The Impact of Payor/Provider Type on Health Care Use and Expenditures among the Frail Elderly

Bettina Experton, MD, MPH, Zili Li, MD, MPH, Laurence G. Branch, PhD, Ronald J. Ozminkowski, PhD, and Diana M. Mellon-Lacey, MPH

ABSTRACT

Objectives. This study examined whether health care expenditures and usage by the frail elderly differ under three payor/provider types: Medicare fee for service, Medicare health maintenance organization (HMO), and dual Medicare–Medicaid enrollment.

Methods. In-home interviews were conducted among 450 frail elderly patients of a San Diego, Calif, health care system. Cost and use data were collected from providers.

Results. Analyses revealed no difference in total expenditures between fee-for-service and HMO enrollees, but Medicare–Medicaid beneficiaries' expenditures were 46.8% higher than those for HMO enrollees and 52.2% higher than those for the fee-for-service group. Fee-for-service participants were less than half as likely as HMO enrollees to have two or more hospital admissions, but hospital usage rates between those two payor/provider groups did not differ. Nor were there payor/provider differences in access to home health care, but HMO home health care users received significantly fewer services than the others.

Conclusions. The care provided to these HMO beneficiaries resulted in a combination of restricted home health use and higher multiple hospitalizations. This raises compelling questions for future research. For the dually enrolled, stronger cost containment may be required. (*Am J Public Health.* 1997;87:210–216)

Introduction

There has been considerable and widespread focus on the high cost of medical care for the elderly. As the fastest-growing segment of the US population and at higher risk of dependency arising from chronic conditions, the elderly consume a disproportionate share of public and private health care resources.[1] The prevalent fee-for-service system, which often is fragmented, focused on acute care, and likely to duplicate services, is ill prepared to control costs while not always able to meet the health and social needs of an aging population. In an attempt to control costs for the care of the elderly, the Health Care Financing Administration (HCFA) introduced Medicare health maintenance organizations (HMOs) in 1983. However, there is concern about whether the current capitated systems are truly cost-effective and can offer integrated care models to adequately address the needs of the elderly, particularly those with the greatest needs such as the frail older persons and their families.[2,3]

Reviewing the performance of current Medicare HMO risk contractors is important, both to evaluate their strengths and to identify areas needing improvement. A number of studies have been conducted to determine the efficiency and effectiveness of risk-based contracts for Medicare patients. Most of these studies have focused on the demonstration programs of the early 1980s, emphasizing the equality of care compared with that found in the fee-for-service sector.[4,5] However, more recent studies suggest that the HFCA's program may have actually increased costs since HMOs apparently have attracted the least sick of the elderly population to their plans.[6,7] This favorable selection is problematic because HCFA pays capitated health plans 95% of an adjusted average per capita cost,[8] which lacks adequate health status adjustments. As a result, some have argued that the federal government pays more for the care of healthier elders under capitated health plans than it would if those elders had remained in the fee-for-service sector.[6,7] Other studies have demonstrated that Medicare HMOs save money by shortening the average hospital length of stay (but not reducing the number of admissions), by substituting less intensive short-term nursing home admissions for the more intensive and higher-cost rehabilitation units, and by generally providing a less intensive course of services.[9,10]

To help overcome the impediment of possible favorable selection, there is a need for multivariate analyses of expenditures, usage, and outcomes among different components of the delivery system that focus on a population of frail elderly and control for the preexisting differences associated with the delivery system. From a practical perspective, it is essential to have population-based data documenting the complete utilization histories of the frail elderly as experienced under different service delivery systems.[11] This article addresses this need by reporting on a study that examined the differences in health care usage and costs among a cohort of frail elders under the three

Bettina Experton is with HUMETRIX, Inc, and Zili Li and Diana M. Mellon-Lacey are from San Diego, Calif. Laurence G. Branch is with Duke University Medical Center, Durham, NC. Ronald J. Ozminkowski is with the MEDSTAT Group, Ann Arbor, Mich.

