients to determine the patient and practice characteristics associated with high levels of satisfaction with eye care. We conducted separate analyses for each of the seven dimensions of satisfaction

assessed in PSQ-18 and for satisfaction with physician care, which we derived by combining the subscales for technical quality, interpersonal manner, communication, and time spent with doctor. The dependent variable in each model was a binary variable indicating whether the satisfaction score for the particular subscale was  $\geq 4$ , which we defined as a high level of satisfaction. We collapsed subscale scores into binary variables due to the negatively skewed distributions of the scores, which exhibited a ceiling effect.

The key explanatory variables in the regression models were characteristics of the eye care practices where the study patients were treated. The practice variables included an indicator variable for group (versus solo) practice; alternatively, in some models we used a set of indicator variables for the size of the group (2–5 providers, 6–19 providers, or  $\geq 20$  providers). Other practice variables were an indicator variable for whether the practice had a “concordant” specialist ophthalmologist, defined as a glaucoma specialist for OAG patients and a retina specialist for DR patients; a set of indicator variables for the proportion of practice revenues, if any, obtained from capitation payments (0 percent [the omitted category], 1–24 percent, or  $\geq 25$  percent);<sup>4</sup> and, for group practices, a set of indicator variables for the proportion of individual provider incomes, if any, derived from bonuses (0 percent [the omitted category], 1–24 percent, or  $\geq 25$  percent).<sup>5</sup> In preliminary analyses, we examined models that included indicator variables for whether the generalist or specialist ophthalmologists in the practice were subject to utilization review and for the use of practice guidelines and computerized information systems. We also examined models that included interactions between having a concordant specialist and group size, since patients’ ability to see the concordant specialist might depend on the number of providers in the practice. Because these variables did not affect the results, however, we dropped them from the final models to save degrees of freedom. Last, we examined models that included an indicator variable for optometry-only practices, but there were too few patients in such practices.

The covariates in the regression models were patient characteristics. The patient variables included age, indicator variables for female sex and for excellent or very good self-rated general health, PCS score, MCS score, VFQ-25 score, and an indicator variable for diabetic retinopathy. In preliminary analyses, we examined models that included nonwhite race or Hispanic ethnicity and additional measures of general and vision-related health status, such as the number of visual symptoms and the number of medical conditions, as explanatory variables. These variables did not affect the results, however, and we dropped them from the final model.

All analyses were weighted using inverse probability weights to account for differences across patients in the probability of being included in the study sample. Standard errors were corrected for clustering of patients within practices (Huber 1967; White 1982).

## RESULTS

### *Descriptive Data*

Table 1 presents descriptive statistics for the satisfaction subscales of the PSQ-18. The Cronbach alphas (Nunnally 1978) for the satisfaction subscales were as follows: general satisfaction, 0.70; technical quality, 0.76; interpersonal

Table 1. Satisfaction Scores for Study Patients

<i>Satisfaction Dimension</i>	<i>Open-angle Glaucoma</i>	<i>Diabetic Retinopathy</i>	<i>Pooled Sample</i>
General satisfaction			
Mean score	4.37	4.35	4.36
Proportion with high level of satisfaction <sup>a</sup>	0.89	0.89	0.89
Technical quality			
Mean score	4.47	4.46	4.46
Proportion with high level of satisfaction <sup>a</sup>	0.87	0.86	0.87
Interpersonal manner			
Mean score	4.40	4.35	4.38
Proportion with high level of satisfaction <sup>a</sup>	0.88	0.89	0.89
Communication			
Mean score	4.54	4.47	4.51
Proportion with high level of satisfaction <sup>a</sup>	0.94	0.94	0.94
Time spent with doctor			
Mean score	4.25	4.22	4.24
Proportion with high level of satisfaction <sup>a</sup>	0.87	0.84	0.86
Financial aspects			
Mean score	4.18	4.08	4.14
Proportion with high level of satisfaction <sup>a</sup>	0.80	0.78	0.79
Accessibility and convenience			
Mean score	4.29	4.15	4.22
Proportion with high level of satisfaction <sup>a</sup>	0.84	0.72	0.79
Physician care <sup>b</sup>			
Mean score	4.41	4.37	4.39
Proportion with high level of satisfaction <sup>a</sup>	0.85	0.82	0.83

<sup>a</sup>Defined as a subscale score  $\geq 4$ .

