Beneficiary selection, use, and charges in two Medicare capitation demonstrations

by Judith D. Kasper, Gerald F. Riley, Jeffrey S. McCombs, and Mary Ann Stevenson

Findings with regard to health status, service use, and charges are presented for Medicare beneficiaries who received care under Medicare risk contracts with two health maintenance organizations from 1980 through 1982 and for fee-for-service comparison groups. Health status of plan enrollees and fee-for-service beneficiaries were compared using mortality data, preenrollment claims, and self-reported health measures. Patterns of use and expenditures during preenrollment and postenrollment periods were examined using Medicare records and data supplied by the plans.

Introduction

Studies by Eggers (1980) and Eggers and Prihoda (1982) of Medicare beneficiaries enrolled in health maintenance organizations (HMO's) and their fee-for-service counterparts provided the first evidence that those who choose HMO enrollment may be healthier. Although evidence on the health status of younger enrollee populations has been mixed (Manning et al., 1984), favorable selection (the enrollment of healthier people) has been documented among those under 65 years of age as well (Jackson-Beeck and Kleinman, 1983; Buchanan and Cretin, 1986). The present study is based on these earlier works, particularly that of Eggers and Prihoda, and it extends them in the following ways:

- By examining measures of health status, other than prior use, that could indicate biased selection in enrollment.
- By examining patterns of post-enrollment use for evidence concerning the ability of HMO's to reduce utilization.

Findings from previous studies raised the following two concerns with regard to Medicare risk contracting:

- That some part of the well-documented savings in providing care attributed to HMO's may be the result of favorable selection rather than of organizational efficiency or different practice patterns.
- That HMO's may be overpaid for providing care to Medicare enrollees, because payments are based on the adjusted expenditures of fee-for-service beneficiaries. The HMO payment method used by the Health Care Financing Administration, the adjusted average per capita cost (AAPCC), does not appear to adjust adequately for biased selection (Eggers and Prihoda, 1982). Both the Federal Government, which wishes to avoid overpayment for services, and the HMO industry, which fears inadequate compensation in the event of adverse selection, have an interest in the accuracy and sensitivity to selection bias of the AAPCC.

Reprint requests: Judith D. Kasper, Johns Hopkins School of Hygiene and Public Health, Department of Health Policy and Management, Room 492, Hampton House, 624 North Broadway, Baltimore, Maryland 21205.

Background

Capitation is viewed by many as an important strategy for constraining the costs of care under publicly financed programs. Legislation was passed in 1982 (the Tax Equity and Fiscal Responsibility Act or TEFRA) to facilitate enrollment of Medicare beneficiaries in HMO's. Further, there is interest in broadening the types of organizations eligible to contract with Medicare for the provision of services under capitated arrangements to include private insurers and provider groups (Moley, 1986). As HMO enrollment has increased, however, so has concern about the adequacy of the AAPCC as a payment mechanism for services provided at risk.[1]

Criticism of the AAPCC centers on its lack of sensitivity to differences in health status between fee-for-service beneficiaries and those enrolled in HMO's. The four health status adjustment factors now used (age, sex, welfare status, and institutional status) have been shown to account for only a small part of the difference between these groups (Beebe, Lubitz, and Eggers, 1985).[2] Hornbrook et al. (1986) have designated health status differences accounted for by the AAPCC as selectivity effects and uncontrolled differences as selection bias. Selection bias results in inequities in payment, either by reducing the anticipated savings to Medicare from capitation in the event of favorable selection or by penalizing the HMO for adverse selection. Selection bias can result from active enrollment practices on the part of the HMO or from various plan characteristics—e.g., premium levels or availability of specialists. In addition, patterns of disenrollment can contribute to selection bias.

Several new health status adjustments to the AAPCC have been proposed, including measures of functional impairment (Thomas and Lichtenstein, 1986; Gruenberg and Stuart, 1982), prior use of services (Beebe, Lubitz, and Eggers, 1985), prior use

[1]Other issues receiving attention are the effects of capitated delivery systems on beneficiary access to care and quality of care (Siu, Brook, and Rubenstein, 1986; Ware et. al., 1986; Kasper, Riley, and McCombs, 1988).

[2]The AAPCC is calculated for each county in the United States using expenditures of the fee-for-service Medicare population adjusted for age, sex, welfare, and institutional status (Eggers and Prihoda, 1982).

of services that take into account physician discretion (Anderson et al, 1986a; 1986b), and social security disability status (Lubitz, Beebe, and Riley, 1985). Many believe such adjustments are needed because the current AAPCC creates incentives for the enrollment of healthier-than-average beneficiaries. In addition to inequities in payment, reduced incentives to enroll sicker beneficiaries may also exclude from HMO's those individuals who could benefit in terms of access, continuity of care, and reduced cost sharing (Bonanno and Wetle, 1984; for opposing views, Schlesinger, 1986).

The potential inadequacies of the AAPCC are sometimes discounted by the argument that differences in health status between enrollee populations and fee-for-service populations will diminish over time (regression toward the mean). This follows from Welch's (1985) observation that biased selection may have both an acute component, which is subject to regression toward the mean, and a chronic component, which is not. As health status differences between populations decline, so should differences in service use, offsetting the effects of biased selection at enrollment. The studies to date of regression toward the mean have used simulated populations (Welch, 1985) or the fee-for-service beneficiary population (Beebe, 1988). Although only 2 years of postenrollment experience is presented, this study provides evidence bearing on the issue of regression toward the mean.

Plan descriptions

The plans in this study were two of the original eight Medicare demonstrations sponsored by the Health Care Financing Administration (HCFA) in 1980—Fallon Community Health Plan of Worcester, Massachusetts, and Greater Marshfield Community Health Plan of Marshfield, Wisconsin. Each began serving Medicare beneficiaries at a time when few HMO's had experience with this population.

The Fallon Community Health Plan is a group model HMO established in 1977 and cosponsored by the Fallon Clinic and Blue Cross of Massachusetts. During the demonstration period (April 1980 through December 1982), the plan enrolled over 5,000 Medicare beneficiaries. The benefit package included reduced deductibles and coinsurance, as well as certain services not regularly covered under Medicare, such as preventive care, eye exams and eye glasses, prescriptions with a small copayment, and unlimited hospital days. Fallon was the first HMO to sign a Medicare risk contract following TEFRA; and, by 1986, it had reached an enrollment of over 12,000 elderly people.

The Greater Marshfield Community Health Plan of Marshfield, Wisconsin, was jointly sponsored in 1971 by the Marshfield Clinic, St. Joseph's Hospital, and Blue Cross-Blue Shield United of Wisconsin. The Clinic is the major provider of physician services for a largely rural population in a seven-county area.During the Medicare enrollment demonstration, additional private practitioners in the area were affiliated with the plan. Because of Marshfield's dominance as a provider of both prepaid care and fee-for-service care, many of those joining the prepaid plan continued to see the same providers they had seen as fee-for-service patients at the clinic. Over 8,000 Medicare beneficiaries enrolled during the demonstration (June 1980 through September 1982), many of whom were already receiving services from the Marshfield Clinic on a fee-for-service basis. Enrollees received the basic Medicare benefits as well as reduced coinsurance and deductibles, preventive services, and unlimited hospital days. Marshfield discontinued enrollment of the elderly in their prepaid plan after the 2-year demonstration, but it continues to serve this population on a fee-for-service basis.