Requests for reprints should be sent to Bettina Experton, MD, MPH, HUMETRIX, Inc, 4370 La Jolla Village Dr, Suite 400, San Diego, CA 92122.

This paper was accepted May 17, 1996.

primary payor/provider systems: Medicare fee for service, Medicare HMO, and dual Medicare–Medicaid enrollment.

Methods

Setting

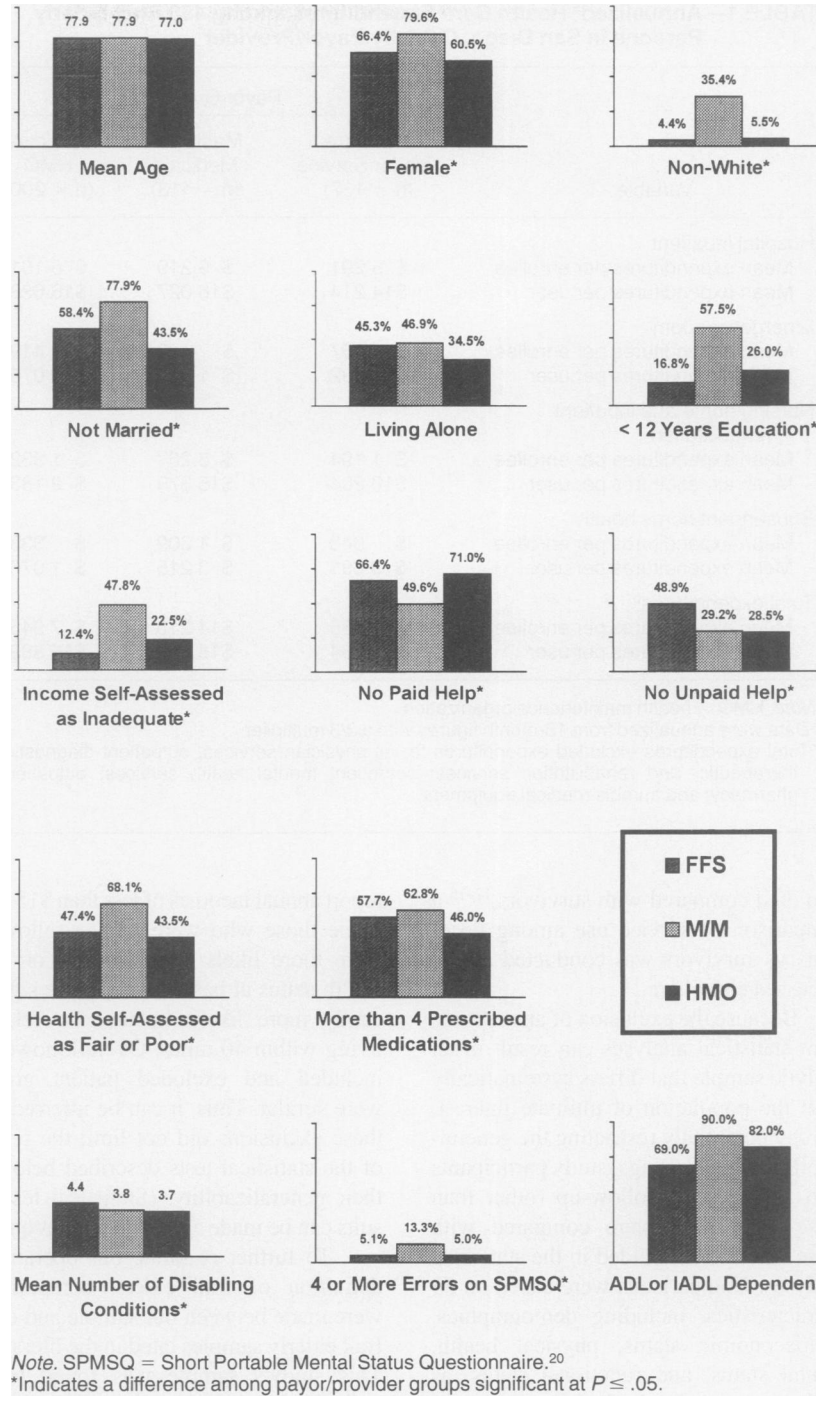
The study was conducted at Sharp HealthCare, the largest health care organization in San Diego County, California, with 6 acute care hospitals, 4 skilled nursing centers, 15 ambulatory clinics, a rehabilitation center, and a large home health agency. Through a network of more than 1000 affiliated physicians, Sharp serves more than a third of San Diego County's population, primarily through managed care risk contracts.