<sup>b</sup>Derived by combining the subscales for technical quality, interpersonal manner, communication, and time spent with doctor.

manner, 0.65; communication, 0.61; time spent with doctor, 0.74; financial aspects, 0.60; accessibility and convenience, 0.79; and physician care, 0.89.

For both the OAG and DR patients, the scores on every subscale exceeded the scores in the patient sample used to develop the PSQ-18. Further, more than four-fifths of the OAG patients reported a high level of satisfaction, defined as a score of 4 or higher, on every dimension of satisfaction assessed by the PSQ-18. Similarly, more than four-fifths of DR patients reported a high level of satisfaction on every satisfaction dimension except accessibility and convenience and financial aspects. Eighty-five percent of OAG patients and 82 percent of DR patients reported a high level of satisfaction with physician care.

Table 2 presents descriptive statistics for patient and practice characteristics. The DR patients were much less likely than OAG patients to self-rate their general health as excellent or very good, probably reflecting the nature of diabetes as a systemic disease. The OAG patients also reported better physical health than DR patients, as measured by the PCS. The VFQ-25 scores for both the OAG and DR patients were similar to those in the patient

Table 2. Means for Patient and Practice Characteristics Used as Explanatory Variables in Regression Model<sup>a</sup>

	<i>Open-angle Glaucoma</i>	<i>Diabetic Retinopathy</i>	<i>Pooled Sample</i>
Patient Characteristics			
Age (yrs)	53.9	51.8	53.0
Female	0.50	0.49	0.49
Excellent or very good health	0.57	0.29	0.46
PCS score	49.2	45.9	47.8
MCS score	53.5	52.5	53.0
VFQ score	85.9	82.7	84.7
Diabetic retinopathy	—	—	0.48
Practice characteristics			
Group practice	0.68	0.75	0.71
Group size 2-5	0.48	0.46	0.47
Group size 6-19	0.11	0.17	0.14
Group size ≥ 20	0.08	0.12	0.10
Concordant specialist	0.22	0.43	0.33
Capitation 1-24% of practice revenues	0.33	0.27	0.30
Capitation ≥ 25% of practice revenues	0.09	0.11	0.09
Bonus 1-24% of provider incomes	0.12	0.16	0.14
Bonus ≥ 25% of provider incomes	0.10	0.11	0.10

<sup>a</sup>All means reported in the table are proportions, with the exception of age, PCS score, MCS score, and VFQ score. Age is in years, whereas the three scores range from 0 to 100 as described in the text.

samples used to develop the VFQ-25 (Mangione et al. 2001). Finally, DR patients were twice as likely as OAG patients to be treated in practices with a concordant specialist ophthalmologist.

### *Regression Results*

#### *Seven Dimensions of Satisfaction*

Table 3 presents regression results for the seven dimensions of satisfaction assessed in the PSQ-18. Older age, female sex, higher MCS score, higher PCS score, and higher VFQ-25 score were associated with higher satisfaction on at least one subscale of the PSQ-18. In addition, treatment in a practice with a concordant specialist was associated with higher satisfaction with technical quality and interpersonal manner; treatment in a practice that obtained 1 to 24 percent of its revenues from capitation was associated with lower satisfaction with time spent with doctor and accessibility and convenience; treatment in a practice that obtained 25 percent or more of its revenues from capitation was associated with lower general satisfaction and lower satisfaction with technical quality, interpersonal manner, time spent with doctor, and accessibility and convenience; and treatment in a group practice where providers obtained 25 percent or more of their incomes from bonuses was associated with lower satisfaction with technical quality, time spent with doctor, and accessibility and convenience.

#### *Satisfaction with Physician Care*

Table 4 presents regression results for satisfaction with physician care, derived by combining the subscales for technical quality, interpersonal manner, communication, and time spent with doctor. Higher MCS score and higher VFQ-25 score were associated with higher satisfaction with physician care. The findings regarding the effects of practice characteristics are of particular interest. Treatment in a practice with a concordant specialist was associated with higher satisfaction with physician care. Conversely, treatment in a practice that obtained 25 percent or more of its revenues from capitation and treatment in a group practice where providers derived 25 percent or more of their incomes from bonuses were associated with lower satisfaction. These findings did not change in the specification with indicator variables for the size of a group practice.

