

## Impact of HMO Ownership on Management Processes and Utilization Outcomes

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**Objective:** To examine the effects of health maintenance organization (HMO) ownership characteristics on selected utilization outcomes and management processes affecting utilization.

**Study Design:** We used 1995 HMO data from the American Association of Health Plans.

**Patients and Methods:** Using regression analysis, we examined the relation between HMO utilization (hospital discharges, days, and average length of stay; cardiac catheterization procedures; and average cost of outpatient prescriptions) and the structural characteristics of HMOs: ownership type (insurance company, hospital, physician, independent, and national managed care company), HMO size, for-profit status, model type, geographic region, and payer mix.

**Results:** HMO ownership type is significantly associated with medical management processes, including risk sharing by providers, risk sharing by consumers, and other management strategies. Relative to hospital-owned HMOs, insurance company-owned HMOs have fewer hospital discharges, fewer hospital days, and longer lengths of stay. National managed care organization-owned HMOs have fewer cardiac catheterizations and lower average outpatient prescription costs. Independently owned HMOs have more cardiac catheterizations. For-profit HMOs have lower prescription costs. Relative to hospital-owned HMOs, insurance company-owned HMOs are more likely to use hospital risk sharing and provider capitation and less likely to use out-of-pocket payments for hospital use and a closed formulary. National managed care organization-owned HMOs are less likely to use provider capitation, out-of-pocket payments for hospital use, catastrophic case management, and hospital risk sharing. Physician-hospital-owned HMOs are less likely to use catastrophic case management. For-profit HMOs are more likely to use hospital risk sharing and catastrophic case management.

**Conclusion:** HMO ownership type affects utilization outcomes and management strategies.

(*Am J Manag Care* 2001;7:489-497)

This study assesses the impact of health maintenance organization (HMO) ownership type on utilization and choice of management processes to control utilization. Because HMOs are vertically integrated entities that can include hospitals, physicians, other ambulatory care providers, administration, and insurance, HMOs owned by providers such as physicians or hospitals are vulnerable to attempts by those owner-providers to shift profits toward themselves, market conditions permitting. In addition, without clear criteria to assess quality and appropriateness of care, provider-owners might feel more comfortable substituting toward the type of care they know best.

For example, hospital-owned HMOs might be more likely to use hospital care, whereas physician-owned HMOs might be more likely to use inpatient and outpatient procedures. Insurance companies and other nonprovider HMOs (such as national managed care organizations [MCOs]) face different incentives. Alternatively, because insurers are experts in assessing risk, collecting and processing claims data, and pricing, they might be more likely to use financial incentives and risk sharing by providers to decrease utilization. In addition, they might be more likely to use data-driven processes to construct capitation rates for physicians and other

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This study received funding from Group Health Northwest, Spokane, WA, for purchasing the data set.

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management controls such as physician profiling and utilization review.

A few recent studies have looked at how HMO ownership type (hospital, physician, and insurance company) impacts HMO utilization. One study<sup>1</sup> found that ownership by physicians vs hospitals has an impact on the type of medical services used (hospital-owned HMOs were more likely to use hospital services). In the present study, we use more recent data to determine whether ownership continues to impact utilization, and we extend the study to examine what types of utilization strategies different owners are likely to use.

From an economic standpoint, to the extent that many HMOs are increasingly in more competitive environments, they might have less leeway to operate from biases due to ownership, weakening the effects of ownership type on HMO utilization. In addition, regulatory environments faced by HMOs might also have an impact on their utilization decisions.

Utilization processes examined in this study with regard to their use by different owners include provider capitation, hospital risk sharing, and out-of-pocket payments for inpatient hospital use. (The particular type of risk sharing is not defined in detail in this data set.) In addition, we look at the relation between utilization and other management processes, including catastrophic case management, physician profiling, and use of closed drug formularies. The study controls for an array of internal structural variables in addition to ownership, including tax status, HMO size, model type, length of time in business, and proportion of members across payers.

The potential impact of tax status is unclear, although many studies have addressed this issue. Whereas some researchers have argued that for-profit organizations have had a greater incentive to minimize costs and have had better (cheaper) access to capital, others suggest that both for-profit and nonprofit firms seek to minimize costs in markets in which both are present and competing with one another.<sup>2</sup> Results of a recent study<sup>3</sup> using 1997 HMO data suggest that for-profit HMOs, relative to nonprofit HMOs, have lower pharmaceutical costs and shorter lengths of stay for Medicare patients. Another study<sup>4</sup> found significantly lower costs in for-profit group-model HMOs. A recent study<sup>5</sup> found that for-profit HMOs might deliver a lower quality of care.

