Association of Managed Care Market Share and Health Expenditures for Fee-for-Service Medicare Patients

Laurence C. Baker, PhD

Growth in the size and power of managed care organizations is widely thought capable of transforming fundamentally the structure and functioning of the entire health care system. Not only can health maintenance organizations (HMOs) and other managed care organizations influence the care provided to the patients they cover, but also the activities of these organizations may bring about broad, system-level changes in the delivery of health care. Such ‘spillover effects’ of managed care could ultimately affect even patients who have not joined managed care organizations. This study investigates the relationship between managed care activity and health care for patients not enrolled in managed care organizations.

Managed care could affect non–managed care patients through a number of mechanisms. Managed care activity may bring about changes in the system-wide availability of medical infrastructure, clinicians, and new technologies. If, for example, increases in managed care activity led to growth in the number of outpatient surgery centers or to decreases in the number of magnetic resonance imaging (MRI) units available in an area, all patients in the area may be more likely to receive outpatient surgery or less likely to undergo MRI. Managed care may also influence the choices physicians and other clinicians make when treating patients. Physicians conditioned to function in a managed care environment may find themselves treating even fee-for-service patients with a managed care mindset.

While many studies have examined the health care provided to patients enrolled in managed care plans, less attention has been focused on the system-wide effects of managed care.1,2 Some recent studies indicate that areas with high HMO market shares may indicate that traditional Medicare beneficiaries in areas with high market shares received fewer or less intensive services than traditional Medicare beneficiaries in other areas.

Context Managed care has the potential to transform fundamentally the structure and functioning of the entire health care system, including the care provided to patients who are not enrolled in managed care plans.

Objective To determine whether increasing health maintenance organization (HMO) market share is associated with decreased expenditures for the care of patients covered by Medicare’s traditional fee-for-service plan, a group cared for well outside the boundaries of managed care.

Design and Setting Data from the Health Care Financing Administration were used to compare expenditures for the care of Medicare fee-for-service beneficiaries for 802 market areas, representing the entire United States, for 1990 to 1994. These data were matched with data on system-wide (Medicare and non-Medicare) HMO market share in these areas.

Patients All fee-for-service Medicare beneficiaries (1990-1994) except for those with end-stage renal disease.

Main Outcome Measure Average fee-for-service expenditure per fee-for-service Medicare beneficiary by market area.

Results In a regression model, increases in system-wide HMO market share were associated with declines in both Part A and Part B fee-for-service expenditures per Medicare beneficiary (P < .001). Increases from 10% market share to 20% market share were associated with 2.0% decreases in Part A fee-for-service expenditures and 1.5% decreases in Part B fee-for-service expenditures.

Conclusions Managed care can have widespread effects on the health care system. Health care for individuals who are not covered by managed care organizations can be influenced by the presence of managed care. Lower expenditures in areas with high HMO market shares may indicate that traditional Medicare beneficiaries in areas with high market shares received fewer or less intensive services than traditional Medicare beneficiaries in other areas.
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DATA AND METHODS

Data

Data on Part A and Part B Medicare expenditures by county for all counties in the United States for 1990 to 1994 were obtained from the Health Care Financing Administration (HCFA). These data were used to compute the average fee-for-service expenditure per fee-for-service beneficiary for each county. Payments for the care of HMO-enrolled beneficiaries are not included. Expenditures that are not covered by Medicare, such as co-payments, deductibles, payments for noncovered services, and payments for services covered by supplementary “Medigap” insurance, are also not included. The data include expenditures for the elderly and disabled but exclude expenditures for patients with end-stage renal disease. To account for the fact that the Medicare Fee Schedule for Part B was phased in during this time period, the Part B expenditure data for each year have been adjusted by HCFA’s Office of the Actuary to reflect what payments in each year would have been under the 1994 Medicare Fee Schedule.

Managed care activity is measured by the level of Medicare HMO market share. While spillover effects could theoretically be caused by a variety of managed care organizations, HMO market share is, in practice, the only variable for which comparable data for relatively small geographic areas can be obtained for 1990 to 1994. During the early 1990s, changes in HMO activity should provide a reasonable proxy for more general differences in managed care activity across markets and over time. This study uses county-level estimates of the percentage of the population enrolled in HMOs that were developed for previous studies using data from the Group Health Association of America and Interstudy.10

This study examines data at the level of the market area and thus requires a definition of market areas. Markets are defined here using Health Care Service Areas (HCSCs), groups of counties thought to approximate markets for hospital services.20 There are 802 HCSCs in the United States. The expenditure, HMO market share, and other data were aggregated to the HCSC level for analysis.

