
Health Status of Medicare Enrollees in HMOs and Fee-for-Service in 1994

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We compared the health status of 863 health maintenance organization (HMO) enrollees with that of 4,576 non-enrollees, controlling for demographics and area of residence, using 1994 data from the Medicare Current Beneficiary Survey (MCBS). HMO respondents were less likely to report fair or poor health, functional impairment, or heart disease. Average predicted costs based on various health-status measures were substantially lower for HMO respondents than for respondents in fee-for-service (FFS) arrangements.

The Medicare payment formula for HMOs does not adequately adjust for the better health and consequent lower expected costs of HMO enrollees. The addition of health-status measures would improve payment accuracy and reduce average HMO payments significantly below current levels.

INTRODUCTION

The health status of Medicare beneficiaries enrolled in HMOs is of continuing interest to policymakers. Under current law, HMOs entering into risk-based contracts with the Medicare program are paid a monthly capitated amount for each enrollee, regardless of the amount of services used. The capitation payment is equal to 95 percent of the adjusted average per capita cost (AAPCC), which is a formula intended to estimate what an HMO's

enrollees would have cost Medicare had they remained in the FFS sector. For a given HMO, the AAPCC takes into account projected U.S. per capita costs, historical county per capita costs, and an adjustment for enrollee demographic characteristics. Demographic adjustors include age, sex, Medicaid status, and institutional status (an additional adjustor to account for working-aged status was added in 1995). Payment for a given HMO's enrolled population in a county incorporates the average demographic cost factor for the HMO's enrollees in the county, divided by the average demographic cost factor for the county. The demographic adjustors, which are intended to account for enrollee health status, have been shown to be weak predictors of future medical service costs, raising concerns about the appropriateness of Medicare payments to HMOs (Lubitz, Beebe, and Riley, 1985).

Numerous studies have shown that Medicare beneficiaries enrolled in HMOs are, on average, healthier than beneficiaries in FFS, after controlling for the demographic adjustors included in the AAPCC (Hellinger, 1995). These studies have measured health status using a variety of methods: pre-enrollment costs and use of services (Physician Payment Review Commission, 1996; Brown et al., 1993; Eggers and Prihoda, 1982); pre-enrollment use of services predictive of high future use (Brown et al., 1993); mortality rates (Physician Payment Review Commission, 1996; Riley, Lubitz, and Rabey, 1991); functional health status (Brown et al., 1993; Lichtenstein

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et al., 1991; Kasper et al., 1988); prevalence of chronic conditions (Brown et al., 1993; Kasper et al., 1988); and self-reported health status (Brown et al., 1993; Kasper et al., 1988). According to most of these measures, HMO enrollees are healthier, on average, than Medicare beneficiaries in FFS. Dowd et al. (1993), however, found no evidence of selection among Medicare HMO enrollees in the Twin Cities, using survey and Medicare claims data. Price Waterhouse (1996) found few health-status differences between HMO enrollees and non-enrollees, using MCBS data from 1992, and found that imputed costs of HMO enrollees are similar to the costs of beneficiaries in FFS, after controlling for demographic factors in the AAPCC.

In a comprehensive evaluation of Medicare's risk-contracting program, Mathematica Policy Research, Inc., estimated that, because the favorable health status of HMO enrollees is not adequately controlled for in the AAPCC, the Medicare program overpays HMOs by 11 percent, resulting in losses of 5.7 percent (Brown et al., 1993). Consequently, several research efforts have attempted to improve the AAPCC by developing measures of health status that are more predictive of future health care costs. These studies have examined prior use, functional status, self-reported health status, self-reported chronic conditions, behavioral factors, and chronic disease risk factors as possible risk adjusters (Gruenberg, Kaganova, and Hornbrook, 1996; Physician Payment Review Commission, 1994; Hornbrook et al., 1993; Epstein and Cumella, 1988; Lubitz, 1987; Howland et al., 1987; Thomas and Lichtenstein, 1986). All these health-status measures are predictive of future health care expenditures, although some are much stronger predictors than others. Recently, risk-adjustment methods were

developed that rely on diagnostic information extracted from encounter data on hospitalizations and physician visits (Ellis et al., 1996; Weiner et al., 1996).