Sample

The study sample was generated from the patient population aged 65 and over of Sharp Home HealthCare, a Medicare-certified home health agency. Eligible participants were receiving physician-prescribed home care services and were thereby operationally defined as frail elders. Among the 833 patients from the three major payor/provider categories who met the inclusion criteria and were invited to participate, 700 (84%) accepted. The three payor/provider categories represented include Medicare fee for service (n = 220), Medicare HMO (n = 310), and both Medicare and Medicaid for dual enrollees (n = 170).

Medicare fee-for-service and Medicare–Medicaid beneficiaries (who also received services on a fee-for-service basis) obtained health care services from community physicians accepting these payor sources. All Medicare HMO patients were members of Secure Horizons, a Medicare HMO. Sharp HealthCare is the main San Diego County Secure Horizons provider, with 65 000 plan enrollees. Some 40 000 of these Secure Horizons members receive care within the Sharp HealthCare system through physician members of the Sharp Rees-Stealy Medical Group. The service delivery pattern for this HMO at Sharp HealthCare can be characterized as a group model. The physicians serving the non-HMO patients were not members of Sharp Rees-Stealy.

Analyses were limited to only those 450 frail elderly who responded to the baseline and follow-up surveys, who did not change payor type, and who survived the 18-month study period, which fell between November 1990 and May 1993.



Note. SPMSQ = Short Portable Mental Status Questionnaire.[20]
*Indicates a difference among payor/provider groups significant at $P \leq .05$.

FIGURE 1—Baseline sociodemographic and clinical characteristics of survivors, to follow-up (n = 450), by payor/provider type.

Excluded from the analyses were 250 elders, including 127 decedents (who were evenly distributed among payor groups), 88 who were lost to follow-up or who refused to participate in the follow-up surveys, and 35 who changed insurance type during the study period. These elders were excluded because complete interview data were lacking for those who died or were lost to follow-up and because switching payors made it problematic to assume causal relationships between particular payors and resource use. Since numerous studies of the Medicare population illustrate substantially greater resource use among those

TABLE 1—Annualized[a] Health Care Expenditures among 450 Frail Elderly Persons in San Diego, Calif, by Payor/Provider

Variable	Payor Group: Medicare Fee for Service (n = 137)	Medicare-Medicaid (n = 113)	Medicare HMO (n = 200)
Hospital inpatient			
Mean expenditures per enrollee	$ 5 291	$ 9 219	$ 6 161
Mean expenditures per user	$14 214	$16 027	$16 638
Emergency room			
Mean expenditures per enrollee	$ 157	$ 418	$ 119
Mean expenditures per user	$ 692	$ 1 210	$ 1 076
Nursing home and inpatient rehabilitation			
Mean expenditures per enrollee	$ 1 194	$ 3 267	$ 1 332
Mean expenditures per user	$10 904	$15 379	$ 9 183
Subsequent home health			
Mean expenditures per enrollee	$ 943	$ 1 309	$ 333
Mean expenditures per user	$ 3 691	$ 3 215	$ 1 076
Total expenditures[b]			
Mean expenditures per enrollee	$ 7 585	$14 213	$ 7 945
Mean expenditures per user	$14 234	$18 895	$15 889