We conducted a series of sensitivity analyses to assess the robustness of the results regarding satisfaction with physician care. The first two columns in Table 5 present the findings for the effects of practice characteristics from regression models that included fixed effects for the six study plans. Including

Table 3. Regression Results: Association of Patient and Practice Characteristics with a High Level of Satisfaction on Seven Dimensions of Satisfaction

	<i>Odds Ratios<sup>a</sup></i>						
	<i>General Satisfaction</i>	<i>Technical Quality</i>	<i>Inter-personal Manner</i>	<i>Communication</i>	<i>Time Spent with Doctor</i>	<i>Accessibility/Convenience</i>	<i>Financial Aspects</i>
Patient characteristics							
Age	1.03** (2.48)	1.02 (1.19)	1.00 (0.37)	1.02 (0.96)	1.01 (0.78)	1.02 (1.58)	1.02 (1.28)
Female	1.05 (0.18)	0.88 (0.52)	1.01 (0.05)	1.12 (0.29)	1.16 (0.54)	1.80*** (2.60)	0.75 (1.29)
Excellent or very good health	1.20 (0.60)	1.18 (0.57)	1.01 (0.04)	0.59 (1.14)	1.22 (0.66)	1.16 (0.55)	0.94 (0.24)
PCS score	1.00 (0.30)	0.99 (0.74)	1.01 (1.08)	1.03* (1.71)	1.01 (0.90)	1.01 (0.90)	1.00 (0.05)
MCS score	1.03** (2.24)	1.02 (1.61)	1.03** (2.06)	1.04** (2.05)	1.02* (1.95)	1.05*** (3.84)	1.02** (1.98)
VFQ score	1.02** (2.45)	1.02*** (2.87)	1.00 (0.38)	1.01 (0.94)	1.01 (1.57)	1.00 (0.07)	1.02*** (3.71)
Diabetic retinopathy	1.25 (0.85)	1.04 (0.16)	1.10 (0.35)	0.87 (0.30)	0.81 (0.73)	0.49*** (3.23)	1.01 (0.04)
Practice characteristics							
Group practice	0.94 (0.13)	0.91 (0.23)	0.88 (0.29)	1.07 (0.13)	0.98 (0.05)	1.14 (0.43)	1.10 (0.38)
Concordant specialist	1.14 (0.46)	1.83*** (2.14)	2.05** (1.96)	1.43 (0.83)	1.63 (1.53)	1.08 (0.36)	0.97 (0.11)
Capitation 1–24% of practice revenues	0.84 (0.49)	0.98 (0.08)	1.25 (0.59)	0.78 (0.54)	0.53** (2.01)	0.51*** (3.48)	0.96 (0.16)
Capitation ≥ 25% of practice revenues	0.35** (2.45)	0.34*** (2.75)	0.31** (2.29)	0.53 (1.26)	0.31** (2.04)	0.49** (2.15)	1.14 (0.25)
Bonus 1–24% of provider incomes	0.91 (0.23)	1.15 (0.33)	0.87 (0.25)	0.65 (0.86)	0.85 (0.32)	0.95 (0.19)	0.78 (0.82)
Bonus ≥ 25% of provider incomes	0.87 (0.40)	0.33*** (2.96)	0.60 (1.24)	0.55 (1.36)	0.50** (2.26)	0.56** (2.57)	0.82 (0.58)
F statistic	3.68	4.67	2.29	2.46	2.55	4.81	3.40

<sup>a</sup>t-statistics for regression coefficients are in parentheses.

\*Significantly different from 1.00 at 10% level.

\*\*Significantly different from 1.00 at 5% level.

\*\*\*Significantly different from 1.00 at 1% level.

Table 4. Regression Results: Association of Patient and Practice Characteristics with a High Level of Satisfaction with Physician Care

	<i>Odds Ratios<sup>a</sup></i>	
Patient characteristics		
Age	1.02 (1.33)	1.02 (1.30)
Female	1.24 (1.01)	1.23 (0.99)
Excellent or very good health	1.23 (0.73)	1.22 (0.69)
PCS score	1.00 (0.19)	1.00 (0.19)
MCS score	1.03*** (2.65)	1.03*** (2.71)
VFQ score	1.01* (1.71)	1.01* (1.76)
Diabetic retinopathy	0.86 (0.63)	0.85 (0.66)
Practice characteristics		
Group practice	0.65 (1.13)	—
Group size 2–5	—	0.64 (1.15)
Group size 6–19	—	0.70 (0.79)
Group size ≥ 20	—	0.48 (1.45)
Concordant specialist	1.98** (2.43)	2.10** (2.47)
Capitation 1–24% of practice revenues	0.85 (0.61)	0.88 (0.46)
Capitation ≥ 25% of practice revenues	0.26*** (3.16)	0.29*** (2.68)
Bonus 1–24% of provider incomes	1.05 (0.11)	0.99 (0.02)
Bonus ≥ 25% of provider incomes	0.48*** (2.59)	0.45*** (2.78)
F statistic	3.73	3.04

<sup>a</sup>t-statistics for regression coefficients are in parentheses.

