

## Visits to Primary Care Physicians and to Specialists Under Gatekeeper and Point-of-Service Arrangements

Geoffrey F. Joyce, PhD; Kanika Kapur, PhD; Krista A. Van Vorst, MS; and José J. Escarce, MD, PhD

### Abstract

**Objective:** To assess utilization of ambulatory visits to primary care physicians (PCPs) and to specialists in 2 different managed care models: a closed panel gatekeeper health maintenance organization (HMO) and an open panel point-of-service HMO.

**Study Design:** Retrospective study of patients enrolled in a single managed care organization with 2 distinct product lines: a gatekeeper HMO and a point-of-service HMO. Both plans shared the same physician network.

**Patients and Methods:** The study sample included 16,192 working-age members of the gatekeeper HMO and 36,819 working-age members of the point-of-service HMO. We estimated the number of PCP and specialist visits using negative binomial regression models and predicted the number of visits per year for each person under each HMO type and copayment option.

**Results:** There were more annual visits to PCPs and a greater number of total physician visits in the gatekeeper HMO than in the point-of-service plan. However, we did not observe higher rates of specialist visits in the point-of-service HMO.

**Conclusion:** We found no evidence that direct patient access to specialists leads to higher rates of specialty visits in plans with modest cost-sharing arrangements.

(*Am J Manag Care* 2000;6:1189-1196)

For editorial comment, please see page 1253.

Freedom of choice in selecting providers is a distinguishing characteristic of traditional indemnity insurance. Unrestricted access, coupled with a lack of incentives for limiting referrals, has historically resulted in high rates of use of specialty care. Efforts to rationalize the use of specialists stem from the high costs of specialty care and the belief that many people go to specialists for conditions that could be better treated by primary care physicians (PCPs).

The potential overuse of specialists has been a major cost-cutting target of managed care organizations. Traditional health maintenance organizations (HMOs) use closed panels of providers and permit access to specialists only with authorization from a primary care gatekeeper and/or plan administrators. Original estimates, principally from demonstration projects in the 1980s, suggested that adding a primary care gatekeeper to a managed care plan could reduce costs by as much as 15% relative to indemnity insurance and improve the quality of care by better coordinating the delivery of services.<sup>1-7</sup>

However, much of the recent growth in managed care enrollment has been in plans that have open physician panels and allow patients relatively free access to specialists, such as preferred provider organizations and point-of-service HMOs. Unlike traditional HMOs, point-of-service HMOs provide generous coverage for self-referred visits to specialists in the network and partial coverage for out-of-network use.

Although the shift toward greater provider choice seems at odds with efforts to control healthcare

From RAND Health Program, Santa Monica, CA (GFJ, KK, JJE); and Ingenix, Eden Prairie, MN (KAV).

This research was supported by grant R01-HS09414 from the Agency for Health Care Policy and Research.

Address correspondence to: José J. Escarce, MD, PhD, RAND Health Program, 1700 Main St, PO Box 2138, Santa Monica, CA 90407-2138. E-mail: jose\_escarce@rand.org.

costs, in fact there is little objective information on how alternative managed care models affect the use of physician services. To fill the gap, this paper compares the utilization of ambulatory visits to PCPs and specialists in 2 different managed care models: a closed panel gatekeeper HMO and an open panel point-of-service HMO. Rates of use of ambulatory visits are important because these visits often trigger longer episodes of care that involve a variety of healthcare services.

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... DATA AND METHODS ...

### Setting

The study HMOs are distinct product lines of a single managed care organization located in an upper Midwestern metropolitan area, where their market penetration is 15%. Both HMOs are commercial products; they have no Medicaid or Medicare members. The network physicians are independent contractors, not employees of the managed care organization; and both plans share the same physician network. The majority of the network physicians are in solo practice or in small, single-specialty groups, while the remainder practice in multispecialty groups. All network physicians are paid on a discounted fee-for-service basis, using the same fee schedule, with a year-end bonus based on performance. Both study plans include an evaluation of each PCP's referral patterns in the bonus criteria and provide feedback to PCPs on their referral patterns. Most employers' contracts with the HMOs also limit the number of specialty visits per referral.