Data

Sources

Most of the data presented here were obtained from either the Medicare Statistical System or from the HMO's. All information on use and expenditures for fee-for-service beneficiaries was taken from the Medicare Statistical System, and that for HMO enrollees for the period prior to enrollment was also taken from the Medicare Statistical System. However, use and expenditure data after enrollment were obtained from the HMO's. Charges for HMO enrollees are fee-for-service equivalents obtained from the two plans. Both Marshfield and Fallon serve fee-for-service patients in addition to prepaid plan members.

For the Marshfield site, data are available for the period January 1979 through September 1982 for about 8,600 enrollees and a sample of about 14,400 fee-for-service beneficiaries. Marshfield began enrollment of Medicare beneficiaries in June 1980; 56 percent of those who joined enrolled in that month. At Fallon, data are available for the period January 1979 through December 1983 for about 5,300 enrollees and 14,500 fee-for-service beneficiaries. Fallon began enrollment in April 1980, and they enrolled 54 percent of the total demonstration enrollment in the first 3 months.

Comparability

Much of the analysis presented here is a comparison of preenrollment and postenrollment use and expenditure patterns relative to an enrollment data for HMO enrollees and a pseudoenrollment date for fee-for-service beneficiaries. Pseudoenrollment dates were created by randomly sampling enrollment dates within age-sex-HMO penetration cells of the enrollee

population and by assigning these dates to fee-for-service beneficiaries in corresponding cells.[3]

Adjustments

Several adjustments to charge data were necessary for comparisons to be made between fee-for-service beneficiaries and enrollees. First, charges for some types of services were available from the Medicare Statistical System but not from the HMO's. Skilled nursing facility charges were excluded from Part A charges for this reason. Charges associated with home health services and hospital outpatient department or emergency room services were excluded from Part B charges. (See Technical Note for preenrollment charges associated with excluded services.) Second, several adjustments were made to Part B charges. The Medicare Statistical System contains Part B charges after a fee-screen reduction, so an equivalent reduction was made to enrollee Part B charges.[4] Charges for any enrollee who did not meet the annual Part B deductible ($60 before 1982, $75 since) were removed from the HMO data because these charges are not retained in the Medicare Statistical System. These adjustments made the Part B charge data from the HMO's equivalent to the Part B reasonable charges contained in the Medicare Statistical System.

Health status differences

In their earlier study, Eggers and Prihoda (1982) found HMO enrollees were younger than fee-for-service beneficiaries at both Fallon and Marshfield. As shown in Table 1, a higher percentage of enrollees than of fee-for-service beneficiaries were in the age range 65 to 69 years (42.4 versus 32.3 percent at Marshfield, 46.3 versus 33.5 percent at Fallon). About 12 percent of fee-for-service beneficiaries were 85 years of age or older, and only 4 percent of Fallon enrollees and 6 percent of Marshfield enrollees were in this age group.

Without adjustment, age differences alone would lead to lower levels of use and expenditures in the HMO populations. Although the AAPCC does adjust for age of enrollee, the concern is whether health status differences exist between fee-for-service beneficiaries and enrollees that are not accounted for by age and other current adjustment factors. In this section, data are presented for three measures of health status: self-reported health, mortality rates, and patterns of prior use and expenditures for services.

Self-reported health

A survey of enrollees and fee-for-service beneficiaries was conducted at Marshfield and Fallon in 1982 to collect demographic, socioeconomic, and attitudinal data not available from HMO or Medicare claims files.[5] As indicated in Table 2, a lower percentage of enrollees at Fallon than of fee-for-service beneficiaries regarded their health as fair or poor, in general and relative to others their age. Enrollees also were less likely to report needing help with self-care (eating, dressing, bathing, or using the toilet) or being unable to perform routine yardwork or housework. At Marshfield, there were no significant differences between enrollees and fee-for-service beneficiaries on self-reported health measures. Both perceived health and functional limitations in routine activities have been shown to predict subsequent levels of functioning and service use (Andersen and Newman, 1973; Guralnik and Kaplan, 1987); thus, differences between the enrollee population and fee-for-service beneficiaries suggest biased selection.

Table 1

Number of Medicare enrollees and fee-for-service beneficiaries and percent distribution, by age, sex, and site: 1980-82

Age and sex	Marshfield site		Fallon site	
	Enrollees	Fee-for-service	Enrollees	Fee-for-service
Number	8,630	13,564	5,309	14,546
	Percent distribution			
Total	100.0	100.0	100.0	100.0
Age at enrollment[1]				
65-69 years	42.4	32.3	46.3	33.5
70-74 years	26.3	24.7	27.8	28.7
75-79 years	16.5	18.5	15.4	18.0
80-84 years	9.0	12.8	6.8	12.8
85 years or over	5.8	11.7	3.7	12.0
Male				
Total	46.9	42.9	48.3	38.2
65-69 years	43.6	34.6	47.9	38.3
70-74 years	26.3	25.8	29.0	25.8
75-79 years	16.8	19.1	14.0	16.8
80-84 years	8.0	11.3	6.1	10.9
85 years or over	5.3	9.2	3.0	8.3
Female				
Total	53.1	57.1	51.7	61.8
65-69 years	41.4	30.6	44.8	30.5
70-74 years	26.3	23.9	26.7	22.4
75-79 years	16.2	18.1	16.6	18.8
80-84 years	10.0	13.9	7.5	14.0
85 years or over	6.2	13.5	4.4	14.4

[1]Age at date of enrollment in a health maintenance organization (HMO) or age for fee-for-service beneficiaries at a date assigned based on the distribution of HMO enrollment dates.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Statistical System.

[3]There were 84 age-sex-HMO penetration rate cells created for purposes of sampling the fee-for-service population (6 age groups, 2 sex classifications, and 7 penetration rate strata). HMO penetration rate refers to the percent of all Medicare beneficiaries in a zip code area who enroll in the HMO (McDevitt, 1984). The sampling approach was to select fee-for-service beneficiaries from these cells so that the age-sex-HMO penetration rate would be similar to that for the enrollee distribution.

[4]During the demonstration period, this reduction in Part B fee-for-service charges averaged 21 percent in Massachusetts and 25 percent in Wisconsin. HMO Part B charges were reduced accordingly.

[5]The survey was conducted by Research Triangle Institute, Research Triangle Park, N.C. Data were collected for 307 enrollees and 322 fee-for-service beneficiaries at Fallon and for 303 enrollees and 392 fee-for-service beneficiaries at Marshfield. The age-sex distribution of enrollees and nonenrollees in the samples was matched.

Mortality rates

A second measure of biased selection is mortality rates. A lower than expected mortality rate among enrollees would indicate favorable selection and a higher than expected rate, adverse selection. Mortality is measured on a postenrollment basis only because neither the enrollee population nor the fee-for-service group included individuals who died prior to enrollment.