Concern about the adequacy of the AAPCC has grown with the recent expansion of risk contracting under Medicare. In January 1990, there were 96 Medicare risk contracts, with enrollment of 1.1 million beneficiaries. In April 1996, there were 202 risk contracts with a combined enrollment of 3.5 million. It is not known whether increased penetration of HMOs in the Medicare population has been associated with any changes in the favorable health status of HMO enrollees. If the health status of risk-contract enrollees continues to be better than that of persons in FFS, then overpayments under the AAPCC will persist, and resulting losses to the Medicare program will grow rapidly.

This study examines health-status differences between Medicare HMO enrollees and non-enrollees using Round 10 of the MCBS, conducted in late 1994. The MCBS contains several measures of health status, including presence of chronic conditions, functional status, and a general health-status question.

The purpose of this study is to determine if the findings from earlier studies on differences in health status between Medicare HMO enrollees and non-enrollees still hold. Many earlier studies are based on data prior to 1990 and therefore do not reflect the recent rapid growth in Medicare's risk-contracting program. We compared various health-status measures to determine how HMO and FFS respondents differ along different dimensions of health. In addition, we combined our findings with the published results of other analyses of MCBS data to examine the potential cost impact of introducing health-status adjusters to the AAPCC.

DATA AND METHODS

Data

The MCBS is a longitudinal, multipurpose survey of a representative sample of the Medicare population, with oversampling of the disabled and the very old (Adler, 1994). Both institutionalized persons and those residing in the community are included. Respondents are asked about service utilization (both covered and non-covered services), out-of-pocket expenses, health status, access to and satisfaction with care, and supplementary health insurance. The survey responses have been linked to selected Medicare administrative records, such as entitlement data, claims files, and information on HMO enrollment. The sample is supplemented with new respondents once a year to permit both cross-sectional and longitudinal estimates to be made. Analyses of earlier rounds of the MCBS have found an 87-percent response rate in Round 1, and a 77-percent response rate through Round 4, with no major differences in health status between respondents and non-respondents (Kasper, Campbell, and Gutierrez-Mohamed, 1994). Our study sample was selected from among 16,119 respondents interviewed between September and December 1994.

Sample Selection

We used Medicare administrative records to identify the 863 respondents who were enrolled in HMOs with standard risk contracts at the time of their Fall 1994 interview and who did not have end stage renal disease (ESRD). Administrative records on State and county of residence were used to identify a comparison group of 4,576 respondents in FFS who did not have ESRD and who resided in

counties with at least one HMO respondent. We restricted our FFS sample to respondents who resided in counties with HMO respondents because our purpose was to measure residual health-status differences between HMO and FFS respondents after controlling for factors incorporated in the AAPCC; the AAPCC is based on county-level costs and demographic characteristics. Members of HMOs with cost contracts, with old risk contracts without full capitation, and with demonstration-project status were excluded from the study (169 respondents).

Health-Status Measures

We examined the relationship between HMO-membership status and several health-status measures captured in the MCBS. First, the MCBS asks a global question on general health status (excellent, very good, good, fair, poor). Respondents are also asked if they have ever been told by a doctor that they have certain conditions, such as heart disease or arthritis. Information on functional status is collected, including performance of activities of daily living (ADLs) or instrumental activities of daily living (IADLs). With respect to functional status, we analyzed only the responses to questions about whether respondents had difficulty performing certain activities; other questions ask whether respondents receive help or supervision with certain activities, comprising a more restrictive definition of functional disability. Lastly, questions are asked about previous and current smoking habits, which are associated with health status.