HMO model type has also been shown to be related to utilization because of its correlation with different physician compensation methods. In particular, staff models have tended to pay primary

care physicians on a salary basis, independent practice associations (IPAs) on a discounted fee-for-service basis, and group and network models on a capitation basis. Staff-model HMOs, which often employ physicians, are likely to foster a high level of mutual purpose and vision between the health plan and providers<sup>6</sup>; however, staff models tend to have more utilization controls, offering good financial access but providing less access to provider services.<sup>7</sup> Model type is only a crude representation of physician payment methods, as HMOs are moving toward more mixed models.<sup>8</sup>

Regarding HMO size, consolidation has occurred in the 1990s to enable HMOs to leverage their size to extract favorable rates from physicians, hospitals, and providers in their networks, meaning that larger HMOs might have greater scale efficiencies.<sup>4</sup> Research has also identified diseconomies of scope associated with providing both non-Medicare and Medicare products.<sup>4</sup> Finally, managed care penetration rates (percentage of the population enrolled in HMOs) and managed care competition rates (number of HMOs in a region) have been shown to be associated with utilization, eg, in a study by Wholey et al.<sup>4</sup>

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... METHODS ...

**Data and Sample Characteristics**

Data are from the American Association of Health Plans 1995 survey of preferred provider organizations and HMOs,<sup>9</sup> which collected information on network-based health plans in the United States and its territories. In this survey, "health plan" is defined as an organization that might offer its enrollees an HMO option, a preferred provider organization option, a point of service option, or any combination of the three. Of the 1529 health plans identified through the census process, 1047 (68.5%) responded completely enough to describe basic operating characteristics. Enrollment information is complete enough to allow good estimates of the total nationwide enrollment in each category of general medical/surgical plans.<sup>9</sup>

To assess selectivity bias, we compared characteristics of the survey sample with our study sample. Characteristics regarding ownership are as follows: insurance company owned in the overall sample, 34% (n = 210), and in the study sample, 13% (n = 46); physician owned in the overall sample, 3% (n = 21), and in the study sample, 3% (n = 11); hospital owned in the overall sample, 10% (n = 61), and in the study sample, 7% (n = 25); physician-

hospital owned in the overall sample, 3% (n = 20), and in the study sample, 2% (n = 8); national MCO owned in the overall sample, 21% (n = 128), and in the study sample, 26% (n = 93); independently owned in the overall sample, 12% (n = 74), and in the study sample, 15% (n = 54); and other ownership in the overall sample, 17% (n = 103), and in the study sample, 19% (n = 67). Ownership percentages are significantly different between the survey sample and the study sample ( $P < .01$ ), with the study sample having a smaller proportion of insurance company-owned HMOs. Characteristics regarding for-profit status are as follows: for-profit in the overall sample, 74% (n = 456), and in the study sample, 70% (n = 248). These percentages are not significantly different.

We selected organizations that identified themselves as predominantly HMOs.\*

Characteristics of HMO respondents are shown in Table 1. Across ownership categories, national MCO owned composes 26% of HMOs, insurance company owned, 13%; hospital owned, 7%; physician owned, 3%; physician-hospital joint owned, 2%; independently owned, 15%; and other ownership, 19%. We grouped university owned and employer or employer group owned into "other ownership." The majority of HMOs in the sample are

for-profit organizations (70%). HMOs serve mainly commercial members (73%), and also serve Medicare members (3%) and Medicaid members (11%). HMOs in the sample have been in operation an average of 13 years.