\*Significantly different from 1.00 at 10% level.

\*\*Significantly different from 1.00 at 5% level.

\*\*\*Significantly different from 1.00 at 1% level.

plan fixed effects did not change the findings for treatment in a practice with a concordant specialist or in a group practice where providers derived 25 percent or more of their incomes from bonuses. However, adding plan

fixed effects weakened the result for treatment in a practice that obtained 25 percent or more of its revenues from capitation in the specification with indicator variables for the size of a group practice.

The second two columns in Table 5 present the findings for the effects of practice characteristics from models in which we redefined a high level of satisfaction with physician care as a score > 4 (rather than ≥4). Redefining a high level of satisfaction did not change the main results shown in Table 4. Specifically, treatment in a practice with a concordant specialist was associated

Table 5. Sensitivity Analyses: Association of Practice Characteristics with a High Level of Satisfaction with Physician Care

	Odds Ratios <sup>d</sup>			
	Fixed Effects <sup>b</sup>	Fixed Effects <sup>b</sup>	Redefine High Satisfaction <sup>c</sup>	Redefine High Satisfaction <sup>c</sup>
Practice characteristics <sup>d</sup>				
Group practice	0.72 (0.86)	—	0.66 (1.28)	—
Group size 2–5	—	0.70 (0.91)	—	0.67 (1.22)
Group size 6–19	—	0.82 (0.39)	—	0.61 (1.22)
Group size	—	0.59 (0.91)	—	0.40* (1.85)
Concordant specialist	2.02*** (2.68)	2.05*** (2.67)	1.79** (2.36)	2.02*** (2.63)
Capitation 1–24% of practice revenues	0.82 (0.43)	0.84 (0.35)	0.97 (0.11)	1.03 (0.12)
Capitation ≥25% of practice revenues	0.36* (1.89)	0.41 (1.50)	0.33*** (3.24)	0.40** (2.21)
Bonus 1–24% of provider incomes	0.84 (0.45)	0.81 (0.52)	1.26 (0.56)	1.17 (0.39)
Bonus ≥25% of provider incomes	0.45** (2.19)	0.44** (2.36)	0.59* (1.69)	0.54** (2.09)
F statistic	3.04	2.82	3.10	2.60

<sup>a</sup>t-statistics for regression coefficients are in parentheses.

<sup>b</sup>Model includes fixed effects for the six study plans.

<sup>c</sup>High level of satisfaction redefined as a subscale score > 4 (rather than ≥4).

<sup>d</sup>All the models control for the patient characteristics shown in Table 4.

\*Significantly different from 1.00 at 10% level.

\*\*Significantly different from 1.00 at 5% level.

\*\*\*Significantly different from 1.00 at 1% level.

with higher satisfaction with physician care, whereas treatment in a practice that obtained 25 percent or more of its revenues from capitation or in a group practice where providers derived 25 percent or more of their incomes from bonuses was associated with lower satisfaction. In the specification with indicator variables for the size of a group practice, treatment in a large group with 20 or more providers was associated with lower satisfaction with physician care.

In additional sensitivity analyses, we estimated regression models in which we specified the proportion of practice revenues obtained from capitation and the proportion of provider incomes derived from bonuses as continuous rather than categorical variables. The findings were consistent with the main results in Table 4.

## DISCUSSION

To our knowledge, this study is the first to assess the correlates of patient satisfaction with specialty care under managed care. Specifically, we examined the association between characteristics of eye care practices and satisfaction with care among patients with two common and clinically important eye conditions: OAG and DR.

We found that the patients with OAG or DR in our study were very satisfied with the eye care they received. Their scores on the seven dimensions of satisfaction assessed in the PSQ-18 exceeded the scores in previous studies (Stump et al. 1995; Marshall and Hays 1994), and the vast majority of patients reported high levels of satisfaction.