Analysis

Each health-status measure was expressed as a dichotomous variable, with a value of one representing presence of a

condition or difficulty with an ADL or IADL. Each dichotomous variable served as the dependent variable in a separate logistic regression model, which enabled us to examine the relationship between HMO-membership status and the individual health-status measures separately. Independent variables in the models were the same as the demographic factors in the AAPCC: age (represented as a categorical variable), sex, Medicaid status, and institutional status, plus a dummy variable indicating HMO-membership status. The regression models were designed to identify residual health-status differences between HMO and FFS respondents, after controlling for variables incorporated in the AAPCC. Age, sex, and HMO-membership status were obtained from Medicare administrative records, and Medicaid and institutional status were obtained from survey responses. Dummy variables were used to represent all possible combinations of age groups, sex, and Medicaid status; a single institutional-status variable was incorporated in the model because there were too few institutionalized individuals to interact with the other variables. Three IADL questions (concerning meal preparation, light housework, and heavy housework) were not asked of institutionalized persons, and so those individuals were excluded from the relevant analyses. We also included 22 dummy variables in the models to represent all metropolitan statistical areas (MSAs) with 10 or more HMO respondents; these counties contained 83 percent of respondents in HMOs and 50 percent of those in FFS. Regression coefficients were exponentiated to provide odds ratios (ORs), which provide a direct measure of the relative healthiness of HMO enrollees compared with local beneficiaries in FFS.

We estimated the potential impact on Medicare payments of including health-sta-

tus adjustors to the AAPCC, using a model developed by Gruenberg, Kaganova, and Hornbrook (1996). This model predicts Medicare costs in the form of "cost ratios," defined as the ratio of an individual's cost to average Medicare costs, using various health-status measures contained in the MCBS. Average predicted cost ratios were computed for HMO and FFS respondents separately; the ratio of the two averages simulates a payment adjustor of the type currently used in the AAPCC, which is based on demographic factors only. We calculated predicted cost ratios for the FFS sample rather than using actual costs, because at the time we began this study, claims data for 1995 were not available.

The Gruenberg et al. model was based on Round 1 data from the MCBS, administered in the Fall of 1991, combined with Medicare claims data for the following calendar year (1992). The model uses demographic data, self-reported conditions, functional status, and general health status to predict cost ratios for 1992. The model was developed from data on respondents in FFS who were entitled to Parts A and B of Medicare in 1991, did not have ESRD, were not institutionalized, were years of age 65 or over at the time of the Round 1 interview, and were alive on January 1, 1992. The functional health-status measures employed by Gruenberg et al. were different than those we employed. Their definition of difficulties with ADLs incorporated the requirement of needing help or supervision; they also included variables indicating difficulties with lifting, walking two or three blocks, and meal preparation, which were measured on a four- or five-point scale.

Average cost ratios were also estimated using a different prediction model containing only significant demographic and diagnostic factors (Gruenberg, 1996).

The Gruenberg et al. models are described in Table 1.

Survey weights and survey design effects were incorporated into all analyses using WESVAR and WESLOG, which are special software packages developed by Westat, Inc. The Westat programs estimate sampling errors of model parameters using balanced repeated replication.

Statistical Power

We estimated the power of our sample to detect a 20-percent relative difference between HMO and FFS populations, using bases of 10 percent, 20 percent, and 30 percent, assuming two-tailed tests at the 0.05 significance level. From a base of 10 percent, we had statistical power to detect a relative 20-percent difference (i.e., a 2-percentage-point difference) between HMO and FFS only 31 percent of the time. From a base of 20 percent, we had 59 percent

power, and from a base of 30 percent, we had 82 percent power.