**Table 1.** Variables, Means, and SDs for Variables Used in the Regression Analyses

Variable	No. of HMOs, Variable/Total	Proportion or Mean (SD)
<b>Dummy process dependent variables</b>		
Hospital risk sharing	154/355	43%
Provider profiling	269/355	76%
Catastrophic case management	263/355	74%
Provider capitation	257/355	72%
Copay for hospitalization	125/355	35%
Closed formularies	91/318	29%
<b>Continuous utilization dependent variables</b>		
Hospital discharges per 1000 enrollees	224	68.5 (22.5)
Hospital days per 1000 enrollees	225	236.7 (90.05)
Hospital average length of stay	229	3.4 (0.85)
Average cost of outpatient prescriptions per member per month	204	\$12.41 (\$3.77)
Cardiac catheterization procedures per 1000 enrollees	176	0.01 (0.005)
<b>Dummy structural independent variables</b>		
For-profit HMOs	248/355	70%
Insurance company ownership*	46/355	13%
Physician ownership	11/355	3%
Hospital ownership	25/355	7%
Hospital and physician joint ownership	8/355	2%
National managed care organization ownership	93/355	26%
Independently owned	54/355	15%
Other ownership†	67/355	19%
Region 1 (New England and Mid-Atlantic)‡	64/355	18%
Region 2 (South Atlantic and East and West South Central)	126/355	36%
Region 3 (East and West North Central)	96/355	27%
Region 4 (Mountain and Pacific)	83/355	23%
<b>Continuous structural independent variables</b>		
Staff model	346	7% (22.15%)
Group model	346	9% (25.04%)
Network model	346	22% (37.68%)
Independent practice association model	346	62% (45.21%)
Medicare proportion	355	3% (7.53%)
Medicaid proportion	355	11% (28.09%)
Commercial§	355	73% (39.24%)
Government	355	13% (21.33%)
Years in operation	354	13.6 (13.4)
HMO enrollment size	355	91,932 (216,945)

HMO=health maintenance organization; SD = standard deviation.

\*Blue Cross Blue Shield and other insurance company owned.

†Employer or employer group and "other" owned.

‡Some HMOs operate in more than one region.

§Private employers, unions, and individual enrollees.

||Local, state, and federal employees and CHAMPUS.

\*In using the data, fewer HMOs reported utilization data than those that reported structural characteristics, thereby decreasing the number of HMOs that were included in the regression analysis. We deleted outliers and calculated utilization variables when data for the numerator and denominator were available.

This study uses model type as a continuous variable, indicating the proportion of enrollment in each model type. This configuration better recognizes the mixed nature of HMO enrollment because many HMOs in the 1990s offered several models to their enrollees. Staff models are defined as prepaid health systems that pay physicians on a salary basis, and IPA models are prepaid health systems organized around independent private practice physicians. Group models are prepaid health systems that con-

tract with one or more group practices whereby each group primarily treats HMO enrollees; network models are prepaid health systems that contract with one or more group practices that do not primarily treat the HMO's enrollees. As shown in Table 1, 62% of HMO enrollment is in IPA models, 22% is in network models, 9% is in group models, and 7% is in staff models.

To conserve the number of observations in the study, we aggregated the 9 American Hospital

**Table 2.** Results of Regression Analyses for Utilization Outcomes

Independent Variable*	Dependent Variable				
	Hospital Discharges per 1000 Enrollees (n = 218) <sup>†</sup>	Hospital Days per 1000 Enrollees (n = 219) <sup>†</sup>	Average Length of Stay (n = 222) <sup>‡</sup>	Cardiac Catheterization Procedures per 1000 Enrollees (n = 172) <sup>§</sup>	Average Outpatient Prescription Cost PMPM (n = 200) <sup>  </sup>
Intercept	76.003 <sup>¶</sup>	219.199 <sup>¶</sup>	3.304 <sup>¶</sup>	0.01 <sup>¶</sup>	15.899 <sup>¶</sup>
For-profit HMOs	-0.353	-0.488	-0.143	0.0009	-1.748 <sup>#</sup>
Insurance company owned	-15.339 <sup>¶</sup>	-43.923 <sup>**</sup>	0.393 <sup>**</sup>	-0.0002	-0.103
Physician owned	0.453	-24.381	-0.306	0.004	0.945
Physician-hospital joint owned	6.086	23.069	0.254	0.004	-1.539
National MCO owned	4.946	0.695	0.059	-0.004 <sup>¶</sup>	-1.589 <sup>**</sup>
Independently owned	-6.470	-22.389	-0.000005	0.003 <sup>#</sup>	-0.671
Other ownership	2.458	2.158	-0.266	-0.001	-1.144
Staff model	-0.023	-0.213	-0.005 <sup>#</sup>	-0.00001	0.0004
Group model	-0.002	-0.372	-0.0001	-0.00002	-0.009
Network model	-0.078 <sup>**</sup>	-0.253	-0.003 <sup>#</sup>	0.000004	-0.007
Region 1 (New England and Mid-Atlantic)	8.540 <sup>**</sup>	66.766 <sup>¶</sup>	0.353 <sup>#</sup>	0.002	1.230
Region 2 (South Atlantic and East and West South Central)	6.111 <sup>**</sup>	36.432 <sup>#</sup>	0.192 <sup>**</sup>	0.002	0.666
Region 3 (East and West North Central)	6.727 <sup>**</sup>	25.123 <sup>**</sup>	0.118	0.003 <sup>¶</sup>	1.313 <sup>**</sup>
Years in operation	-0.055	0.307	0.004	-0.00003	-0.009
HMO size	-0.000008	-0.00003	-0.000003	-0.00000009	0.000005
Proportion Medicare	0.432 <sup>#</sup>	2.918 <sup>¶</sup>	0.033 <sup>¶</sup>	0.00002	-0.054
Proportion Medicaid	0.092	0.535	0.004	-0.000008	-0.045 <sup>¶</sup>
Proportion commercial	-0.144 <sup>¶</sup>	-0.153	-0.0004	0.000003	-0.019 <sup>**</sup>