Members of the gatekeeper HMO must obtain healthcare through a PCP and require PCP referrals to see specialists. Members of the point-of-service plan also select a PCP from whom they are encouraged to obtain all routine care and specialist referrals, but point-of-service members enjoy generous coverage for self-referrals to specialists within the network as well. Both study plans require copayments for PCP visits and PCP-referred specialty visits that range from \$0 to \$20, depending on the employer contract. However, point-of-service members pay only an incremental copayment averaging \$5 to \$10 for self-referred specialist visits. In addition, point-of-service members can use providers outside the network, although they face an average deductible of \$200 and a 20% coinsurance.

We had no information on the other health insurance plans available to HMO members through their employers.

### Conceptual Framework and Hypotheses

We considered utilization of PCP and specialist visits and noted that the total number of specialist visits is the sum of specialist visits obtained on referral from PCPs and specialist visits obtained through patient self-referral. A lower out-of-pocket price for a particular service is always expected to increase the use of that service, but cross-price effects depend on whether services are substitutes or complements.

Empirical evidence suggests that patient self-referrals to specialists are substitutes for both PCP referrals and PCP services.<sup>8-12</sup> Patients who self-refer to specialists are less likely to see PCPs, since some of their clinical problems are being managed by specialists. Therefore, a lower out-of-pocket price for self-referrals is expected to reduce use of PCP visits and PCP-referred specialist visits, while lower out-of-pocket prices for PCP visits and PCP referrals are expected to decrease self-referrals.

In contrast, PCP services and PCP referrals to specialists appear to be complements.<sup>8,10,12,13</sup> Patients who want referrals from PCPs usually have to see the PCPs, while patients who see PCPs more often have more opportunities to receive referrals. Thus, a lower out-of-pocket price for PCP referrals would be expected to increase the use of PCP visits, and a lower out-of-pocket price for PCP visits would be expected to increase the rate of PCP referrals.

From patients' perspectives, the major difference between the 2 study HMOs is the lower out-of-pocket price of patient self-referrals to specialists in the point-of-service HMO. The gatekeeper HMO does not cover patient self-referrals, whereas the point-of-service HMO requires only a modest incremental copayment for self-referred specialist visits. Consequently, we expected utilization of PCP visits and PCP-referred specialist visits to be higher in the gatekeeper HMO, whereas we expected use of self-referred specialist visits to be higher in the point-of-service HMO. Of note, the effect of HMO model on total number of specialist visits is indeterminate. However, we hypothesized that the total number of specialist visits would be lower in the gatekeeper HMO, because our expectation was that more PCP referrals were unlikely to compensate fully for fewer patient self-referrals. Physician incentives were not expected to alter these general patterns of utilization since the incentives are similar in both HMOs.

### Data

The study sample included 16,192 working-age (18-64 years old) members of the gatekeeper HMO

and 36,819 working-age members of the point-of-service HMO. All members were primary insureds who had continuous coverage for at least 365 days during the 2-year period from January 1, 1994, through December 31, 1995 (we excluded dependents because of incomplete ascertainment of utilization as a result of other insurance coverage). Enrollment files from the study plans were used to obtain each person's age, sex, zip code of residence, and copayments for ambulatory visits and for prescription drugs. Provider claims files were used to identify ambulatory visits to physicians and to determine whether visits were obtained on referral from a PCP or were self-referred. (Current Procedural Terminology [CPT] codes used to identify ambulatory visits were 99201-99205, 99211-99215, 99241-99245, 99386, 99387, 99395, 99396, and 92002-92014.<sup>14</sup>) Pharmacy claims files were used to identify each person's chronic conditions, as described below. Finally, zip code-level data from the 1990 census were used to assess the characteristics of the areas where members resided. Table 1 shows the visit copayments used by the study HMOs and the number of persons subject to each copayment level.

### Empirical Model

Our goal was to assess the impact of type of HMO and patient copayment on utilization of ambulatory visits to PCPs and to specialists, controlling for other patient characteristics that may affect utilization. Therefore, we estimated multivariate regression models for the following dependent variables: number of ambulatory visits to PCPs, number of ambulatory visits to specialists, and total ambulatory visits. PCPs were general practitioners, family physicians, and general internists; specialists were medical subspecialists, dermatologists, neurologists, general surgeons, surgical subspecialists, obstetrician/gynecologists, and a small number of miscellaneous other specialists (eg, physiatrists, geneticists). The key independent variables in the models were binary indicator variables for the 6 combinations of HMO type and visit copayment observed in the data (Table 1). Covariates included prescription drug copayment, distance to the nearest PCP or specialist, demographic characteristics, chronic conditions, area characteristics, and entry/exit indicator variables.