RESULTS

The HMO and FFS respondents differed significantly from each other with respect to their distribution across demographic cells used in the AAPCC (Table 2). Among HMO respondents, 4.3 percent were disabled, compared with 10.0 percent of FFS respondents. The very old (85 years of age or over) were also underrepresented among HMO respondents (7.1 percent versus 11.5 percent in FFS). The HMO sample also had fewer Medicaid-eligible and institutionalized individuals. These differences are not of concern because Medicare payments to HMOs reflect the demographic factors included in Table 2.

In bivariate comparisons, HMO respondents tended to be healthier than respondents in FFS (Table 3). Only 17.5 percent of HMO enrollees reported their health as

Table 1
Regression Statistics for Cost-Prediction Models With the Dependent Variable Defined as the Ratio of an Individual's Medicare Cost to Average Medicare Costs

Variable	Comprehensive Model		Diagnostic Model	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	0.3185	0.0740	0.2966	0.0559
Age Over 65 Years	0.0126	0.0045	0.0283	0.0043
Female	-0.1393	0.0604	—	—
Medicaid Buy-In	—	—	0.3024	0.1106
Bathing	0.4272	0.1388	—	—
Toileting	0.3827	0.2208	—	—
Eating	0.6434	0.2930	—	—
Lifting	0.0694	0.0272	—	—
Walking	0.0989	0.0254	—	—
Meal Preparation	0.2100	0.0565	—	—
General Health	0.0598	0.0290	—	—
Artery	0.2518	0.0888	0.3644	0.0897
Myocardial Infarction	0.3203	0.0885	0.3989	0.0867
Other Heart Disease	0.1861	0.0703	0.2746	0.0705
Cancer (Non-Skin)	0.1327	0.0761	0.1559	0.0768
Diabetes	0.2606	0.0830	0.4287	0.0828
Osteoporosis	0.1680	0.1139	0.3361	0.1128
Parkinson's Disease	0.7951	0.2502	1.1565	0.2520
Emphysema	0.2612	0.0883	0.4156	0.0877
Amputation	0.8362	0.2802	1.2130	0.2819
Stroke	—	—	0.2038	0.1146
Partial Paralysis	—	—	0.2872	0.1364

SOURCES: (Gruenberg, Kaganova, and Hornbrook, 1996; Gruenberg, 1996); data from the Medicare Current Beneficiary Survey, 1991.

fair or poor, compared with 26.1 percent of FFS respondents. Significantly fewer HMO respondents reported difficulty with each ADL measure and each IADL measure than did FFS respondents ($p < 0.05$). Differences in the prevalence of reported conditions were not as strong. Fewer HMO respondents reported a heart condition (31.3 percent versus 38.1 percent) or a mental disorder (3.6 percent versus 7.7 percent). For 10 other conditions, there was a non-significant difference between the HMO and FFS groups in the percent reporting the condition. For 9 of these 10 conditions, however, the prevalence of the condition in the HMO group was slightly lower. There were 25.3 percent of HMO enrollees reporting five or more conditions, compared with 31.0 percent of FFS respondents ($p < 0.01$). Total reported conditions included Parkinson's disease, amputations, skin cancer, Alzheimer's dis-

ease, mental retardation, broken hip, and partial paralysis. Most of the conditions not reported separately on Table 3 were relatively uncommon. Significantly more HMO respondents reported they had ever smoked (65.0 percent versus 59.7 percent), but the percent of current smokers was similar for the two groups (13.7 percent of HMO respondents, 14.6 percent in FFS).

After controlling for covariates, HMO respondents' odds of reporting their health as fair or poor were only 0.77 that of respondents in FFS (95-percent confidence interval = [0.61, 0.97]) (Table 4). There was no significant difference between HMO and FFS respondents in the percent reporting individual conditions, with the exception of heart disease, which HMO respondents were less likely to report (OR = 0.77, 95-percent confidence interval = [0.63, 0.93]). Among the 12 ORs reported for individual conditions, 6 were above 1 and 6 were below 1. Five ORs were below 0.90, though only one was statistically significant. One OR was above 1.10. The OR for reporting 5 or more conditions (out of 19) was 0.83 for HMO enrollees (95-percent confidence interval = [0.67, 1.02]).