PMPM = per member per month; MCO = managed care organization.

\*Excluded (referent) variables are hospital ownership, independent practice association model, region 4 (Mountain and Pacific), and other payers (including federal, state, municipal, or county workers and CHAMPUS).

<sup>†</sup>R<sup>2</sup> = 0.19; adjusted R<sup>2</sup> = 0.12.

<sup>‡</sup>R<sup>2</sup> = 0.19; adjusted R<sup>2</sup> = 0.11.

<sup>§</sup>R<sup>2</sup> = 0.27; adjusted R<sup>2</sup> = 0.18.

<sup>||</sup>R<sup>2</sup> = 0.18; adjusted R<sup>2</sup> = 0.10.

<sup>¶</sup>P ≤ .01.

<sup>#</sup>P ≤ .05.

<sup>\*\*</sup>P ≤ .1.

Association regions into 4 geographic regions: region 1, New England and Mid-Atlantic; region 2, South Atlantic and East and West South Central; region 3, East and West North Central; and region 4, Mountain and Pacific. Some HMOs operate in more than 1 region. We used these regional variables as crude proxies for managed care penetration and competition across different geographic markets.<sup>3,4</sup> As shown in Table 1, region 1 is represented by 64 HMOs (18% of HMOs in the study sample), region 2 by 126 HMOs (36%), region 3 by 96 HMOs (27%), and region 4 by 83 HMOs (23%). Some HMOs operate in more than 1 region.

Table 1 also shows averages for utilization and management dependent variables. HMOs have an average of 68.5 hospital discharges per 1000 enrollees, an average of 236.7 hospital days per 1000 enrollees, an average length of stay of 3.4 days, an average cost of outpatient prescriptions per member per month of \$12.41, and 0.01 cardiac catheterization procedures per 1000 enrollees. The proportions of HMOs with management controls are as follows: hospital risk sharing, 43%; provider profiling, 76%; catastrophic case management, 74%; provider capitation, 72%; copay for hospitalization, 35%; and closed formularies, 29%.

### Design of Study

This study is a cross-sectional analysis of HMOs in the United States in 1995. **Table 2** shows the relation between HMOs' structural characteristics (independent variables) and their utilization (dependent variables). We selected 5 utilization measures: hospital discharges per 1000 enrollees, hospital days per 1000 enrollees, average length of stay, cardiac catheterization procedures per 1000 enrollees, and average cost of outpatient prescriptions per member per month.

Structural variables measured as dichotomies (1,0) included ownership (physician owned, physician-hospital owned, hospital owned, insurance company owned, national MCO owned, independently owned, and other ownership) and tax status (1 = for profit). HMO model type, payer mix, and size are measured as continuous variables. HMO model type is assessed as the proportion of enrollees for each of the 4 types (staff model, group model, network model, and IPA model). Payer mix is measured as the proportion of HMO membership across payers (Medicare, Medicaid, commercial, and other government [federal, state, and local government workers]. HMO size and years in operation are assessed as continuous variables, with HMO size measured as total enrollment in 1995.

To further examine why HMOs were high or low utilizers, we used logistic regression analysis to estimate the relation between HMOs' structural characteristics and key management processes (**Table 3**). In this analysis it is important to recognize that although we selected organizations that identified themselves as predominantly HMOs, many of them have other lines of business. The HMOs' structural characteristics are independent variables, and each management process is a dichotomous dependent variable. Process variables include (1) risk bearing by providers (whether hospitals bear risk and whether providers are capitated), (2) risk bearing by consumers (copays for hospitalization), and (3) other medical management strategies (provider profiling, catastrophic case management, and a closed pharmaceutical formulary).