It is uncertain to what extent mortality differences could be affected by differences in quality of care between HMO and fee-for-service providers. Quality differences would have to be quite dramatic to substantially affect mortality rates in the first 2 years following enrollment. In addition, at Marshfield, both enrollees and fee-for-service beneficiaries received most of their care from the same group of providers, so mortality rate differences between the two beneficiary populations could not be attributed to differences in providers. On the other hand, differences in preenrollment health status can be expected to produce immediate differences in mortality rates between the enrollees and fee-for-service beneficiaries.

A life table analysis on enrollee and fee-for-service cohorts, with mortality measured from date of enrollment or (in the case of fee-for-service beneficiaries) pseudoenrollment, is given in Table 3. Those who disenrolled from the HMO were excluded from the analysis at time of disenrollment. Probabilities of death are presented for the enrollee and fee-for-service cohorts for successive 6-month intervals following enrollment (the probabilities are conditional on survival to the beginning of each interval). Probabilities of death for fee-for-service beneficiaries were adjusted to the age and sex distribution of the enrollee samples by the direct method to facilitate comparisons (three age groups were used in the adjustment: 65-69 years, 70-79 years, 80 years of age or over). Also in Table 3 are relative risks of mortality for enrollees, again presented by 6-month intervals. Relative risk is the ratio of enrollee to fee-for-service mortality rates. Relative risks were estimated using methods described by Fleiss (1981)[6] for six age and sex strata. Relative risks were not adjusted for institutional and welfare status because these beneficiary characteristics were not available from the data. The stratum-specific estimates were then combined by taking a weighted average.

The estimated relative risk of Fallon enrollees over a 2-year period following enrollment was .40, indicating their mortality rate was about 40 percent of their fee-for-service counterparts. Relative risk was lowest (.13) for Fallon enrollees in the 6 months immediately following enrollment. This might be expected because it seems unlikely that terminally ill beneficiaries would elect to change providers and join an HMO in the last months before death. Relative mortality among Fallon enrollees increased with time to .68 by 19 to 24 months following enrollment, indicating regression toward the mean in the enrollees' health status.

The relative risk for Marshfield enrollees was .68 over a 2-year period postenrollment, also indicating favorable selection with respect to mortality. But unlike Fallon, Marshfield enrollees did not have exceptionally low mortality immediately following enrollment. Their relative risk was .67 in the first and second 6-month periods following enrollment. This may reflect the opportunity to join the prepaid plan without changing providers, and it suggests that some seriously ill beneficiaries may have taken advantage of this opportunity. Also in contrast to Fallon, no strong pattern appeared of relative risk increasing over time. Relative risk for Marshfield enrollees was .77 at 19 to 24 months following enrollment, only moderately higher than in the first 6 months.

It should be noted that, in evaluating the cost implications of lower enrollee mortality, one would also need to adjust for differences between enrollee and fee-for-service cohorts in numbers of institutionalized and welfare persons. Given the high average costs incurred in the last years of life (Lubitz and Prihoda, 1984), one would expect lower enrollee mortality to lead to lower expected costs for the HMO. An adjustment for institutional and welfare status could eliminate much of the mortality difference between HMO and fee-for-service beneficiaries because both Fallon and Marshfield reported few such beneficiaries among their enrollees.

Table 2

Self-reported health status of Medicare enrollees and fee-for-service beneficiaries, by site: 1980-82

Health status[1]	Fallon		Marshfield	
	Enrollees	Fee-for-service	Enrollees	Fee-for-service
	Percent			
Reports fair or poor health	*21.8	28.6	35.3	39.0
Reports health "worse or much worse than others my age"	*21.5	36.0	37.6	38.8
Needs help with self-care	*4.6	8.7	8.6	5.1
Needs help walking	9.1	11.2	13.2	12.0
Unable to do routine yardwork or housework	*13.7	19.6	22.4	28.1

*Chi-square test indicates enrollee population is different from the control population at .05 level or better.
[1]Based on a survey of enrollees and fee-for-service beneficiaries prestratified by age, sex, and county.

SOURCE: (Kasper, Riley, and McCombs, 1988).

Prior use and expenditures

Medicare claims data have been used previously to examine differences between enrollees and fee-for-service beneficiaries that may indicate biased selection.

[6]Tests for homogeneity of relative risks across strata indicated no significant differences among the strata for any of the time intervals.

Table 3

Mortality rates and relative risks for Fallon and Marshfield Medicare enrollees and fee-for-service beneficiaries, by months following enrollment: 1980-82

Site and measurement	Months following enrollment				
	Total	1-6	7-12	13-18	19-24
Fallon					
Probability of death:[1]					
Enrollees	0.038	0.002	0.009	0.009	0.015
Fee-for-service beneficiaries[2]	0.094	0.020	0.023	0.022	0.023
Relative risk	0.40	0.13	0.42	0.41	0.68
(95-percent confidence interval)	(.35, .47)	(.07, .22)	(.31, .56)	(.30, .56)	(.52, .90)
Marshfield					
Probability of death:[1]					
Enrollees	0.065	0.014	0.015	0.016	0.018
Fee-for-service beneficiaries[2]	0.095	0.021	0.023	0.023	0.023
Relative risk	0.68	0.67	0.67	0.73	0.77
(95-percent confidence interval)	(.61, .75)	(.54, .82)	(.54, .82)	(.59, .90)	(.62, .96)

[1]Probability of death is conditional on survival to the beginning of the interval.
[2]The rate for fee-for-service beneficiaries is adjusted to the age and sex distribution of the enrollee population by the direct method.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Statistical System.

Eggers and Prihoda (1982) compared Medicare reimbursements for beneficiaries who subsequently enrolled in HMO's and others over a 4-year period prior to enrollment. Their findings indicated lower total Medicare reimbursements for enrollees in two sites (Fallon and Kaiser) and no difference in a third (Marshfield). Preenrollment charges and hospital use for a 1-year period are shown in Tables 4, 5, and 6. Overall, these findings confirm those of the earlier study.[7]

The ratio of per capita enrollee charges to fee-for-service charges at Fallon in the year prior to enrollment was .58; in other words, 42 percent lower for enrollees than for the comparison group (Table 4). (Eggers and Prihoda found a 31-percent difference in reimbursements over a 4-year period prior to enrollment, adjusting for age and sex). Differences between enrollee groups and fee-for-service groups were greater for Part A charges representing hospital inpatient care (ratio of .55, or 45 percent lower for enrollees) than for Part B physician services (ratio of .71, or 29 percent lower for enrollees).

At Marshfield, overall charges were lower among enrollees than among fee-for-service beneficiaries in the year prior to enrollment (ratio of .76, or 24 percent lower for enrollees), but this difference was attributable to lower Part A charges for enrollees (Table 5). Enrollees and fee-for-service beneficiaries had equivalent Part B charges in the year prior to enrollment. This is consistent with Eggers and Prihoda who found that enrollee inpatient reimbursements ranged from 7 to 15 percent below comparison group reimbursements over 4 years (though in 1 year exceeding fee-for-service reimbursements by 8 percent). They also found AAPCC-adjusted Part B reimbursements were consistently higher for enrollees (from 11 to 34 percent) than for the comparison group for each of the 4 years.