Demographic characteristics in the regression models included binary indicator vari-

ables for sex and age categories and their interactions. Chronic conditions were assessed by using an updated version of the Chronic Disease Score (CDS),<sup>15-17</sup> which identifies conditions based on the prescription drugs that patients fill over a defined time period. We used the CDS to construct a set of binary indicator variables for 17 chronic conditions of sufficient prevalence to affect the use of primary care and specialist visits. Zip code-level variables in the models included per-capita income, percent minority, and the fraction of high school and college graduates. Lastly, we included binary indicator variables for persons who entered or exited a study HMO over the 2-year observation period to account for potential start-up or disenrollment effects on utilization.

### Estimation

Because our dependent variables were visit counts, we estimated negative binomial models.<sup>18,19</sup> The negative binomial is a generalization of the Poisson model that is appropriate when there is overdispersion of the data (ie, when the conditional variance of the distribution exceeds the conditional mean). By allowing for overdispersion, the negative binomial helps to account for unobserved heterogeneity among the individuals in the study.<sup>19</sup>

We used the coefficient estimates from the negative binomial models to obtain the predicted annual

**Table 1.** Number of Patients by Managed Care Model and Visit Copayment Level

Copayment (\$)*	HMO	
	Gatekeeper	Point-of-Service
0	12,922	—
10	3270	—
0, 20%	—	12,431
10, 15	—	19,857
10, 20	—	1058
15, 20	—	3473
<b>Total No. of Patients</b>	<b>16,192</b>	<b>36,819</b>

PCP = primary care physician.

\*For a particular patient, the copayments for PCP and PCP-referred specialist visits are the same. For the point-of-service HMO, the second dollar amount (or percentage) is the copayment (or coinsurance) for self-referred specialist visits.

number of visits per person under each of the 6 combinations of HMO type and visit copayment, adjusted for differences in patient characteristics, as follows. First, we used the estimated coefficients to predict the number of visits per year for each person, under each plan type/copayment combination, by alternately switching each plan/copayment indicator variable on and off. Second, we averaged the individual predictions across all the persons in the study sample. Standard errors of regression coefficients were corrected for clustering within PCP. The delta method<sup>20</sup> was used to derive the standard errors of the predicted annual number of visits per person. All models included an “offset” term to account for differences across individuals in the time enrolled in a study plan.

... RESULTS ...

**Descriptive Data**

The annual number of physician visits by type of HMO and visit copayment is reported in Table 2.

Unadjusted visit rates were substantially higher in the gatekeeper HMO. Specifically, gatekeeper HMO members had 35% more PCP visits, 28% more specialist visits, and 33% more total visits than persons in the point-of-service HMO. However, the distribution of specialist visits across specialty categories was similar in the 2 HMOs. Thus approximately 42% of specialist visits were to general surgeons and surgical subspecialists in both plan types, 33% were to medical subspecialists, and 22% to 24% were to obstetrician/gynecologists. It is noteworthy that about 83% of specialist visits in the point-of-service HMO were obtained through PCP referrals, and only 17% were obtained through patient self-referrals.

Table 3 presents sample means for the demographic variables, chronic conditions, area characteristics, and entry/exit indicator variables for each managed care model. Members of the gatekeeper HMO were slightly older than point-of-service members (mean age of 40.9 years vs 38.4 years). The gatekeeper HMO also had a higher proportion of women and higher rates of the chronic conditions.

**Table 2.** Annual Number of Physician Visits by Managed Care Model and Visit Copayment Level

Type of HMO*	Total Visits	PCP Visits	Specialist Visits <sup>†</sup>	Specialist Visits		
				General Surgeons and Surgical Subspecialists	Medical Subspecialists <sup>‡</sup>	Obstetricians and Gynecologists
<b>Gatekeeper</b>						
\$0 (n = 12,922)	3.70	2.54	1.16	0.48	0.39	0.27
\$10 (n = 3,270)	3.18	2.15	1.03	0.42	0.33	0.26
Total (n = 16,192)	3.60	2.46	1.13	0.47	0.37	0.27
<b>Point-of-service</b>						
\$0, 20% (n = 12,431)	2.96	1.96	1.00	0.41	0.33	0.23
\$10, \$15 (n = 19,857)	2.55	1.74	0.81	0.35	0.26	0.18
\$10, \$20 (n = 1,058)	3.27	2.25	1.03	0.45	0.35	0.20
\$15, \$20 (n = 3,473)	2.42	1.63	0.80	0.33	0.27	0.18
Total (n = 36,819)	2.70	1.82	0.88	0.37	0.29	0.19

PCP = primary care physician.