Odds ratios for ADLs and IADLs showed a clearer pattern of better health among HMO enrollees than did ORs for prevalence of reported conditions. The OR for each ADL was less than one, and four of the six ORs were less than 0.80. The ORs for bathing and dressing were statistically significant. The OR for reporting difficulties with one or more ADLs was 0.81 (95-percent confidence interval = [0.67, 0.97]), and that for reporting difficulties with three or more ADLs was 0.71 (95-percent confidence interval = [0.53, 0.96]).

ORs for each IADL were also less than one for HMO respondents, with three of them less than 0.80. ORs for preparing meals (OR = 0.59, 95-percent confidence interval = [0.41, 0.86]) and for shopping

Table 2

Number and Demographic Characteristics of Study Sample, by Type of Enrollment

Number or Characteristic	Enrollment Type	
	HMO	FFS
		Number
Sample Size	863	4,576
Weighted Sample	2,083,574	10,066,809
		Percent
Age		
Disabled		
Under 45 Years	**0.5	4.0
45-64 Years	**3.8	6.0
Aged		
65-69 Years	**25.9	23.2
70-74 Years	**29.3	24.0
75-79 Years	**21.0	18.7
80-84 Years	**12.5	12.7
Over 84 Years	**7.1	11.5
Male	44.3	41.8
Eligible for Medicaid	**5.9	17.4
Institutionalized	**1.2	6.4

NOTES: HMO is health maintenance organization. FFS is fee-for-service. For difference between HMO and FFS enrollment type by chi-square test: * $p < 0.05$, ** $p < 0.01$. A single chi-square test was used for differences in age levels between HMO and FFS.

SOURCE: Data from the Medicare Current Beneficiary Survey, 1994.

(OR = 0.70, 95-percent confidence interval = [0.53, 0.94]) were significant. HMO respondents' odds of reporting problems

Table 3
Health Status of Health Maintenance Organization (HMO) and Fee-for-Service (FFS) Respondents

Health-Status Measure	Enrollment Type	
	HMO	FFS
Percent		
General Health		
Excellent	**22.9	17.5
Very Good	**30.5	24.4
Good	**29.2	32.0
Fair	**13.0	17.9
Poor	**4.5	8.2
Reported Conditions		
Heart (Myocardial Infarction, Angina, Other Heart Conditions)	**31.3	38.1
Hardening of Arteries	12.8	14.8
Hypertension	49.3	51.5
Cancer (Non-Skin)	17.2	18.6
Stroke	10.5	12.2
Arthritis	56.4	55.3
Diabetes	15.3	15.5
Osteoporosis	11.1	11.2
Emphysema	12.5	14.5
Mental Disorders	**3.6	7.7
Vision Problems	39.1	40.5
Hearing Problems	40.5	41.2
Five or More Conditions ¹	**25.3	31.0
Difficulties With Activities of Daily Living (ADLs)		
Bathing	**8.8	17.6
Dressing	**5.8	12.3
Eating	**3.0	6.1
Transferring	**10.8	17.3
Walking	**21.4	27.8
Toileting	**3.8	9.2
One or More ADLs	**23.7	33.9
Three or More ADLs	**7.3	14.1
Difficulties With Instrumental Activities of Daily Living (IADLs)		
Telephone	**6.9	11.3
Light Housework	**9.3	14.0
Heavy Housework	*30.7	35.6
Preparing Meals	**6.0	11.5
Shopping	**11.8	21.6
Paying Bills	**5.9	13.7
One or More IADLs	**34.8	41.1
Three or More IADLs	**8.1	14.7
Smoking		
Ever Smoked	*65.0	59.7
Smokes Now	13.7	14.6

¹Includes conditions listed above, plus Parkinson's disease, amputations, skin cancer, Alzheimer's disease, mental retardation, broken hip, and partial paralysis.