Methods

The relationship between system-wide HMO activity and fee-for-service expenditures was examined using least squares regressions that model the natural logarithm of expenditures in each market area as a function of HMO market share and a number of variables designed to control for confounding factors. Separate models were estimated for Part A and Part B expenditures since differences between the content and reimbursement of ambulatory and hospital care may cause the effect of HMOs to vary. The regression models were weighted by Medicare Part A enrollment to account for the possibility that the variance of expenditures conditional on the independent variables was not constant.

The main independent variable was the system-wide HMO market share in each market area. Because the relationship between HMO market share and expenditures may be nonlinear (ie, may change as the level of HMO market share varies),16,17 the models include both system-wide HMO market share and its square. The results were not sensitive to the use of other nonlinear functional forms.

A number of variables were included to control for potential confounding factors. Many studies have found that HMOs and other managed care organizations receive a favorable selection of beneficiaries,21-23 which would associate increases in Medicare HMO market share with increases in Medicare fee-for-service expenditures since moving healthy beneficiaries into Medicare HMOs will leave the Medicare fee-for-service population sicker and more expensive. Medicare HMO market share (including risk, cost, and health care prepayment plans) was obtained from HCFA and is included in the model to control for this effect.

Per capita income, the proportion of the population aged 65 to 74, 75 to 84, and older than 85 years, and the proportions of the population older than 65 years who are female, black, and other race (ie, not white and not black) are included to capture variation in area demographics. To control for general characteristics of the health care system that may influence utilization patterns and expenditures, the number of physicians and hospital beds per 1000 population are included. These data were obtained from the Area Resource File and the US Census Bureau.

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set of indicator variables for years controls for time trends in expenditures.

Despite the inclusion of a number of control variables, there may still be unobservable characteristics of areas that are not included but that are correlated with both market share and expenditures. This problem is addressed by including an individual intercept (or “fixed effect”) for each market area in the models. Specification of the regression models is discussed more fully elsewhere.\(^{19}\)

The estimated regression coefficients are used to examine the effect of changes in system-wide HMO market share on expenditures. Statistical significance is assessed using F tests for the hypotheses that the linear and quadratic market share terms are jointly equal to 0. Since the estimated function is quadratic in market share, the coefficients themselves can be difficult to interpret directly. To examine the magnitude of the implied effects of HMO market share, the regression coefficients were used to generate estimates of the percent change in expenditures that would accompany increases in HMO market share from 10% to 20%, 20% to 30%, and 30% to 40%. The estimated percent changes were computed by generating predicted values from the regressions at 10%, 20%, 30%, and 40% market share, holding the other control variables constant. The predicted values were retransformed into dollar terms, and the various percent changes were computed.\(^{24,25}\) The retransformation process is described in a technical appendix that may be obtained from the author.

### Results

In 1990, the national average Medicare expenditure per beneficiary was $2037 for hospital care (Part A) and $1233 for ambulatory care (Part B). By 1994, these amounts had risen to $2865 and $1539, increases of 40.6% and 24.8%, respec-

### Table 1. Means and Variation in System-wide Market Share and Medicare Expenditures, 1990 and 1994*  

<table>
<thead>
<tr>
<th>Year</th>
<th>Nationwide Mean</th>
<th>10th Percentile</th>
<th>50th Percentile</th>
<th>90th Percentile</th>
</tr>
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<tbody>
<tr>
<td><strong>System-wide</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>15.1</td>
<td>0.0</td>
<td>2.5</td>
<td>16.2</td>
</tr>
<tr>
<td>1994</td>
<td>20.5</td>
<td>0.0</td>
<td>5.7</td>
<td>22.5</td>
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<tr>
<td><strong>Part A</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>2037</td>
<td>1374</td>
<td>1698</td>
<td>2103</td>
</tr>
<tr>
<td>1994</td>
<td>2865</td>
<td>1841</td>
<td>2418</td>
<td>3271</td>
</tr>
<tr>
<td><strong>Part B</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>1233</td>
<td>791</td>
<td>979</td>
<td>1260</td>
</tr>
<tr>
<td>1994</td>
<td>1539</td>
<td>1076</td>
<td>1282</td>
<td>1573</td>
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<tr>
<td><strong>Variation Across Markets</strong></td>
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<tr>
<td>1990-1994 Levels of HMO Market Share and Expenditures</td>
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<tr>
<td>System-wide HMO market share, %</td>
<td>5.4</td>
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<td>2.1</td>
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<td>Part A expenditures per beneficiary, $</td>
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<td>328</td>
<td>713</td>
<td>1241</td>
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<tr>
<td>Part B expenditures per beneficiary, $</td>
<td>306</td>
<td>216</td>
<td>304</td>
<td>409</td>
</tr>
</tbody>
</table>

*The sample size is 802 market areas per year. Nationwide means are computed by aggregating the health maintenance organization (HMO) market share and expenditure data used in the analyses to the national level.