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### ... RESULTS ...

Regarding the impact of ownership on utilization (see Table 2), we found that insurance company-owned HMOs have significantly fewer hospital discharges than hospital-owned HMOs ( $P < .01$ ); in addition, insurance company-owned HMOs seem to have fewer hospital days per 1000 enrollees ( $P < .1$ ) and longer lengths of stay ( $P < .1$ ). Independently owned HMOs have significantly greater use of cardiac catheterization procedures than hospital-owned HMOs ( $P < .05$ ). In contrast, national MCO-owned HMOs have significantly lower use of cardiac catheterization procedures than hospital-owned HMOs ( $P < .01$ ). Finally, national MCO-owned HMOs seem to have lower average outpatient prescription costs per member per month than hospital-owned HMOs ( $P < .1$ ).

With the exception of average outpatient prescription costs, ownership type is associated with variation in several utilization outcomes, whereas HMO tax status is not. In this case, for-profit HMOs have significantly lower costs than nonprofit HMOs.

Other factors significantly related to utilization (see Table 2) include the proportion of Medicare, Medicaid, and commercial membership; geographic region of operation; and HMO model type. More Medicare membership is associated with higher levels of hospital discharges relative to the referent, which is government employees ( $P < .05$ ); a similar relation is shown for hospital days per 1000 enrollees and longer lengths of stay ( $P < .01$  for both). In contrast, a higher proportion of commercial membership is associated with lower levels of

hospital discharges relative to the referent ( $P < .01$ ); in addition, more commercial membership seems to be associated with lower outpatient prescription costs ( $P < .1$ ). More Medicaid membership is associated with lower outpatient prescription costs relative to the referent ( $P < .01$ ).

Results suggest that region 1 might be associated with more hospital discharges per 1000 enrollees ( $P < .1$ ), more hospital days per 1000 enrollees ( $P < .01$ ), and longer average lengths of stay ( $P < .05$ )

than the referent, which is region 4. Region 2 is associated with more hospital days per 1000 enrollees ( $P < .05$ ) and seems to have more hospital discharges ( $P < .1$ ) and longer average lengths of stay ( $P < .1$ ) than region 4. Region 3 is associated with more cardiac catheterization procedures than region 4 ( $P < .01$ ). Results also suggest that region 3 might be associated with more hospital discharges per 1000 enrollees and longer average lengths of stay than region 4 ( $P < .1$  for both).

**Table 3.** Logistic Regression Analyses for Provider and Consumer Financial Incentives and Medical Management Processes\*

Independent Variable	Dependent Variable					
	Hospital Risk Sharing <sup>†</sup>	Provider Capitation <sup>‡</sup>	Out-of-Pocket Payments for Hospital Use <sup>§</sup>	Physician Profiling <sup>  </sup>	Catastrophic Case Management <sup>¶</sup>	Closed Formulary <sup>#</sup>
For-profit HMOs	2.30 <sup>   </sup>	0.445 <sup>¶¶</sup>	1.615	1.030	2.468 <sup>   </sup>	0.727
Insurance company owned**	2.790 <sup>   </sup>	7.323 <sup>   </sup>	0.393 <sup>   </sup>	1.918	0.912	0.214 <sup>   </sup>
Physician owned	0.610	0.758	1.251	7.088 <sup>¶¶</sup>	1.313	0.481
Independently owned	0.748	1.171	0.916	0.658	0.716	1.362
Physician-hospital joint owned	1.127	0.213 <sup>¶¶</sup>	0.878	0.261 <sup>¶¶</sup>	0.156 <sup>   </sup>	1.027
National managed care organization owned	0.378 <sup>   </sup>	0.129 <sup>##</sup>	0.278 <sup>##</sup>	1.502	0.098 <sup>##</sup>	0.771
Other ownership	0.688	0.263 <sup>   </sup>	0.383 <sup>   </sup>	1.141	0.599	0.975
Staff model <sup>††</sup>	1.002	0.999	0.998	0.984 <sup>##</sup>	0.988 <sup>   </sup>	1.014 <sup>   </sup>
Group model	1.003	1.004	0.992	0.998	1.002	1.026 <sup>##</sup>
Network model	1.007 <sup>   </sup>	1.010 <sup>   </sup>	1.005	0.998	1.000	1.003
Region 1 (New England and Mid-Atlantic) <sup>†††</sup>	0.995	0.730	0.212 <sup>##</sup>	2.903 <sup>   </sup>	0.931	0.257 <sup>##</sup>
Region 2 (South Atlantic and East and West South Central)	1.118	1.358	1.092	1.567	0.715	0.956
Region 3 (East and West North Central)	1.214	0.502 <sup>¶¶</sup>	0.561 <sup>¶¶</sup>	1.899 <sup>¶¶</sup>	0.839	0.455 <sup>   </sup>
Years in operation	1.006	0.975	1.020	1.012	1.018	0.995
HMO size	1.001	1.001 <sup>##</sup>	1.001 <sup>   </sup>	1.001 <sup>¶¶</sup>	1.001 <sup>¶¶</sup>	1.001
% Medicare <sup>§§</sup>	1.032 <sup>¶¶</sup>	1.056 <sup>   </sup>	0.996	0.999	1.035	1.029 <sup>¶¶</sup>
% Medicaid	1.009	1.006	0.992	0.996	0.996	1.003
% Commercial	1.002	0.994	0.994	1.001	0.995	1.001