\*For a particular patient, the copayments for PCP and PCP-referred specialist visits are the same. For the point-of-service HMO, the second dollar amount (or percentage) is the copayment (or coinsurance) for self-referred specialist visits.

<sup>†</sup>Total specialist visits are the sum of visits to general surgeons and surgical subspecialists, medical subspecialists, obstetricians/gynecologists, and miscellaneous other specialists (see text).

<sup>‡</sup>Includes dermatologists and neurologists.

Over the 2-year observation period, the point-of-service HMO had higher rates of entry and lower rates of disenrollment compared with the gatekeeper HMO.

**Regression Results**

Table 4 reports the predicted annual number of ambulatory visits to PCPs and specialists for each combination of HMO type and visit copayment, adjusted for differences in patient characteristics. The number of annual visits to PCPs and total physician visits were higher in the gatekeeper HMO than in the point-of-service plan. However, we did not observe higher rates of specialist visits in the point-of-service HMO.

*Effect of the Managed Care Model.* To understand better the independent effect of the managed care model on utilization, we compared predicted annual visits in the 2 HMOs at similar visit copayment levels (Table 5). The first set of rows in Table 5 compares physician visits in the gatekeeper and point-of-service HMOs with \$0 copayments for PCP and PCP-referred specialist visits. Consistent with expectations, the number of PCP visits was significantly higher in the gatekeeper HMO. However, contrary to our hypothesis, specialist visits were not statistically different in the 2 HMOs. Total physician visits were modestly higher in the gatekeeper HMO because of more PCP visits. We obtained similar results when we compared physician visits in the gatekeeper HMO with \$10 copayments for PCP and PCP-referred

specialist visits with the point-of-service HMO with \$10 copayments for PCP and PCP-referred specialist visits and a \$15 copayment for self-referred visits. Finally, we found no statistically significant differences in either PCP or specialist visit rates when we compared the gatekeeper HMO with \$10 copay-

**Table 3.** Sample Means by Managed Care Model

Characteristic	HMO	
	Gatekeeper (n = 16,192)	Point-of-service (n = 36,819)
<b>Gender</b>		
Male	0.574	0.637
<b>Age distribution (y)</b>		
18-24	0.050	0.109
25-34	0.250	0.300
35-44	0.345	0.298
45-49	0.134	0.109
50-54	0.092	0.083
55-59	0.074	0.066
60-64	0.056	0.036
<b>Plan entry/exit</b>		
Enter	0.283	0.485
Exit	0.340	0.212
<b>Area characteristics (zip code)</b>		
Per-capita income (log)	9.59	9.59
% Minority	14.64	13.06
% High school graduate	80.46	80.18
% College graduate	20.75	20.45
Miles to nearest provider	0.36	0.40
<b>Chronic conditions</b>		
Depression	0.073	0.053
Hyperlipidemia	0.047	0.029
Psychotic illness	0.018	0.013
Asthma	0.066	0.053
Cardiac disease*	0.009	0.004
Heart disease/hypertension*	0.088	0.061
Hypertension*	0.098	0.066
Crohn's disease and ulcerative colitis	0.005	0.005
Diabetes	0.027	0.022
Epilepsy	0.010	0.009
Glaucoma	0.006	0.004
HIV/AIDS	0.009	0.006
Malignancies	0.010	0.007
Anxiety	0.042	0.030
Thyroid disorders	0.021	0.015
Acid peptic disease	0.100	0.074
Vascular disease	0.012	0.009

\*Cardiac disease signifies patients who take drugs that are only used for heart disease. Hypertension signifies patients who take drugs that are mainly used for hypertension. Heart disease/hypertension signifies patients who take drugs that are often used for either condition.