### Table 2. Results From Fixed-Effects Regression Analysis of the Relationship Between Changes in HMO Market Share and Changes in Expenditures, 1990-1994*  

<table>
<thead>
<tr>
<th>Year</th>
<th>Coefficient</th>
<th>SE</th>
<th>P Value</th>
</tr>
</thead>
</table>
| 1991          | −0.012      | 0.008
| 1992          | −0.003      | 0.001
| 1993          | 0.107       | 0.012
| 1994          | −0.004      | 0.002
| Population aged 65-74 y, % | −0.212 | 0.173
| Population aged 75-84 y, % | −1.315 | 0.214
| Population age 84 y, % | 8.217 | 0.541
| Elderly female population, % | 0.893 | 0.146
| Elderly black population, % | −0.975 | 0.082
| Elderly population of “other race,” % | 0.322 | 0.040
| Per capita income, $000s | −0.018 | 0.002
| Hospital beds per 1000 population | 0.045 | 0.038
| Physicians per 1000 population | 0.003 | 0.006
<table>
<thead>
<tr>
<th>Year</th>
<th>Coefficient</th>
<th>SE</th>
<th>P Value</th>
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</table>
| 1991          | 0.051       | 0.007
| 1992          | 0.179       | 0.006
| 1993          | 0.240       | 0.009
| 1994          | 0.330       | 0.013

*The sample size is 4010 market areas (802 per year for 5 years). The dependent variable is the natural logarithm of expenditures per beneficiary. Regressions also contain fixed effects for market areas and an intercept. Regressions are weighted by Medicare enrollment. The \(R^2\) for the Part A regression is 0.984; the \(R^2\) for the Part B regression is 0.982. These high \(R^2\) values are typical of fixed-effects models. The omitted year is 1990. HMO indicates health maintenance organization.

†The \(P\) value for the system-wide and Medicare HMO market share coefficients are from F tests of the hypothesis that the linear and quadratic market share terms are jointly equal to 0.
Increases in system-wide HMO market share are associated with declines in expenditures for the care of patients covered by traditional, fee-for-service Medicare. The fact that managed care activity influences expenditures for a group of patients who are not covered by managed care is strong evidence that managed care can have widespread effects on the entire health care system. While most of the attention given to managed care has been devoted to patients enrolled in managed care plans, the presence of significant spillover effects suggests that it is also important to devote attention to the system-wide effects of managed care, including effects on non–managed care patients.

The effects observed here are modest in size. One way to get a perspective on this is to use the estimates to roughly approximate the reductions in Medicare fee-for-service spending that can be associated with managed care growth. Between 1990 and 1994, average HMO enrollment in the United States increased from 15.1% to 20.5%. Using the regression results to estimate the ratio of expenditures at 20.5% market share to expenditures at 15.1% suggests that this increase in market share can be associated with a 1.2% reduction in Part A spending and a 0.8% reduction in Part B spending. Evaluated at the 1994 means ($2865 for Part A and $1539 for Part B), this indicates that 1994 spending is lower by $34 per beneficiary for Part A and $12 per beneficiary for Part B, on average.

It is possible that these figures underestimate the actual effect of HMOs on expenditures somewhat. If HMOs locate in areas with the highest fee-for-service expenditures, where there is presumably the most fat to be trimmed, then high expenditures and high HMO market share would be seen together. The models presented attempt to statistically adjust for this effect, but to the extent that it persists in influencing the estimates, it would result in an underestimate of the true effect of HMOs on expenditures.

Reductions in traditional Medicare expenditures could come about in several different ways. Total expenditures for any given patient are the sum of expenditures for each of the services the patient receives. For each individual service, expenditures are the product of price and quantity. Thus, total expenditures can vary for 3 reasons: the number of services used can vary (eg, 2 intermediate office visits cost more than 1 visit), the types of services can vary (eg, an intermediate office visit costs more than a brief office visit), and the prices can change.

While the empirical analysis presented here cannot identify the relative importance of each of these mechanisms, it is not difficult to believe that changes in the number and intensity of services received by traditional Medicare beneficiaries are a significant part of the explanation. Medicare expenditures are very responsive to the number and intensity of services. In Medicare Part B, physician reimbursement increases with the number of services performed and with the intensity of the services. For hospital expenditures, the Prospective Payment System pays per hospital stay, so that changes in the number of hospital stays will change expenditures. Moreover, because of outlier payments and because procedure choice influences the diagnosis related group to which patients are assigned, actual expenditures under the Prospective Payment System reflect the type and intensity of services performed during a hospital stay to a large degree.26 Thus, if managed care influences system-wide utilization patterns, it could easily bring about changes in expenditures.