Enrollee admission rates (Table 6) were lower than those for the fee-for-service group in the year prior to enrollment at both Fallon (ratio of .64) and Marshfield (ratio of .87). Both annual hospital days per person and average length of stay (days per admission) were less for enrollees as well. Admissions, on the average, were about 2 days shorter among enrollees.

Postenrollment charges and utilization

There is considerable interest in postenrollment patterns of service use in HMO's. Studies have consistently shown lower levels of hospital admissions among enrollees (Luft, 1981), prompting research on whether these findings were attributable to biased selection or patterns of service delivery in HMO's. The health status measures already discussed provide evidence of biased selection in HMO enrollment among Medicare beneficiaries. Even if HMO's enroll healthier people, however, they may achieve additional reductions in use over what would be seen in the fee-for-service sector. Alternatively, regression toward the mean may reduce differences between enrollees and fee-for-service beneficiaries as both groups age.

Enrollee and fee-for-service postenrollment patterns

Tables 4 through 6 show 2 years of postenrollment data for enrollees and fee-for-service beneficiaries in addition to a year of preenrollment experience. At Fallon (Table 4), both Part A and Part B charges for

[7]There are several differences between this study and the earlier one including the preenrollment time period, exclusion in the current study of some services for purposes of postenrollment comparability, selection of the fee-for-service comparison groups, use of weights versus AAPCC factors to control for demographic differences, and use of Medicare reimbursements versus Medicare charges. Although the magnitude of enrollee and fee-for-service differences varies, the findings are consistent.

Table 4

Mean charges per person-year in 1982 constant dollars for surviving and deceased Fallon Medicare enrollees and fee-for-service beneficiaries, by type of charges and enrollment period: 1980-82

Enrollment period	Total charges			Part A charges			Part B charges		
	Enrollee	Fee-for-service[1]	Ratio	Enrollee	Fee-for-service[1]	Ratio	Enrollee	Fee-for-service[1]	Ratio
Total									
Total postenrollment (33 months)	$*1,562	$3,554	0.44	$*1,331	$3,077	0.43	$*366	$725	0.50
1 year preenrollment	*1,080	1,873	0.58	*721	1,309	0.55	*311	437	0.71
1 year postenrollment	*1,490	3,001	0.50	*1,104	2,366	0.47	*385	634	0.61
2 year postenrollment	*1,304	2,816	0.46	*977	2,203	0.44	*328	612	0.54
Survivors									
Total postenrollment (33 months)	*1,121	1,840	0.61	*909	1,611	0.56	*344	479	0.72
1 year preenrollment	*1,020	1,448	0.70	*677	1,001	0.68	*298	371	0.80
1 year postenrollment	*1,203	1,664	0.72	*830	1,227	0.68	*373	437	0.85
2 year postenrollment	*975	1,857	0.53	*661	1,381	0.48	*314	476	0.66
Decedents[2]									
Total post enrollment (33 months)	*11,423	20,086	0.57	*10,769	17,208	0.63	*858	3,102	0.28
1 year preenrollment	*2,372	5,753	0.41	*1,667	4,120	0.40	*592	1,047	0.57
1 year postenrollment	*7,920	15,886	0.50	*7,263	13,350	0.54	*657	2,536	0.26
2 year postenrollment	*11,800	19,821	0.66	*11,044	16,790	0.66	*756	3,031	0.25

*Significantly different from fee-for-service charges at the .05 level.
[1]Weighted to reflect the age, sex, and geographic distribution (the health maintenance organization penetration rate by county) of the enrollee population.
[2]The number of enrollee deaths was 227. Among the fee-for-service comparison group, 1,492 died during the demonstration period.

SOURCE: For fee-for-service beneficiaries and Fallon enrollees' preenrollment: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Statistical System; for Fallon enrollees' postenrollment: Data reported by the Fallon Community Health Plan.

Table 5

Mean charges per person-year in 1982 constant dollars for surviving and deceased Marshfield Medicare enrollees and fee-for-service beneficiaries, by type of charges and enrollment period: 1980-82

Enrollment period	Total charges			Part A charges			Part B charges		
	Enrollee	Fee-for-service[1]	Ratio	Enrollee	Fee-for-service[1]	Ratio	Enrollee	Fee-for-service[1]	Ratio
Total									
Total postenrollment (27 months)	$*2,183	$1,999	1.09	$1,401	$1,509	0.93	$*844	$550	1.53
1 year preenrollment	*956	1,258	0.76	*592	839	0.71	364	353	1.03
1 year postenrollment	*1,963	1,657	1.19	1,177	1,199	0.98	*787	458	1.72
2 year postenrollment	1,889	1,729	1.09	1,138	1,201	0.95	*751	528	1.42
Survivors									
Total postenrollment (27 months)	*1,474	1,113	1.32	873	807	1.08	*665	370	1.80
1 year preenrollment	841	891	0.94	*513	578	0.89	*330	299	1.10
1 year postenrollment	*1,414	945	1.50	*767	631	1.21	*647	313	2.06
2 year postenrollment	*1,424	1,207	1.18	787	799	0.99	*637	409	1.56
Decedents[2]									
Total postenrollment (27 months)	*12,673	10,335	1.23	9,215	8,113	1.14	*3,488	2,241	1.56
1 year preenrollment	*2,525	4,462	0.57	*1,672	3,119	0.54	825	823	1.00
1 year postenrollment	*10,100	8,362	1.21	7,247	6,541	1.11	*2,853	1,821	1.57
2 year postenrollment	*14,153	11,481	1.23	10,398	8,729	1.19	*3,755	2,752	1.36

*Significantly different from fee-for-service charges at the .05 level.
[1]Weighted to reflect the age, sex, and geographic distribution (the health maintenance organization penetration rate by county) of the enrollee population.
[2]The number of enrollee deaths was 546. Among the fee-for-service comparison group, 1,536 died during the demonstration period.

SOURCE: For fee-for-service beneficiaries and Marshfield enrollees' preenrollment: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Statistical System; for Marshfield enrollees' postenrollment: Data reported by the Greater Marshfield Community Health Plan.

Table 6

Mean hospital admissions per 1,000 person-years, days per person-year, and days per admission for Fallon and Marshfield Medicare enrollees and fee-for-service beneficiaries, by enrollment period: 1980-82

Enrollment period	Fallon			Marshfield		
	Enrollee	Fee-for-service[1]	Ratio	Enrollee	Fee-for-service[1]	Ratio
	Admissions per 1,000 person-years					
Total postenrollment[2]	*276	486	0.57	393	388	1.01
1 year preenrollment	*195	307	0.64	*200	230	0.87
1 year postenrollment	*267	431	0.62	355	331	1.07
2 year postenrollment	*228	397	0.57	337	339	0.99
	Days per person-year					
Total postenrollment[2]	*2.5	5.8	0.43	*3.6	4.0	0.90
1 year preenrollment	*1.9	3.5	0.54	*1.7	2.5	0.68
1 year postenrollment	*2.4	5.0	0.47	3.2	3.5	0.97
2 year postenrollment	*1.9	4.5	0.42	3.0	3.3	0.91
	Days per admission					
Total postenrollment[2]	*8.1	11.0	0.74	*8.7	10.0	0.87
1 year preenrollment	*9.7	11.4	0.87	*8.7	10.8	0.81
1 year postenrollment	*8.2	11.2	0.73	*9.0	10.3	0.87
2 year postenrollment	*8.0	11.2	0.71	*8.7	9.6	0.91

*Significantly different from fee-for-service rates at the .05 level.
[1]Weighted to reflect the age, sex, and geographic distribution (the health maintenance organization penetration rate by county) of the enrollee population.
[2]Maximum postenrollment period was 33 months at Fallon and 27 months at Marshfield.