**Table 4.** Predicted Annual Visits to PCPs, Specialists, and All

HMO*	Annual Visits <sup>†</sup>		
	PCPs	Specialists	Total
<b>Gatekeeper</b>			
\$0	2.34 (0.08)	1.11 (0.08)	3.43 (0.04)
\$10	2.11 (0.09)	1.02 (0.07)	3.10 (0.06)
<b>Point-of-service</b>			
\$0, 20%	2.10 (0.08)	1.05 (0.07)	3.15 (0.05)
\$10, \$15	1.90 (0.06)	0.94 (0.05)	2.85 (0.04)
\$10, \$20	2.17 (0.13)	1.06 (0.08)	3.25 (0.13)
\$15, \$20	1.74 (0.08)	0.91 (0.06)	2.65 (0.07)

Physicians

PCP = primary care physician.

\*For a particular patient, the copayments for PCP and PCP-referred specialist visits are the same. For the point-of-service HMO, the second dollar amount (or percentage) is the copayment (or coinsurance) for self-referred specialist visits.

<sup>†</sup>Standard errors are in parentheses.

**Table 5.** Differences in Predicted Visits by Managed Care Model and Visit Copayment Level

HMO Model	Copayment*	Annual Visits		
		PCP	Specialist	Total
Gatekeeper (A)	\$0	2.34	1.11	3.43
Point-of-service (B)	\$0, 20%	2.10	1.05	3.15
<b>Difference (A-B)<sup>†</sup></b>		<b>0.25<sup>‡</sup></b> (0.04)	<b>0.06</b> (0.04)	<b>0.28<sup>‡</sup></b> (0.06)
Gatekeeper (A)	\$10	2.11	1.02	3.10
Point-of-service (B)	\$10, \$15	1.90	0.94	2.85
<b>Difference (A-B)<sup>†</sup></b>		<b>0.22<sup>‡</sup></b> (0.05)	<b>0.08</b> (0.05)	<b>0.25<sup>‡</sup></b> (0.06)
Gatekeeper (A)	\$10	2.11	1.02	3.10
Point-of-service (B)	\$10, \$20	2.17	1.06	3.25
<b>Difference (A-B)</b>		<b>-0.05</b> (0.12)	<b>-0.04</b> (0.09)	<b>-0.15</b> (0.13)

PCP = primary care physician.

\*For a particular patient, the copayments for PCP and PCP-referred specialist visits are the same. For the point-of-service HMO, the second dollar amount (or percentage) is the copayment (or coinsurance) for self-referred specialist visits.

<sup>†</sup>Standard error of the difference is in parentheses.

<sup>‡</sup>Significantly different from zero at the 1% level.

ments and the point-of-service HMO with \$10 and \$20 copayments (Table 5).

*Effect of Cost-Sharing.* To assess the independent impact of patient cost-sharing on utilization, we compared predicted PCP and specialist visit rates within the same managed care model, but at different copayment levels. Raising the copayment from \$0 to \$10 in the gatekeeper HMO was associated with a 10% decline in PCP visits ( $P < .001$ ), an 8% decline in specialty visits ( $P = .018$ ), and a 10% reduction in total visits ( $P < .001$ ) (see Table 4). Similar comparisons for the point-of-service HMO yielded less consistent results owing to the high visit rates for the point-of-service HMO with copayments of \$10/\$20.

*Effects of Covariates.* Several covariates in the regression models affected the utilization of ambulatory visits. A higher prescription drug copayment was associated with fewer specialist visits, suggesting that prescription drugs and specialist visits are complements. Women had more PCP and specialist visits than men, although the difference narrowed and eventually disappeared at older ages. Persons with any of the chronic conditions identified by the CDS had more visits than persons without the condition. Lastly, the plan entry indicator variable was associated with more PCP visits, while the plan exit indicator variable was associated with more PCP and specialist visits.

*Sensitivity Analyses.* To assess the robustness of our results, we conducted several sensitivity analyses. First, we reestimated the regression models including fixed effects for PCPs (ie, a binary indicator variable for each PCP) to control for unobserved differences in practice patterns and referral

styles across PCPs. Second, we reestimated the models restricting the sample to members who were enrolled in the same plan for the entire 2-year period to assess whether differential entry and exit from the plans may have influenced our results. Predicted annual visits for each plan type and copayment level were only slightly affected, and differences in predicted visit rates between the managed care models were unchanged.

Finally, to examine the potential impact of selection bias, we reestimated the regression models for a subsample of “healthy” patients—defined as enrollees without chronic conditions—whom we expect to be less likely to self-select into a specific plan based on unmeasured dimensions of health status. As anticipated, the mean number of PCP visits (1.29) and specialist visits (0.55) was substantially lower among healthier enrollees compared with the full sample (see Table 2). However, relative use across plan types and copayment levels was unchanged.