\*Data are given as odds ratios. If the odds ratio is 1 or greater, the relation between the dependent variable and the independent variable is positive; if the odds ratio is less than 1, the relation is negative.

<sup>†</sup>Concordant pairs: 70.5%.

<sup>‡</sup>Concordant pairs: 83.0%.

<sup>§</sup>Concordant pairs: 74.2%.

<sup>||</sup>Concordant pairs: 70.9%.

<sup>¶</sup>Concordant pairs: 77.0%.

<sup>#</sup>Concordant pairs: 77.5%.

\*\*Referent for ownership categories: hospital ownership.

††Referent for model categories: independent practice association.

†††Referent for regions: region 4 (Mountain and Pacific).

§§Referent for payers: government payers (including federal, state, municipal, or county workers and CHAMPUS).

<sup>|||</sup>  $P \leq .05$ .

<sup>¶¶</sup>  $P \leq .1$ .

<sup>##</sup>  $P \leq .01$ .

Finally, results regarding model type show that HMOs with higher proportions of staff-model enrollees have significantly shorter lengths of stay than the referent (IPA models) ( $P < .05$ ). HMOs with higher proportions of network-model enrollees are associated with shorter lengths of hospital stay than IPA-model HMOs ( $P < .05$ ) and seem to have fewer hospital discharges per 1000 enrollees ( $P < .1$ ).

Table 3 shows the relation between HMO structural characteristics and management processes related to financial incentives, including those for providers and consumers. Odds ratios of 1 or greater indicate that HMOs with that structural variable are more likely to use the medical management process (dependent variable). In contrast, odds ratios less than 1 indicate that HMOs are less likely to use the process.

Regarding ownership, insurance company-owned HMOs are more likely than hospital-owned HMOs to use hospital risk sharing and provider capitation and less likely to use out-of-pocket payments for hospital use and a closed formulary ( $P < .05$  for all). National MCO-owned HMOs are less likely than hospital-owned HMOs to use provider capitation ( $P < .01$ ), out-of-pocket payments for hospital use ( $P < .01$ ), catastrophic case management ( $P < .01$ ), and hospital risk sharing ( $P < .05$ ). Physician-hospital-owned HMOs are less likely than hospital-owned HMOs to use catastrophic case management ( $P < .05$ ), provider capitation ( $P < .1$ ), and physician profiling ( $P < .1$ ). Results also suggest that physician-owned HMOs might be more likely than hospital-owned HMOs to use physician profiling ( $P < .1$ ). Other owners are less likely than hospital-owned HMOs to use provider capitation and less likely to use out-of-pocket payments for hospital use ( $P < .05$  for both).

Other structural characteristics related to management processes include for-profit status, model type, HMO size, region, and payer mix. For-profit HMOs are more likely to use hospital risk sharing ( $P < .05$ ) and catastrophic case management ( $P < .05$ ) and less likely to use provider capitation ( $P < .1$ ). HMOs with higher proportions of staff-model enrollment are less likely than HMOs with higher proportions of IPA enrollment to use physician profiling ( $P < .01$ ) and catastrophic case management ( $P < .05$ ) and more likely to use a closed formulary ( $P < .05$ ). HMOs with higher proportions of group-model enrollment are more likely than HMOs with higher proportions of IPA enrollment to have a closed formulary ( $P < .01$ ). HMOs with higher proportions of network-model enrollment are more likely than HMOs with higher proportions of IPA enrollment to

have hospital risk sharing and to use provider capitation ( $P < .05$  for both).