SOURCE: For fee-for-service beneficiaries and health maintenance organization (HMO) enrollees' preenrollment: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Statistical System; for HMO enrollees' postenrollment: Data reported by the HMO's.

enrollees were lower than those for fee-for-service beneficiaries in the first and second year postenrollment. The ratio of enrollee to fee-for-service Part A charges was .55 in the year prior to enrollment, falling to .47 in the first year postenrollment and .44 in the second year. For Part B charges, the ratio was .71 in the year prior to enrollment, .61 in the first year postenrollment, and .54 in the second year. These reductions over time occurred for survivors (from .70 for total charges one year prior to enrollment to .53 in the second year postenrollment) but not for decedents. These groups are shown separately because their trajectory of use and expenditures is quite different. In addition, they differentially affect estimates for the total enrollee and fee-for-service populations. The low death rates for the enrollee populations, particularly Fallon, mean comparisons of charges between enrollee and fee-for-service decedents must be undertaken cautiously.

Data on hospital admission rates (Table 6) are consistent with data on Part A charges. Admission rates for Fallon enrollees were 38 percent lower than those for fee-for-service beneficiaries in the first year postenrollment and 43 percent lower in the second year postenrollment. This is consistent with the figure often quoted in the literature of a 40-percent reduction in use of inpatient care in HMO's (Luft, 1981; Manning et al., 1984). The availability of preenrollment data on these same populations suggests that much of this difference may exist prior to enrollment (those who enrolled had 36 percent fewer admissions in the year prior to enrollment); nevertheless, the HMO appears to have achieved further reductions in use of inpatient care from year one to year two postenrollment.

The decline in the ratio of enrollee to fee-for-service use and charges from the preenrollment to postenrollment period suggests that Fallon succeeded in controlling enrollee utilization. Given the favorable selection that was evident among Fallon enrollees, it might be expected that enrollee to fee-for-service ratios would increase over time as a result of regression toward the mean. Because they declined, it suggests that Fallon was able to control the use of services among its enrollees. The similarity of patterns for Part A and Part B charges and hospital admissions suggests that Fallon controlled use of both ambulatory and inpatient services.

Though still considerably below fee-for-service levels, use and expenditures for Fallon enrollees were higher in the first year following enrollment than in the previous year. As might be expected, the increase was substantially greater among decedents. For all enrollees, Part A charges increased from $721 to $1,104, and Part B charges increased from $311 to $385. It cannot be determined from these data whether this represents unmet need as HMO's often claim (people who previously had little physician contact and enroll with untreated, possibly undiscovered illnesses, for example) or a startup effect, whereby newly enrolled beneficiaries make use of previously uncovered services (preventive care, vision care, or drug coverage offered by the HMO). Increased service use by enrollees in the initial period following enrollment has been observed in one study of a younger HMO population (Griffith and Baloff, 1981).

Both Part A and Part B charges increased for Marshfield enrollees in the first year compared with the year before enrollment (Table 5). Unlike Fallon, where charges for enrollees remained substantially below those of fee-for-service beneficiaries following

enrollment, Part B charges for Marshfield enrollees exceeded those of the fee-for-service group in the first year postenrollment. Average Part B enrollee charges doubled from the preenrollment year to the first year of enrollment, exceeding by 70 percent fee-for-service charges in the first year post ($787 versus $458). The increase was greater for survivors than for decedents, suggesting it cannot be attributed to intensive service use by people in the last months of life. Marshfield reduced charges for enrollees from year one to year two, even though Part B charges remained high in comparison with fee-for-service beneficiaries.

Hospital use by Marshfield enrollees increased following enrollment to levels similar to those of fee-for-service beneficiaries (Table 6). Admission rates were virtually identical between the two groups by the second year postenrollment, and hospital days were only 9 percent lower in the HMO group (this compares with 13 percent fewer admissions and 32 percent fewer days for enrollees in the year prior to enrollment).

High-, low-, and no-cost users

Tables 7 and 8 provide information on patterns of postenrollment charges for those who were nonusers, low-cost users, and high-cost users in the period prior to enrollment. Only persons having 6 months or more of preenrollment experience are included. High-cost users had more than $100 per month in charges at Fallon and more than $50 per month at Marshfield. Low-cost users had charges more than $0 but less than $100 per month at Fallon and less than $50 per month at Marshfield. Nonusers had no charges.

At Fallon, enrollees who were high-cost users prior to enrollment incurred lower charges per person per year in the postenrollment period, $3,095 compared with $6,116 (Table 7). Charges for previously high-cost fee-for-service beneficiaries increased slightly in the post period, apparently because of the higher costs of decedents. Among high-cost fee-for-service beneficiaries surviving the postenrollment period, charges decreased from $7,102 to $3,701. However, the reduction in charges was greater among enrollees (the ratio of enrollee to fee-for-service charges was .85 for survivors in the preenrollment period and only .55 in the postenrollment period).

For previously low-cost users, charges rose substantially for both enrollees and fee-for-service beneficiaries, reflecting regression toward the mean. However, the increase in charges per person per year was considerably less for enrollees—from $199 to $1,537—than for the fee-for-service beneficiaries—from $222 to $2,917. Ignoring survival status, the ratio of enrollee charges to fee-for-service charges decreased from .90 in the preenrollment period to .53 in the postenrollment period; among survivors, the ratio decreased from .91 to .63.

Among those previously using no services, subsequent HMO enrollees incurred average charges that were only 56 percent as high as those for fee-for-service beneficiaries ($1,178 versus $2,087). Among survivors, enrollee charges were 78 percent as high as fee-for-service charges, $875 on the average versus $1,124.

Regardless of being a high-cost user, low-cost user, or nonuser in the preenrollment period, Fallon enrollees had lower levels of postenrollment period charges than the fee-for-service beneficiaries had. Charges for both groups rose during the postenrollment period among previously low-cost users and nonusers. However, previously high-cost users had lower postenrollment charges among enrollees and higher postenrollment charges among fee-for-service beneficiaries. Some of the difference in the postenrollment period charges may be the result of uncontrolled selection differences (Hornbrook et al., 1986), but Fallon appears to have reduced charges among previously high-cost users and, compared with the fee-for-service sector, to have substantially reduced the rate of increase among previously low-cost users and nonusers.