... DISCUSSION ...

This study examined how a point-of-service HMO performed relative to a gatekeeper HMO with regard to utilization of ambulatory visits to PCPs and specialists. As anticipated, the number of PCP visits was significantly higher in the gatekeeper HMO. But contrary to expectations, we found no evidence that specialist visits were more numerous in the point-of-service plan.

A possible explanation for our findings is that the administrative rules governing the gatekeeper HMO may actually induce additional visits to both PCPs and specialists. Patients in the gatekeeper HMO had to see their PCPs before they could receive most services, and patients who see PCPs more often have more opportunities to receive referrals. In addition, the study HMOs, like many managed care plans, limited the number of specialty services per referral. Limiting the number of services per referral forces patients requiring additional specialty services or procedures during the same episode of care to return to their PCPs for additional referrals and, possibly, to the specialist for additional visits.<sup>21</sup>

Further, the use of self-referred specialist visits in the point-of-service HMO was modest: only one sixth of specialist visits were obtained through patient self-referral. It seems plausible that the higher use of PCP referrals in the gatekeeper plan could compen-

sate for the low rate of self-referrals even if administrative rules did not induce many additional visits.

The study also examined the impact of patient cost-sharing on the use of ambulatory visits. Modest increases in copayments led to significant reductions in PCP visits in the gatekeeper HMO, whereas the findings for the point-of-service HMO were mixed.

Our results suggest that direct patient access to specialists does not necessarily result in increases in specialist visits in HMOs with modest cost-sharing arrangements. Recent trends toward expanding provider choice may be a response to widespread patient dissatisfaction with traditional gatekeeper HMOs and their restrictive referral policies. Patient surveys indicate that choice of physician is highly correlated with patient satisfaction.<sup>22</sup> However, another possibility is that traditional gatekeeper HMOs do not reduce costs compared with other HMO models. Monitoring PCPs and maintaining authorization procedures are costly, and these costs may offset any cost savings from reductions in specialty care. Moreover, our findings suggest that greater provider choice does not necessarily lead to increased use of specialists. Patient cost-sharing, physician financial incentives, and utilization review may control the demand for specialty care without constraining patient choice of provider.

Our analysis has several limitations. First, we examined the experience of working-age members from a single managed care organization in the Midwest. Thus, our findings may not be generalizable across health plans and areas of the country. On the other hand, the focus on a single plan is a strength of the study, because the results are less likely to be confounded by unobserved physician or plan effects. Second, our measures of patient case-mix were constrained by the inherent limitations of claims data. While the CDS, based on pharmaceutical claims, appears to be an important advance in measuring case-mix in ambulatory patients, our analyses may be biased toward finding higher visit rates in the gatekeeper plan if enrollees in this plan are sicker in unobserved ways. Third, we could not identify self-referred visits to specialists in the gatekeeper plan because no claims were filed. But counting such visits, if any, would strengthen our results.

Finally, we could not control for self-selection into each type of HMO based on unmeasured patient attributes because we had no information on which patients had other health insurance choices. Selection can occur at the firm level if employers tai-

lor their insurance offerings to the characteristics of the workforce. For example, firms with older workers may be more likely to offer only a gatekeeper plan in order to control access to specialists. Alternatively, selection may occur at the patient level due to unobserved heterogeneity among individuals in their preferences for medical care. Prior evidence suggests that persons with stronger preferences for medical care often choose the least restrictive forms of insurance coverage available to them.<sup>23,24</sup> While both forms of selection are possible, the extent of bias in this study is likely to be limited. The ability of employees to self-select into plans is dependent upon having a choice of insurance options. However, published studies suggest that only half of all workers in establishments that offer insurance have a choice of 2 or more plans.<sup>25</sup> More important, if sicker patients were self-selecting into 1 or the other HMO, we should have observed a different relative pattern of use among enrollees without chronic conditions.

This study provides an initial look at how point-of-service HMOs affect the use of primary and specialty care. We found little evidence that expanding access to specialists leads to increased use of specialist visits in plans with modest cost-sharing arrangements. Future work is needed to determine whether these findings are consistent across a broader spectrum of plans and patient populations. More detailed data on patients' underlying health status would reduce potential bias from unobserved heterogeneity. Further, more complete data on the range of health plans available to each person would provide additional insight into the role of selection bias in the choice of health plans.