HMOs in region 1 compared with region 4 are less likely to use out-of-pocket payments for hospital use and to have a closed formulary ( $P < .01$  for both). HMOs in region 1 are more likely to use physician profiling ( $P < .05$ ). HMOs in region 3 are less likely than those in region 4 to have a closed formulary ( $P < .05$ ) and might be less likely to use provider capitation ( $P < .1$ ) and out-of-pocket payments for hospital use ( $P < .1$ ). In addition, HMOs in region 3 might be more likely to use physician profiling ( $P < .1$ ). Also, larger HMOs are more likely to use provider capitation ( $P < .01$ ) and out-of-pocket payments for hospital use ( $P < .05$ ). Results suggest that larger HMOs might be more likely to use physician profiling and catastrophic case management ( $P < .1$  for both).

The proportion of Medicare members impacts the use of these strategies by HMOs. HMOs with greater proportions of Medicare members are more likely than those with greater proportions of government employees to use provider capitation ( $P < .05$ ). In addition, results suggest that HMOs with more Medicare members might be more likely to use hospital risk sharing and closed formularies ( $P < .1$  for both).

Finally, an important negative finding of this study is the absence of an association between years in operation and provider and consumer financial incentives and medical management processes. This finding is unexpected because number of years in operation should be correlated with learning by the organization and increasing expertise in cost-effective care.

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... DISCUSSION ...

We found that HMO ownership across insurers, providers, and national chains (MCOs) in the study sample was associated systematically with different utilization outcomes and management utilization control processes. Primarily, insurance company ownership (relative to hospital ownership) was associated in 1995 with lower hospital utilization for both discharges and days per 1000 enrollees; however, members of insurance company-owned HMOs had longer lengths of stay, suggesting that insurance company-owned HMOs might have been more efficient in controlling hospital utilization. Furthermore, insurance company-owned HMOs were substantially more likely to use hospital risk sharing and provider capitation. Provider-owned HMOs might have been more reticent about impos-

ing such financial controls on themselves. At the same time, insurance company-owned HMOs were less likely to use out-of-pocket payments to discourage inpatient hospital use.

National MCO-owned HMOs relative to hospital-owned HMOs in the study sample were associated with lower use of cardiac catheterization procedures per 1000 enrollees and lower average outpatient prescription costs. These results are consistent with our hypothesis that nonprovider-owned HMOs are likely to use fewer medical procedures and services than provider-owned HMOs, which might have incentives to overuse and overprescribe their own services. This result is particularly interesting given that national MCO-owned HMOs are significantly less likely to impose all types of management controls, such as hospital risk sharing, provider capitation, out-of-pocket payments for hospital use, and catastrophic case management.

Overall, these findings suggest that national MCO-owned HMOs might have less induced demand due to nonprovider ownership. Alternatively, these HMOs might have less acutely ill members than hospital-owned HMOs. Under nonprovider ownership, such as insurance company ownership, management utilization controls might not be as important as in other settings. In addition, relative to the finding that national MCO-owned HMOs were associated in 1995 with lower average outpatient prescription costs, national MCO-owned HMOs might be able to realize economies of scale that help reduce those costs.

Other ownership effects are not clearly linked in the study sample to management strategies. For example, independently owned HMOs use more cardiac catheterizations than hospital-owned HMOs, but there is no evidence regarding their use of management strategies that might impact this outcome. It is important to recognize that although independently owned and national MCO-owned HMOs are not owned by providers, independently owned HMOs might be subject to more local influence than national MCOs. For example, independent owners might have more provider joint ventures for outpatient surgicenters and other outpatient arrangements at the local level. To the extent that this is the case, it might account for higher cardiac catheterization services.

Thus, these results suggest that ownership in the 1995 study sample might have been exerting a significant impact on HMOs' use of resources, after controlling for a variety of other effects. Relative to ownership, in this study tax status seems to have only a weak effect on utilization. For-profit tax sta-

tus is associated only with significantly lower average outpatient prescription costs, after controlling for ownership. For-profit HMOs in 1995 were more likely to have hospital risk sharing and catastrophic case management but less likely to use provider capitation. More research needs to be done to clarify the impact of tax status.