At Marshfield, the ratio of enrollee charges to fee-for-service charges did not change significantly for previously low-cost or high-cost users from the preenrollment period to the postenrollment period (Table 8). Among previously high-cost users, the ratio of enrollee charges to fee-for-service charges increased from .93 to .97; and among previously low-cost users, it increased from 1.03 to 1.05. The apparent continuity of these ratios is somewhat deceptive, however, because of the lower mortality rates experienced by Marshfield enrollees. Removing the effect of decedent expenses substantially increases the ratio of enrollee charges to fee-for-service charges from .99 to 1.17 for previously high-cost users and from 1.03 to 1.30 for previously low-cost users.

These data indicate substantial increases in use among Marshfield enrollees compared with fee-for-service beneficiaries in the postenrollment period, among both previously high-cost and low-cost users. Among those with no previous use, enrollees incurred charges 30 percent above those of fee-for-service beneficiaries in the postenrollment period, a greater percentage increase than for either high-cost users (18 percent) or low-cost (27 percent) users.

Much of the increased use in the post period among Marshfield enrollees occurred with respect to Part B services (Table 8). Among survivors in the postenrollment period Part B charges were, on the average, at least 50 percent higher for enrollees than for fee-for-service beneficiaries among previously high-cost and low-cost users, and they were twice as high among those with no previous use. In contrast, enrollee Part A charges to fee-for-service Part A charges were quite similar (enrollee ratios to fee-for-service ratios of .99, 1.12, and 1.01 for high-cost users, low cost users, and nonusers, respectively).

Discussion

Fallon Community Health Plan and Greater Marshfield Community Health Plan were two of the first prepaid plans to provide services to Medicare

beneficiaries on a capitated basis. Fallon continues to serve a large elderly population, but Marshfield withdrew from Medicare contracting because of financial losses. In light of their pioneering role and the numerous changes that have occurred in the HMO industry (increased growth of for-profit and individual practice association type HMO's; proliferation of preferred provider organizations; greater efforts toward utilization control, in some instances creating incentives for fewer services and less referral by putting physicians financially at risk), the experience of these plans may best be regarded as case studies. Nonetheless, their experience is instructive.

The cumulative evidence of this study and the earlier one by Eggers and Prihoda indicates favorable selection with regard to the health status of Fallon enrollees. Beneficiaries who chose to enroll at Fallon were healthier than those who did not by their own report, by mortality rates in the postenrollment period, by levels of use, and by expenses prior to enrollment. Marshfield presents a more complex picture. Only the mortality rate data suggest favorable selection. Self-reports of health status and measures of prior use in the year preceding enrollment do not indicate biased selection, either favorable or adverse to the HMO. Marshfield appears to have enrolled few

Table 7

Mean charges per person per year in 1982 constant dollars for surviving and deceased Fallon Medicare enrollees and fee-for-service beneficiaries, by level of preenrollment use for persons with 6 months or more of preenrollment experience: 1980-82

Level of preenrollment use	Total charges			Part A charges			Part B charges		
	Enrollees	Fee-for-service[1]	Ratio	Enrollees	Fee-for-service[1]	Ratio	Enrollees	Fee-for-service[1]	Ratio
Former high-cost users									
Total									
Preenrollment[2]	$6,116	$8,087	*0.76	$4,772	$6,462	*0.74	$1,344	$1,625	*0.83
Postenrollment	3,095	8,884	*0.35	2,635	7,067	*0.37	461	1,817	*0.25
Survivors									
Preenrollment[2]	6,037	7,102	*0.85	4,712	5,587	*0.84	1,325	1,514	*0.87
Postenrollment	2,039	3,701	*0.55	1,596	2,754	*0.58	443	946	*0.47
Decedents[3]									
Preenrollment[2]	6,880	11,706	*0.59	5,346	9,673	*0.55	1,534	2,032	*0.75
Postenrollment	13,284	27,911	*0.48	12,654	22,896	*0.55	630	5,015	*0.13
Former low-cost users									
Total									
Preenrollment[2]	199	222	*0.90	29	47	*0.62	170	176	0.97
Postenrollment	1,537	2,917	*0.53	1,154	2,256	*0.51	383	661	*0.58
Survivors									
Preenrollment[2]	198	218	*0.91	28	46	*0.61	170	173	0.99
Postenrollment	1,120	1,788	*0.63	761	1,289	*0.59	359	498	*0.72
Decedents[3]									
Preenrollment[2]	235	269	0.88	44	55	0.80	192	214	0.90
Postenrollment	11,332	15,593	0.73	10,379	13,103	0.79	954	2,490	*0.38
Former nonusers									
Total									
Preenrollment[2]	0	0	N/A	0	0	N/A	0	0	N/A
Postenrollment	1,178	2,087	*0.56	864	1,706	*0.51	314	380	0.83
Survivors									
Preenrollment[2]	0	0	N/A	0	0	N/A	0	0	N/A
Postenrollment	875	1,124	*0.78	584	868	*0.67	290	257	*1.13
Decedents[3]									
Preenrollment[2]	0	0	N/A	0	0	N/A	0	0	N/A
Postenrollment	10,012	16,603	*0.60	8,992	14,358	0.63	1,020	2,245	*0.45

*Significantly different from fee-for-service charges at the .05 level.
[1]Weighted to reflect the age, sex, and geographic distribution (the health maintenance organization penetration rate by county) of the enrollee population within use group (*former high-cost user, low-cost user, or nonuser*).
[2]The maximum preenrollment period was 15 months.
[3]The number of enrollee deaths were 70, 97, and 51 for former high-cost users, low-cost users, and nonusers, respectively. Among the fee-for-service comparison groups, the numbers of deaths were 635, 529, and 274, respectively.

NOTE: N/A is not applicable.

SOURCE: For fee-for-service beneficiaries and Fallon enrollees' preenrollment: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Statistical System; for Fallon enrollees' postenrollment: Data reported by the Fallon Community Health Plan.

beneficiaries who died within a year or two of enrollment (as indicated by the mortality data). On the other hand, their enrollees appeared no different, prior to enrollment, from fee-for-service beneficiaries (as measured by total prior reimbursements or self-reported health data) and they subsequently used more services. This suggests that HMO's may experience elements of both adverse and favorable selection among different groups of beneficiaries. When this occurs, overall estimates of use or expenses may combine these offsetting effects.