### Acknowledgments

We thank Paul Fishman, PhD, for providing us with an updated version of the Chronic Disease Score. We also thank Margaret Bernhardt for expert secretarial assistance.

### ... REFERENCES ...

1. Moore S. Cost containment through risk-sharing by primary care physicians. *N Engl J Med* 1979;300:1359-1362.
2. Moore SH, Martin DP, Richardson WC. Does the primary-care gatekeeper control the costs of health care? Lessons from the SAFECO experiment. *N Engl J Med* 1983;309:1400-1404.
3. Lubeck DP, Brown BW, Holman HR. Chronic disease and health service performance: Care of osteoarthritis across three health services. *Med Care* 1985;23:266-277.
4. Bonham GS, Barber GM. Use of health care before and during Citicare. *Med Care* 1987;25:111-119.

5. Hurley RE, Freund DA, Taylor DE. Emergency room use and primary care management: Evidence from four Medicaid Demonstration Programs. *Am J Public Health* 1989;79:843-847.
6. Vertrees JC, Manton KG, Mitchell KC. Case-mix adjusted analyses of service utilization for a Medicaid health insuring organization in Philadelphia. *Med Care* 1989;27:397-411.
7. Hill J, Brown R, Chu D, Bergeron J. The impact of the Medicare risk program on the use of services and costs to Medicare (report). Princeton, NJ: Mathematica Policy Research; 1992.
8. Mayer TR. Family practice referral patterns in a health maintenance organization. *J Fam Pract* 1982;14:315-319.
9. Manning WG, Wells K. Preliminary results of a controlled trial of the effect of prepaid group practice on the outpatient use of mental health services. *J Hum Resour* 1986;21:293-320.
10. Martin DP, Diehr P, Price KF, Richardson WC. Effect of a gatekeeper plan on health service use and charges: A randomized trial. *Am J Public Health* 1989;79:1628-1632.
11. Hurley RE, Freund DA, Gage BJ. Gatekeeper effects on patterns of physician use. *J Fam Pract* 1991;32:167-174.
12. *Conference Summary Report: Research at the Interface of Primary and Specialty Care*. Rockville, MD: US Dept of Health and Human Services, Agency for Health Care Policy and Research; 1996. AHCPR publication 96-0034.
13. Stearns SC, Wolfe BL, Kindig DA. Physician responses to fee-for-service and capitation payment. *Inquiry* 1992;29:416-425.
14. American Medical Association. *Physicians' Current Procedural Terminology*. Chicago, IL: AMA; 1995.
15. von Korff M, Wagner EH, Saunders K. A chronic disease score from automated pharmacy data. *J Clin Epidemiol* 1992;45:197-203.
16. Clark DO, von Korff M, Saunders K, Baluch WM, Simon GE. A chronic disease score with empirically derived weights. *Med Care* 1995;33:783-795.
17. Johnson RE, Hornbrook MC, Nichols GA. Replicating the chronic disease score (CDS) from automated pharmacy data. *J Clin Epidemiol* 1994;47:1191-1199.
18. Cameron AC, Trivedi PK. *Regression Analysis of Count Data*. New York, NY: Cambridge University Press; 1998. Econometric Society Monographs; No. 30.
19. Greene WH. *Econometric Analysis*. Upper Saddle River, NJ: Prentice-Hall; 1997.
20. Bishop T, Fineberg S, Holland P. *Discrete Multivariate Analysis*. Cambridge, MA: MIT Press; 1975.
21. Walker L. Is the gatekeeper a dying breed? *Business Health* January 1998:30-36.
22. Grumbach K, Selby JV, Damberg C, et al. Resolving the gatekeeper conundrum: A study of what patients value in primary care and referrals to specialists. *JAMA* 1999;282:261-266.
23. Hellinger F. Selection bias in HMOs and PPOs: A review of the evidence. *Inquiry* 1995;32:135-142.
24. Riley G, Lubitz J, Rabey E. Enrollees health status under Medicare risk contracts: An analysis of mortality rates. *Health Serv Res* 1991;26:137-163.
25. Cantor JC, Long SH, Marquis MS. Private employment-based health insurance in ten states. *Health Aff* 1995;14(2):199-211.