The regional variables (which relate to market competition and provider and consumer culture) were associated in 1995 with some measures of utilization. These regions show substantial variation in HMO penetration rates as well as utilization. For example, in 1995, industry information shows that the highest HMO penetration rate was in region 1 (38%) and the second highest was in region 4 (36%).<sup>3</sup> Region 3 had a 25% HMO penetration rate, and region 2 had a 21% rate. Region 4 had the shortest average length of stay, whereas region 1 had the longest length of stay. These variations are due to a variety of factors. For example, alliances between physicians and hospitals have been shown to be positively associated with the number of HMOs in a market.<sup>10</sup> More alliances might impact the eventual development of physician-hospital-owned HMOs.

Findings from this study regarding region show that regions 1, 2, and 3 were associated with significantly higher utilization than region 4, in particular, more hospital days per 1000 enrollees, more hospital discharges per 1000 enrollees, and longer average lengths of stay. This is consistent with the longer history of managed care in region 4. Management processes that are impacted by region are related to the consumer. In particular, lower utilization regions (in particular, region 4) were more likely to use strategies that are focused on the consumer, specifically, out-of-pocket payments for hospital use and closed formularies. In contrast, other regions were more likely than region 4 to use physician profiling. Consumers have had more experience with HMOs in region 4 because HMOs have been operating longer in that region. Evidence from the Health Care Financing Administration per capita HMO payment rate has shown that the Pacific Northwest, eg, has historically used fewer Medicare services per capita, and Pacific Northwest HMOs have had lower per capita payments.

As expected, HMO model type was correlated with utilization in this sample from 1995. In particular, HMOs with high staff-model enrollment and those with high network-model enrollment had significantly shorter lengths of stay than IPA HMOs. HMOs with high staff-model enrollment were less likely to use physician profiling and catastrophic case management. These results are not surprising

because staff models usually salary their providers, reducing incentives to overutilize. Network models were more likely than IPA-model HMOs to use provider financial incentives (hospital risk sharing and provider capitation). The meaning of this result is unclear, but to the extent that network HMOs have looser provider relations, they might need additional financial controls over providers. HMO model type was not significantly associated with pharmaceutical costs, although both staff and group models were more likely than IPA models to use closed formularies.

Thus, the results of this study suggest that the ownership of an HMO in 1995 might have had an impact on both utilization and the management processes chosen to control utilization. Longitudinal research is needed to confirm the impact of ownership on utilization because this study is cross-sectional in design and therefore limited to describing this sample from 1995.

There are other limitations of the study. First, we conducted  $\chi^2$  tests on the differences in the larger sample reported in Table 1 vs the smaller sample used for the regression analyses. We found that the HMOs in the regression sample were significantly different relative to 2 variables: size (HMOs in the regression sample were larger,  $P = .0001$ ) and tax status (more HMOs in the regression sample were nonprofit,  $P = .01$ ). Thus, the parameters reported in the regression analysis might be biased. We speculate, however, that the impact of ownership on HMO utilization might be even greater for smaller HMOs because smaller HMOs are more likely not to have established information reporting systems that enable HMOs to better manage utilization and eliminate any biases, including those from ownership. Thus, the impact of ownership is likely to be understated by the parameters. Again, these results can only be viewed as suggestive due to the cross-sectional nature of the study, the possible selectivity bias, and retrospective use of regression analysis. In addition, there is possible bias of the study sample compared with the universe of HMOs because only HMOs that are members of the American Association of Health Plans were sent a survey, and only 68.5% of HMOs that were sent a survey responded with enough data to describe basic characteristics such as tax status and model type. In view of these limitations, these results are best regarded as generating hypotheses for further studies.

Another limitation is that we use geographic region as a control measure of managed care market penetration and HMO competition. We aggregated

regions to conserve the number of observations in the analysis. Although geographic region crudely captures elements of HMO competition, better measures are the proportion of enrollees in managed care plans (HMO penetration) and the number of HMOs operating in markets (HMO competition). The significant relations, however, between all 4 utilization outcomes and region suggest that this measure is capturing some information about variations across markets.

Results from this study and previous studies suggest that HMOs owned by insurance companies were more efficient delivery systems in the early and middle 1990s.<sup>1</sup> This suggests that as healthcare becomes more competitive, those HMO delivery systems whose owners have expertise in managing risk will fare better in controlling costs than other HMOs. Results of a recent study<sup>11</sup> show that physician-hospital organizations are using new integrative strategies such as clinical integration and economic incentives. Thus, although the findings regarding provider propensity to use their own services are mixed, this evidence might indicate that HMO markets are becoming more competitive and therefore that biases of ownership are becoming less prevalent, although evidence in this study suggests that these biases still exist.

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