In principle, expenditures could also vary because of changes in prices. But the structure imposed by Medicare on phy-
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Physicians and hospital payments limits the extent to which managed care can bring about changes in the prices paid in fee-for-service Medicare. Both the Prospective Payment System and the Medicare Fee Schedule rely on centrally set reimbursement amounts, virtually eliminating the potential for individual physicians or hospitals to change prices for services. The centrally set prices do not explicitly vary with managed care activity. While it is possible that managed care–induced variations in physician or hospital prices were incorporated into the Prospective Payment System or Medicare Fee Schedule payment rates through the geographic adjustments that are a part of the central rate-setting algorithm, the strength of this effect is likely to be limited.

Because it is relatively easy for managed care to affect expenditures by changing utilization but relatively difficult for managed care to affect expenditures by changing prices, perhaps the most straightforward explanation for the results seen here is that managed care contributed to reductions in the number or intensity of services received by patients covered by traditional Medicare. The results do not prove that this happened, nor do they prove that the expenditure reductions were only attributable to changes in volume and intensity, but they do suggest that strong consideration should be given to the ability of managed care activity to change utilization patterns among non–managed care patients.

There are a number of plausible ways that HMO activity could influence utilization patterns among traditional Medicare patients. First, managed care could bring about changes in the overall availability of medical infrastructure and services. For example, growth in managed care could encourage the development of outpatient surgery facilities, which, once available, could be used by all patients in the area. Previous literature suggests that increases in HMO market share are associated with decreases in the system-wide availability of costly medical technologies and equipment, and reductions in the size of hospitals, and changes in the number and types of physicians practicing in markets.

Managed care may also influence the practice patterns of physicians and other clinicians. Some literature suggests that physicians tend to adopt the practice patterns of others around them. If this is the case, then increases in the number of managed care physicians practicing in a given area may help spread practice patterns that are preferred by managed care organizations. Since some studies suggest that managed care plans tend to use less hospitalization and less intensive methods, I speculate that increases in managed care could lead to reductions in hospitalization rates, lengths of stay, or specialist referrals, even among physicians who treat mostly or only fee-for-service patients. A related possibility is that physicians who are affiliated with independent practice associations who retain some fee-for-service patients may adopt managed care practice patterns for all their patients. Since most physicians see both Medicare and non-Medicare patients, it is plausible that changes in practice patterns induced by managed care activity outside Medicare could influence the treatment of Medicare beneficiaries.

Managed care could also affect the behavior of traditionally non–managed care insurers. In Medicare, the intermediaries charged with administering physician and hospital payments may respond to the presence of managed care by adopting approaches more like managed care. Outside Medicare, insurers that once operated as traditional unmanaged fee-for-service plans may have added to their arsenals review techniques inspired by managed care. These kinds of changes in the behavior of traditionally non–managed care insurers could result in reductions in utilization for non–managed care patients.

The managed care spillover effects for Medicare patients observed in this study suggest that managed care may also be able to influence expenditures and care for non–managed care patients outside Medicare. The same changes in the health care system that I hypothesize are driving changes in expenditures for Medicare fee-for-service patients could also have an impact outside Medicare. However, drawing conclusions about the magnitude of effects outside Medicare from these results is greatly complicated by the fluid nature of health insurance plans and the much stiffer competitive pressure faced by non-Medicare insurers.

It is difficult to use these results to predict future effects. If managed care spillovers produce 1-time reductions in spending by squeezing additional efficiencies out of the health care system, long-term expenditure trends may be largely unaffected. But, if spillover effects occur by affecting system-wide technology adoption or other drivers of cost increases, they may be able to bring about longer-term savings. Another difficulty in extrapolating the results is the generalizability of the HMO market share measure. This measure does not include preferred provider organizations and point-of-service plans, which seem likely to be important forms of managed care organizations in the future.

By demonstrating that Medicare fee-for-service patients are influenced by managed care, these results prompt additional questions. Further studies that examine specific treatment patterns for individual patients are needed to clearly examine whether managed care influences utilization patterns and, if so, to identify particular patients and procedures that are most affected. If managed care reduces the number or intensity of services that are performed, then it is important to assess whether this has compromised health outcomes.

The presence of spillover effects also raises questions about the interpretation of studies that have compared the care received by patients enrolled in HMOs or other managed care organizations with the care received by patients covered and treated outside the constraints of managed care. If managed care leads to changes in utilization patterns for patients not covered by managed care, then the value of these kinds of comparisons may become questionable as the level of managed care activity grows. For example, in the presence of spillover effects, findings that utilization patterns for...
patients in HMOs and patients with traditional indemnity insurance have become more similar over time could result either because care received by HMO patients has become more like care received by traditionally insured patients or because care for traditionally insured patients has come to more closely resemble HMO care.

REFERENCES

There are very few human beings who receive the truth, complete and staggering, by instant illumination. Most of them acquire it fragment by fragment, on a small scale, by successive developments, cellurally, like a laborious mosaic.

—Anais Nin (1903-1977)