NOTES: For difference between HMO and FFS enrollment type by chi-square test: * $p < 0.05$, ** $p < 0.01$. A single chi-square test was used for differences in general health status between HMO and FFS.

SOURCE: Data from the Medicare Current Beneficiary Survey, 1994.

with one or more IADLs were not substantially different from FFS (OR = 0.93, 95-percent confidence interval = [0.76, 1.13]). HMO respondents were less likely to report problems with three or more IADLs, however (OR = 0.63, 95-percent confidence interval = [0.43, 0.91]).

HMO respondents were slightly more likely to report being former or current smokers, but neither smoking variable was significant (for ever-smoked, OR = 1.10, 95-percent confidence interval = [0.89, 1.36]; for current smoking, OR = 1.07, 95-percent confidence interval = [0.69, 1.45]).

Several of the health-status variables that exhibited significant HMO-FFS differences were contained in the comprehensive model developed by Gruenberg et al. (Tables 1 and 4). A history of myocardial infarction was associated with an increase in predicted cost ratio of 0.32. A 5-point general-health-status scale was included in the model, with each level of progressively worse health associated with a 0.06 increase in predicted cost ratio. Functional-status variables in the model included problems with bathing, toileting, and meal preparation.

We used the comprehensive model developed by Gruenberg et al. to predict the average cost ratios of aged, non-institutionalized HMO and FFS respondents. The average predicted cost ratio for HMO respondents was 0.84, and that for respondents in FFS was 0.99 (Table 5). The ratio of HMO to FFS predicted costs was 0.85 (0.84/0.99). By comparison, the average AAPCC demographic factors for the HMO and FFS respondents were 0.90 and 0.93, respectively (Table 5); the ratio of the two (0.97) simulates the effect of the current demographic adjusters on the AAPCC. This suggests that an adjustment for various health-status measures in addition to demographics would reduce the AAPCC, on average, by about 12 percent.

Table 4
Odds Ratios for the Association of Health Maintenance Organization Enrollment With Various Health-Status Measures

Health-Status Measure	Odds Ratio	95-Percent Confidence Interval
Health Fair or Poor	0.77	*(0.61, 0.97)
Reported Conditions		
Heart (Myocardial Infarction, Angina, Other Heart Conditions)	0.77	*(0.63, 0.93)
Hardening of Arteries	0.89	(0.70, 1.14)
Hypertension	0.98	(0.82, 1.17)
Cancer (Non-Skin)	0.83	(0.65, 1.06)
Stroke	1.03	(0.73, 1.46)
Arthritis	1.04	(0.83, 1.30)
Diabetes	1.08	(0.86, 1.37)
Osteoporosis	1.01	(0.76, 1.31)
Emphysema	0.84	(0.62, 1.13)
Mental Disorders	0.83	(0.54, 1.28)
Vision Problems	1.12	(0.89, 1.41)
Hearing Problems	1.05	(0.88, 1.26)
Five or More Conditions†	0.83	(0.67, 1.02)
Difficulties With Activities of Daily Living (ADLs)		
Bathing	0.71	*(0.52, 0.96)
Dressing	0.70	*(0.49, 0.99)
Eating	0.83	(0.52, 1.33)
Transferring	0.79	(0.61, 1.03)
Walking	0.88	(0.72, 1.08)
Toileting	0.68	(0.45, 1.02)
One or More ADLs	0.81	*(0.67, 0.97)
Three or More ADLs	0.71	*(0.53, 0.96)
Difficulties With Instrumental Activities of Daily Living (IADLs)		
Telephone	0.95	(0.65, 1.39)
Light Housework	0.73	(0.51, 1.05)
Heavy Housework	0.94	(0.78, 1.13)
Preparing Meals	0.59	*(0.41, 0.86)
Shopping	0.70	*(0.53, 0.94)
Paying Bills	0.80	(0.56, 1.14)
One or More IADLs	0.93	(0.76, 1.13)
Three or More IADLs	0.63	*(0.43, 0.91)
Smoking		
Ever Smoked	1.10	(0.89, 1.36)
Smokes Now	1.07	(0.79, 1.45)

*Confidence interval excludes one.