We also found that patient and practice characteristics were associated with patient satisfaction. In analyses of individual satisfaction subscales of the PSQ-18, treatment in a practice with a concordant specialist was associated with higher satisfaction on two of the seven subscales. Additionally, treatment in a practice that obtained a high proportion of its revenues from capitation was associated with lower satisfaction on five subscales, and treatment in a group practice where providers derived a high proportion of their incomes from bonuses was associated with lower satisfaction on three subscales. The most notable specific findings in these analyses were the association of concordant specialists with higher satisfaction with technical quality, and the association of capitation and bonuses with lower satisfaction with time spent with doctor and with accessibility and convenience. Interestingly, practice characteristics were unassociated with satisfaction with communication. Practice characteristics were also unassociated with satisfaction with financial

aspects of care, which is reasonable since patient cost sharing and other financial arrangements are driven by health plan benefit structure rather than provider attributes.

Our most striking and consistent results were for satisfaction with physician care, a measure derived by combining the subscales for technical quality, interpersonal manner, communication, and time spent with doctor. We found strong evidence that treatment in a practice with a concordant specialist was associated with higher satisfaction, whereas treatment in a practice that obtained a high proportion of its revenues from capitation or in a group practice where providers obtained a high proportion of their incomes from bonuses was associated with lower satisfaction. We found weaker evidence that treatment in a large group practice was associated with lower satisfaction.

These results are generally consistent with published studies, although they also provide several new insights and extend existing research. Our finding that patients treated in a practice with a concordant specialist were more satisfied with physician care is consistent with the observation that specialists provide better quality of care for certain conditions (Solomon et al. 1997; Ayanian et al. 1994; Vollmer et al. 1997; Chin, Zhang, and Merrell 2000). Patients' distaste for limitations on access to specialists in managed care health plans has been well documented (e.g., Grumbach et al. 1999; Kerr et al. 1999; Katz et al. 1999; Kerr et al. 1998).

Our finding regarding the effect of capitation on satisfaction is consistent with earlier studies showing reduced satisfaction among patients treated in prepaid group practices or delivery systems (Rubin et al. 1993; Druss et al. 2000; Kyes et al. 1999). On the other hand, the results of these earlier studies are not perfectly analogous to ours, because they did not account for additional features of prepaid delivery systems that may affect satisfaction, such as the methods for compensating providers or managing utilization. Our study is more likely than earlier studies to have captured the independent effect of capitation on satisfaction, and it is the first to do so in the context of specialty care.

Lower patient satisfaction with physician care in eye care practices that obtain a large proportion of their revenues from capitation is likely to reflect the impact of capitation on provider behavior. Physicians report that capitation provides incentives to reduce services (Mitchell et al. 2000), and there is evidence that physicians in prepaid group practices spend less time with patients (Wolinsky and Marder 1982). One study found that primary care physicians were less satisfied with the quality of care they provided to patients covered by capitation contracts compared with their other patients (Kerr et al. 1997).

Our study is also the first to assess the effect on patient satisfaction of income bonuses for providers. Notably, most of the bonuses in our study were based on productivity (Solomon et al. 2002), and their use resulted in lower satisfaction with physician care. Physicians report that compensation based on productivity provides incentives to expand services, not reduce them (Mitchell et al. 2000). However, physicians may try to expand services by seeing more patients, rather than by providing more services to each patient, and this may compromise patient care (Grumbach et al. 1998). Productivity incentives also may reduce physician satisfaction (Grumbach et al. 1998), and one study of primary care physicians suggested that patients of dissatisfied physicians are themselves less satisfied (Haas et al. 2000).

Finally, the finding that patients treated in large group practices may be less satisfied with physician care is consistent with published studies of primary care (Rubin et al. 1993). Physicians in large group practices may spend less time with patients and provide less personal attention (Wolinsky and Marder 1982).

Notably, prior studies of the impact of utilization management on satisfaction have found that requiring preauthorization for referrals to specialists is associated with lower patient satisfaction (Kerr et al. 1999). Our study of satisfaction with specialty care did not find an association with utilization review or the use of quality management systems.

Our study has several limitations. First, although we have documented associations between practice characteristics and patient satisfaction with eye care, our data do not provide direct evidence on the mechanisms by which practice characteristics affect satisfaction. In our discussion, we have emphasized the likely impact of practice characteristics on provider behavior and satisfaction, which in turn may influence patient satisfaction. However, this is informed speculation based on the findings of other research.