Many factors affect the enrollment decision, including characteristics of both HMO's and beneficiaries, existing financing mechanisms, and the medical practice environment of particular georgraphic areas (Merrill et al., 1985; Garfinkel et al., 1986; Medicare Competition Demonstration, 1986). One major difference between Fallon and Marshfield is that Fallon is a group model HMO, therefore, most people must change providers to join. At Marshfield, enrollees were able to switch plans without changing providers. People in poor health are

Table 8

Mean charges per person per year in 1982 constant dollars for surviving and deceased Marshfield Medicare enrollees and fee-for-service beneficiaries, by level of preenrollment use for persons with 6 months or more of preenrollment experience: 1980-82

Level of preenrollment use	Total charges			Part A charges			Part B charges		
	Enrollees	Fee-for-service[1]	Ratio	Enrollees	Fee-for-service[1]	Ratio	Enrollees	Fee-for-service[1]	Ratio
Former high-cost users									
Total									
Preenrollment[2]	$4,302	$4,610	0.93	$2,928	$3,361	*0.87	$1,374	$1,249	*1.10
Postenrollment	4,193	4,337	0.97	2,657	3,157	0.84	1,536	1,180	*1.30
Survivors									
Preenrollment	4,103	4,160	0.99	2,768	2,977	0.93	1,334	1,182	*1.13
Postenrollment	2,684	2,291	*1.17	1,553	1,566	0.99	1,132	725	*1.56
Decedents[3]									
Preenrollment[2]	5,494	6,493	*0.85	3,878	4,967	*0.78	1,615	1,526	1.06
Postenrollment	13,194	12,894	1.02	9,245	9,815	0.94	3,949	3,079	*1.28
Former low-cost users									
Total									
Preenrollment[2]	193	188	1.03	11	13	0.82	184	175	*1.05
Postenrollment	2,178	2,072	1.05	1,327	1,457	0.91	851	614	*1.38
Survivors									
Preenrollment[2]	191	186	1.03	11	13	0.82	181	173	*1.05
Postenrollment	1,524	1,169	*1.30	824	737	1.12	700	432	*1.62
Decedents[3]									
Preenrollment[2]	230	211	1.09	17	13	1.27	215	198	1.08
Postenrollment	12,511	10,998	1.14	9,265	8,580	1.08	3,246	2,419	*1.34
Former nonusers									
Total									
Preenrollment[2]	0	0	N/A	0	0	N/A	0	0	N/A
Postenrollment	1,406	1,194	*1.18	859	892	0.96	546	302	*1.81
Survivors									
Preenrollment[2]	0	0	N/A	0	0	N/A	0	0	N/A
Postenrollment	994	763	*1.30	545	541	1.01	449	222	*2.02
Decedents[3]									
Preenrollment[2]	0	0	N/A	0	0	N/A	0	0	N/A
Postenrollment	10,586	7,036	*1.50	7,859	5,642	1.39	2,726	1,393	*1.96

*Significantly different from fee-for-services charges at the .05 level.
[1]Weighted to reflect the age, sex, and geographic distribution (the health maintenance organization penetration rate by county) of the enrollee population, within use group (former high-cost user, low-cost user, or nonuser).
[2]The maximum preenrollment period was 17 months.
[3]The number of enrollee deaths were 208, 190, and 119 for former high-cost users, low-cost users, and nonusers, respectively. Among the fee-for-service comparison groups, the numbers of deaths were 503, 458, and 530, respectively.

NOTE: N/A is not applicable.

SOURCE: For fee-for-service beneficiaries and Marshfield enrollees' preenrollment: Health Care Financing Administration: Bureau of Data Management and Strategy: Data from the Medicare Statistical System; for Marshfield enrollees' postenrollment: Data reported by the Greater Marshfield Community Health Plan.

probably less likely to sever relationships with providers,[8] particularly the elderly who may rely more heavily on their physicians for advice concerning health care and where to seek it (Berenson, 1986). At least one other study suggests favorable selection is more likely in group model HMO's (Jackson-Beeck and Kleinman, 1983).

The patterns in the postenrollment period are quite different at Fallon and Marshfield. Fallon enrollees who had substantially lower levels of use and expenses prior to enrollment maintained their advantage over fee-for-service beneficiaries. Nonetheless, relative to their prior experience, use increased in the first year of HMO membership. However, there are several indications that, overall, Fallon was able to control enrollee utilization. First, following the increases of the first year, utilization declined in the second. Second, Fallon's ability to maintain its advantage over the fee-for-service sector, despite the pressures of regression toward the mean, suggests successful utilization control. And third, the HMO was able to decrease charges following enrollment of previously high-cost users in contrast to high-cost fee-for-service beneficiaries whose expenses continued to climb.

At Marshfield, both Part A and Part B charges increased among enrollees following enrollment. Moreover, the relationship between enrollee patterns and fee-for-service patterns of use in the preenrollment period (somewhat lower hospital inpatient use by enrollees and similar levels of physician use) changed dramatically. Admission rates were virtually identical between the two groups, but enrollee Part B charges exceeded fee-for-service charges by 70 percent in the first year following enrollment and 40 percent in the second year (50 percent for the total postenrollment period). These findings can be viewed in two ways. A recent article about the Marshfield experience argues the plan had adverse selection within the AAPCC rate categories (Nycz et al., 1987). The authors point to Marshfield's exclusively rural service area, to the fact that 32 percent of the population resided in areas designated as medically underserved in 1982, and to the ability of patients to join the plan without changing providers as factors that resulted in a sicker enrollee population. The argument that many Marshfield enrollees previously had little or no contact with the health care system and had considerable "unmet need" receives some support from the finding that the increased use of enrollees over fee-for-service beneficiaries was greatest among those with no previous use. However, enrollee charges were higher among previously low-cost users and high-cost users as well, all of whom had at least some access to health care providers.

An alternative interpretation to that of adverse selection is that Marshfield was unable to control utilization. Several factors may have contributed. Marshfield had few utilization control mechanisms in place, and following their first year of experience serving Medicare enrollees, instituted new ones that appeared to have some effect (Nycz et al., 1987). There is anecdotal evidence as well of delayed utilization among people planning to enroll. Although enrollment did not begin until June, much of the marketing effort for the demonstration occurred in the winter of 1979-80. Some fee-for-service clients who planned to enroll apparently cancelled examinations and elective procedures preferring to wait until full coverage was available under the prepaid plan (Nycz, 1986).

Over the course of the demonstration, actual expenses at Marshfield exceeded budgeted amounts, and the Health Care Financing Administration assumed a greater share of the risk for losses (Carpenter, 1985). Although Marshfield succeeded in reducing losses over time, it was unable to realize savings by the end of the demonstration; and Medicare risk contracting was discontinued. Whether the failure lay with adverse selection of beneficiaries or inadequate utilization control cannot be definitively determined. Both may have contributed.

The experience of Marshfield and Fallon in serving Medicare beneficiaries on a capitated basis was dramatically different. It is suggested here that the issues of selection bias and the ability of HMO's to alter patterns of use after enrollment are not clear cut or unidirectional and that one or both may occur. It points as well toward the need for a broader base of experience concerning Medicare enrollment in HMO's from which to generalize.

Technical note

For the period prior to enrollment, charges per person-month for the excluded services are shown in Table 9.

Table 9

Excluded charges per person-month for enrollees and fee-for-service beneficiaries, by type of service and site: 1980-82

Type of service	Enrollees		Fee-for-service	
	Marshfield	Fallon	Marshfield	Fallon
Skilled nursing facility	.3	$ .9	$ .5	$2.8
Home health service	.6	1.0	.8	3.2
Hospital outpatient department or emergency room	2.1	4.8	3.1	7.5

References

Andersen, R., and Newman, J.: Societal and individual determinants of medical care utilization in the United States. *Milbank Memorial Fund Quarterly* 51(1):95-124, Winter, 1973.