†Includes conditions listed above, plus Parkinson's disease, amputations, skin cancer, Alzheimer's disease, mental retardation, broken hip, and partial paralysis.

NOTES: Odds ratios are adjusted for age, sex, Medicaid status, institutional status, and area of residence.

SOURCE: Data from the Medicare Current Beneficiary Survey, 1994.

Table 5 also shows average predicted cost ratios for HMO and FFS respondents based on self-reported conditions and demographics (Gruenberg, 1996). The ratio of predicted HMO costs to predicted FFS costs was 0.89 (0.93/1.05), suggesting that a health-status adjuster based on demographics and conditions would lower the

AAPCC, but not quite as much as an adjuster that also included functional status and general health status. It should be noted that the additional effect on the AAPCC of functional status and general-health-status adjusters could be different if disease prevalence rates were measured from encounter data systems, rather than self-report.

The Gruenberg et al. models do not adjust for the differences in geographic distributions of HMO and FFS respondents. To test for the sensitivity of our cost predictions to geographic factors, we reweighted the FFS observations to produce the same percent distribution across counties as the HMO respondents. There was no material change in our findings.

DISCUSSION

Our findings confirm the results of most previous studies, which have shown that Medicare HMO enrollees tend to be healthier than beneficiaries in FFS. Persons in HMOs were less likely than persons in FFS to report problems with three or more ADLs, three or more IADLs, or fair or poor health status. Similarly, persons in HMOs were significantly less likely to report heart problems and were marginally less likely to report five or more conditions.

Our findings suggest that the problem of overpayments documented in the Mathematica evaluation has not improved with the recent expansion of Medicare's risk-contracting program. The ratio of average demographic cost factors for HMO and FFS respondents in our sample was 0.97. When several dimensions of health status were controlled for, the average predicted costs of HMO enrollees were only 85 percent of average predicted costs for respondents in FFS. This suggests that the AAPCC may be 12 percent too high because of the fact that the better health status of HMO enrollees is not adequately accounted for. With HMO payments established at 95 percent of the AAPCC, the resulting financial losses would be about 7 percent. This is similar to the levels of overpayment and losses found by Mathematica.

The impact on HMO payments of adding health-status adjusters to the AAPCC could be substantial. Current research efforts focus on the addition of diagnosis-based adjusters obtained from encounter data on hospitalizations and physician visits. Our findings suggest that the addition of diagnostic information would improve the predictive accuracy of the AAPCC significantly and would reduce the AAPCC below current levels, on average. Our findings also suggest that, even after controlling for diagnoses, some further precision in risk adjustment may be possible by adding adjusters for functional status and general health status. Health-status differences between HMO and FFS populations are multidimensional and may necessitate a combination of risk-adjustment mechanisms to establish appropriate payment levels (Gruenberg, Kaganova, and Hornbrook, 1996).

Our data are taken from a time of very rapid growth in the Medicare risk-contracting program. Only 65 percent of our HMO respondents were enrolled under risk contracts for all of 1993 and 1994. Previous research has shown that new enrollees tend to be the healthiest and that their health status tends to "regress toward the mean" over time (Physician Payment Review Commission, 1996; Riley, Rabey, and Kasper, 1989; Welch, 1985). Our findings may reflect in part the effects of having large numbers of recent HMO enrollees in the Medicare program. At the point when growth under Medicare's risk-contracting program stabilizes, health-status differences between the HMO and FFS sectors may begin to diminish. Given current trends, however, considerable time may elapse before a point of stabilization is achieved.