Second, the PSQ-18 has been found to be a better measure of patient satisfaction than patient dissatisfaction (Stump et al. 1995). Therefore, our study may have overlooked additional correlates of low satisfaction that would have been identified using a different instrument. Certain subscales of the PSQ-18 also have been found to have low internal consistency in older, diseased patients treated in primary care outpatient settings (Stump et al. 1995). However, our patients were working age adults receiving specialty care, and Cronbach alphas for the satisfaction subscales were all within the acceptable range (Nunnally 1978).

Third, our analyses could not control for self-selection of patients into eye care practices. Sorting of patients into practices with different

characteristics according to patients' individual preferences would be expected to blunt associations between practice characteristics and satisfaction. For example, if all patients who prefer treatment by a specialist ophthalmologist choose practices with a concordant specialist, while all patients who prefer treatment by a generalist choose practices without a specialist, we would observe no association between having a specialist and patient satisfaction in cross-sectional data. Of course, in real life patients do not sort perfectly, and many patients are treated in practices that do not exactly match their preferences. But the consequence of imperfect sorting is still to bias cross-sectional estimates of the association between practice characteristics and satisfaction toward a finding of no association. From this perspective, the several robust associations that we found between practice characteristics and patient satisfaction with physician care offer strong evidence of the impact of these characteristics on satisfaction.

This study suggests that many patients with OAG or DR prefer to have their conditions treated by specialists who are expert in treating their diseases. Further, our findings suggest that capitation payment and income bonuses based on productivity reduce patient satisfaction with the care their physicians provide. Given the importance of patient satisfaction for compliance with provider recommendations and other outcomes, managed care health plans and provider groups should aim to blunt the negative impact of managed care features on satisfaction. Matching patients with selected chronic conditions to the most appropriate specialists or subspecialists and minimizing the use of financial incentives to reduce services to these patients merit particular attention.

## APPENDIX A

### ADAPTED PATIENT SATISFACTION QUESTIONNAIRE

The Adapted Patient Satisfaction Questionnaire used in the study is shown below. The response options for each item were: Strongly Agree, Agree, Uncertain, Disagree, and Strongly Disagree. The subscale to which each item belongs is shown in parentheses.

1. My eye doctor is good about explaining the reason for eye tests (Communication).
2. I think my eye doctor's office has everything needed to provide complete eye care (Technical Quality).

3. The eye care I have been receiving is just about perfect (General Satisfaction).
4. Sometimes my eye doctor makes me wonder if his or her diagnosis is correct (Technical Quality).
5. I feel confident that I can get the eye care I need without being set back financially (Financial Aspects).
6. When I go for eye care, my eye doctor is careful to check everything when treating and examining me (Technical Quality).
7. I have to pay for more of my eye care than I can afford (Financial Aspects).
8. I have easy access to the eye specialists that I need (Accessibility and Convenience).
9. My eye doctor sees me as soon as I want when I need care right away (Accessibility and Convenience).
10. My eye doctor acts too businesslike and impersonal toward me (Interpersonal Manner).
11. My eye doctor treats me in a very friendly and courteous manner (Interpersonal Manner).
12. My eye doctor sometimes hurries too much when he or she treats me (Time with Doctor).
13. My eye doctor sometimes ignores what I tell him or her (Communication).
14. I have some doubts about the ability of my eye care doctor to treat me (Technical Quality).
15. My eye doctor usually spends plenty of time with me (Time with Doctor).
16. I find it hard to get an appointment for eye care right away (Accessibility and Convenience).
17. I am dissatisfied with some things about the eye care I receive (General Satisfaction).
18. I am able to get eye care whenever I need it (Accessibility and Convenience).

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## NOTES

1. A reviewer pointed out that providers may pay themselves a salary throughout the year and distribute the balance of their practice revenue as “bonuses” at year’s end for tax purposes or to manage pensions. Such bonuses, of course, are different from true performance bonuses. Our survey did not distinguish the two types of bonuses. However, in our data the percent of provider incomes derived from bonuses was uncorrelated with the percent based on salary.
2. Sixty-nine percent of the patients were treated in only one practice.
3. The sample size was chosen based on power calculations for analyses of process indicators of quality of care for OAG and DR, which are the subjects of ongoing data collection.
4. Nearly all of the practices that obtained revenues from capitation payments were group practices, although a few solo practices did so as well (Solomon et al. 2002).
5. Productivity (e.g., total visits or relative value units) was the major determinant of the bonus in most of the group practices that used bonuses (Solomon et al. 2002).

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