[8]Another study of the Fallon-Marshfield experience indicates that beneficiaries with no usual source of care and no ties to severe were more likely to enroll (Kasper, Riley, and McCombs, 1988).

Anderson, G. F., Cantor, J. C., Steinberg, E. P., and Holloway, J.: Capitation pricing: Adjusting for prior utilization and physician discretion. *Health Care Financing Review*. Vol. 8, No. 2. HCFA Pub. No. 03226. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office, Winter 1986a.

Anderson, G. F., Steinberg, E. P., Holloway, J., and Cantor, J. C.: Establishing payment rates for capitated systems. *Milbank Memorial Fund Quarterly* 64(4):548-565, Winter 1986b.

Beebe, J. C.: Medicare reimbursement and regression to the mean. *Health Care Financing Review*. Vol. 9, No. 3. HCFA Pub. No. 03263. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office. Spring 1988.

Beebe, J. C., Lubitz, J., and Eggers, P.: Using prior utilization information to determine payments for Medicare enrollees in health maintenance organizations. *Health Care Financing Review*. Vol. 6, No. 3. HCFA Pub. No. 03198. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office, Spring 1985.

Berenson, R.: Capitation and conflict of interest. *Health Affairs* 5(1):141-146, Spring 1986.

Bonanno, J. B., and Wetle, T.: HMO enrollment of Medicare recipients: An analysis of incentives and barriers. *Journal of Health Politics, Policy, and Law* 9(1):41-62, Spring 1984.

Buchanan, J. L., and Cretin, S.: Risk selection of families electing HMO membership. *Medical Care* 24(1):39-51, Jan. 1986.

Carpenter, B.: *Analysis of Medicare Risk Contractors' ACR Development*. Contract No. 500-81-0017. Prepared for Health Care Financing Administration. Rockville, Md. Jurgovan and Blair, Inc., Aug. 1985.

Eggers, P.: Risk differential between Medicare beneficiaries enrolled and not enrolled in an HMO. *Health Care Financing Review*. Vol. 1, No. 3. HCFA Pub. No. 03027. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office, Winter 1980.

Eggers, P. and Prihoda, R.: Pre-enrollment reimbursement patterns of Medicare beneficiaries enrolled in "at-risk" HMO's *Health Care Financing Review*. Vol. 4, No. 1. HCFA Pub. No. 03146. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office, Fall, 1982.

Fleiss, J.: *Statistical Methods for Rates and Proportions*, 2nd ed. New York, John Wiley & Sons Inc., 1981.

Garfinkel, S. R., Schlenger, W. E., McLeroy, K. R., et al.: Choice of payment plan in the Medicare capitation Demonstration. *Medical Care* 24(7):565-658, July 1986.

Griffith, M. J., and Baloff, N.: Membership duration and utilization rates in a prepaid group practice. *Medical Care* 19(12):1195-1210, Dec. 1981.

Gruenberg, L., and Stuart, N.: A Health Status-Based AAPCC: The Disability-Level Approach. Unpublished paper. Brandeis University, Dec. 1982.

Guralnik, J., and Kaplan, G.: Predictors of Healthy Aging: Prospective Evidence From the Alameda County Study. Paper presented at the American Public Health Association Meetings, Oct. 20, 1987.

Hornbrook, M., Greenlick, M., and Bennett, M.: Medicare Risk Adjustment for Groups: Health Status and Selection Bias. Paper presented at the Annual Meeting of the Association for Health Services Research, Boston, Mass., June 1986.

Jackson-Beeck, M., and Kleinman, J.: Evidence for self-selection among health maintenance organization enrollees. *Journal of the American Medical Association* 250(20):2826-2829, June 15, 1983.

Kasper, J., Riley, G., and McCombs, J.: Capitation and Medicare: Past, Present and Future. Forthcoming in Pauly, Mark V., and Kissick, William D., eds., *Lessons From the First Twenty Years of Medicare*. University of Pennsylvania Press, 1988.

Lubitz, J., Beebe, J., and Riley, G.: Improving the Medicare HMO payment formula to deal with biased selection. In Sheffler, R., and Rossiter, L., eds. *Advances in Health Economics and Health Services Research: Biased Selection in Health Care Markets*. Vol. 6. JAI Press, Inc., Greenwich, Conn., 1985.

Lubitz, J., and Prihoda, R.: Use and costs of Medicare services in the last 2 years of life. *Health Care Financing Review*. Vol. 5, No. 3. HCFA Pub. No. 03169. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office, Spring 1984.

Luft, H.: *Health Maintenance Organizations, Dimensions of Performance*. New York. John Wiley & Sons, Inc., 1981.

Manning, W., Leibowitz, G., Goldberg, W., et al.: A controlled trial of the effect of a prepaid group practice on use of services. *New England Journal of Medicine* 310(23):1505-1530, 1984.

McDevitt, R.: Sampling and weighting methodologies used in constructing utilization and expenditure files for the Medicare HMO capitation evaluation. Contract No. 500-81-0017. Prepared for the Health Care Financing Administration, Santa Barbara, Calif. SysteMetrics, Inc., Sept. 1984.

Medicare Competition Demonstration: *Report on the Implementation of the Medicare Competition Demonstrations*. Contract No. 500-83-0047. Prepared for Health Care Financing Administration. Princeton, N.J. Mathematica Policy Research, Inc., 1986.

Merrill, J., Jackson, C., and Reuter, J.: Factors that affect the HMO enrollment decision: A tale of two cities. *Inquiry* 22:388-395, Winter 1985.

Moley, K.: Overview of employer capitation activities. *Health Care Financing Review*. 1986 Annual Supplement. HCFA Pub. No. 03225. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office, Dec. 1986.

Nycz, G.: Greater Marshfield Community Health Plan. Personal communication. Marshfield, Wisc., 1986.

Nycz, G., Wenzel, F., Freisinger, R., and Lewis, R.: Medicare risk contracting: Lessons from an unsuccessful demonstration. *Journal of the American Medical Association* 257(5):656-659, Feb. 6, 1987.

Schlesinger, M.: On the limits of expanding health care reform: Chronic care in prepaid settings. *Milbank Memorial Fund Quarterly* 64(2):189-215, 1986.

Siu, A., Brook R., and Rubenstein, L.: Medicare capitation and quality of care for the frail elderly. *Health Care Financing Review.* 1986 Annual Supplement. HCFA Pub. No. 03225. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office, Dec. 1986.

Thomas, J. W., and Lichtenstein, R.: Functional health measures for adjusting health maintenance organization capitation rates. *Health Care Financing Review.* Vol. 7, No. 3. HCFA Pub. No. 03222. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office, Spring 1986.

Ware, J. E., Brook, R. H., Rogers, W. H., et al.: Comparison of health outcomes at a health maintenance organization with those of fee-for-service care. *Lancet* May 3, 1986.

Welch, P.: Medicare capitation payments to HMO's in light of regression toward the mean in health care costs. In Sheffler, R., and Rossiter, L., eds., *Advances in Health Economics and Health Services Research: Biased Selection in Health Care Markets.* Vol. 6. Greenwich, Conn., JAI Press, Inc., 1985.