Our findings differ from those of Price Waterhouse (1996), which showed no cost differences between HMO and FFS

Table 5
Average Predicted Cost Ratios for Aged, Non-Institutionalized Respondents,
by Type of Enrollment

Predictor	Enrollment Type		
	HMO	FFS	HMO/FFS
AAPCC Demographics	0.90	0.93	0.97
Demographics, Self-Reported Conditions	0.93	1.05	0.89
Demographics, Self-Reported Conditions, Functional Status, General Health Status	0.84	0.99	0.85

NOTES: A cost ratio is the ratio of Medicare costs for an individual to average Medicare costs. AAPCC is adjusted average per capita cost. HMO is health maintenance organization. FFS is fee-for-service.

SOURCE: Data from the Medicare Current Beneficiary Survey, 1991 and 1994.

respondents, based on Round 4 (1992) data of the MCBS. The difference in findings may be attributable to small sample sizes or to differences in methodology. Price Waterhouse identified 371 HMO respondents under risk contracts based on their HMO membership status as of January 1992 and predicted their Medicare costs under FFS, based on health status measured in the Fall of 1992. Our study measured HMO membership status and health status at the same point in time. In addition, the Price Waterhouse study selected a matched FFS sample of 1,629 respondents, using geography and AAPCC demographic factors as matching criteria. Our study used all FFS respondents residing in counties with HMO respondents and controlled for geography and AAPCC demographic factors statistically.

Our use of models based on FFS data to impute costs for HMO enrollees may produce biased estimates if coefficients on the health-status variables used in the models are different for individuals choosing the HMO and FFS sectors (Dowd et al., 1993). Such coefficients may differ because of variables omitted from the models, such as the existence of supplementary insurance arrangements in FFS or attitudes toward seeking care. We were unable to identify

whether HMO respondents had supplementary insurance prior to enrollment in an HMO. However, 292 of the 863 HMO respondents were in FFS when they participated in earlier rounds of the MCBS; 15.6 percent reported having no supplemental insurance (including Medicaid), compared with 9.3 percent of FFS respondents in Round 10. Because this difference is small, it is unlikely that differences in supplementary insurance coverage between HMO and FFS respondents would substantially bias our estimates of predicted costs. We did not have any information on preferences for seeking care. Hill and Brown (1992) found that persons in FFS expressed preferences for seeking care that were associated with higher expenditure levels.

Our finding of better health status for HMO enrollees may be attributable in part to improvements in enrollee health resulting from better access to services or quality of care in HMOs. Better care may improve general health or functional health status, although the number of reported conditions would be likely to increase if better access resulted in the detection of previously undiagnosed conditions. Mathematica Policy Research, Inc., found no major differences in quality of

care between HMOs and FFS and documented similar outcomes for a variety of conditions (Brown et al., 1993). It also found no improvement in functioning among HMO enrollees compared with non-enrollees (Retchin et al., 1992; Hill and Brown, 1992). Low levels of pre-enrollment costs and high levels of post-disenrollment costs (Physician Payment Review Commission, 1996) suggest that most of the health-status differences we found are the result of selection. Nonetheless, the effect on enrollee health status of the access to and quality of care in HMOs remains an important issue.

Our study addressed only losses to the Medicare program attributable to uncontrolled health-status differences between HMO and FFS populations. Other issues that may have an impact on savings or losses to Medicare include the accuracy of national per capita cost projections and the accuracy and appropriateness of geographic adjusters. The net impact of risk contracting on Medicare expenditures also depends in part on whether HMOs with Medicare enrollees have an indirect effect on costs in FFS as a result of competitive influences (i.e., "spillover effects"). It was beyond the scope of our study to address these issues.

This study is part of a larger evaluation of Medicare's HMO contracting program. This evaluation will include detailed analyses of much larger data sets using recently developed risk-assessment tools based on claims data (Ellis et al., 1996; Weiner et al., 1996). These additional analyses will provide a more in-depth look at health-status differences between HMO and FFS populations.

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