Note. HMO = health maintenance organization.
[a]Data were annualized from 18-month figures with a 2/3 multiplier.
[b]Total expenditures excluded expenditures for all physician services; outpatient diagnostic, therapeutic, and rehabilitation services; outpatient mental health services; outpatient pharmacy; and durable medical equipment.

who died compared with survivors,[12–16] a comparison of service use among decedents vs survivors was conducted and is discussed elsewhere.[17]

Because the exclusion of any records from statistical analyses can result in an analytic sample that differs systematically from the population of ultimate interest, thereby potentially restricting the generalizability of the findings, study participants who were lost to follow-up (other than those who died) were compared with those who were included in the statistical analyses. Comparisons were based on 53 characteristics, including demographics, socioeconomic status, physical health, mental status, and functional status, as well as unmet needs for care, previous service use, and clinical characteristics at baseline. Chi-squared tests of independence or one-way analyses of variance (ANOVAs) ($\alpha = .05$) indicated no statistical differences between study participants and those lost to follow-up in 50 demographic factors; mental status variables; limitations in activities of daily living, independent or otherwise; other functional status measures; the number of medications taken; or the distribution of patients by main (primary and secondary) diagnoses. It was found that participants included in the study were less likely to report annual incomes of less than $15 000, while those who were lost to follow-up were more likely to report fair or poor health status at baseline and were significantly more likely to have no relative living within 40 miles. Overall, however, included and excluded patient groups were similar. Thus, it can be inferred that these exclusions did not limit the results of the statistical tests described below in their generalizability. (Statistical test results can be made available upon request.)

To further examine our operational definition of frail elders, comparisons were made between our sample and other frail elderly samples cited in the literature. This study's sample was found to be typical of frail elderly populations with respect to age, sex, living arrangements, and health and functional status.[18,19] Surviving participants were 67% female with a mean age of 77.5 years; 41% lived alone, 51% rated their health as poor or fair, 44% had more than one limitation in activities of daily living, and 54% reported taking four or more prescription medications.

Data Collection

Survey data were collected from Sharp Home Health Care patients and their caregivers via in-home interviews conducted by home health care nurses at baseline and again at 6-month intervals for an 18-month period. These interviews were used to collect information on demographics, medical history, physical and mental health status, functional status, social and economic resources, and met and unmet service needs.

Interviews were conducted using a questionnaire derived from widely used, existing instruments.[20–25] Utilization and expenditure data were collected quarterly from all relevant Sharp and non-Sharp health care facilities, agencies, and clinics, including 22 hospitals, 31 skilled nursing facilities, and 17 home health agencies. Retrospective data were collected for the 12-month period preceding enrollment in the study; prospective data were collected for 18 months after enrollment. Subsequent home health care use beyond the index admission, institutional skilled nursing care, inpatient rehabilitation, and hospital services data were collected; such data included information on diagnoses, procedures, payor type, charges, payments, type and number of visits (for home health services), admission source, discharge status, and discharge disposition.

Statistical Methods

Bivariate and multivariate analyses were conducted to estimate relationships between payor source and health care expenditures and usage by the frail elderly. The major dependent variable included in our analyses was the natural logarithm of total health care expenditures. These expenditures were collected from providers and include charges for inpatient care, emergency room care, home health care subsequent to the required first episode, skilled nursing care, and inpatient rehabilitation. Expenditures for physician services and all other outpatient services, prescription medications, and durable medical equipment were not available.

Eight other dependent variables were examined as components of service use. These included three separate indicators for inpatient hospital use (any admission, multiple admissions, and the natural logarithm of the number of hospital days among users), one indicator for the use of long-term skilled nursing care at home,* two indicators for emergency room use (any and multiple visits separately), and two indicators for the use of subsequent home health care services beyond the index episode (any admission and the

*Nursing home stays of 100 or more consecutive days were defined as long term; stays of fewer than 100 days were defined as short term.

natural logarithm of the total number of visits among users). The combination of one total expenditure variable plus the eight service component variables allowed us to test whether payor status influenced total expenditures and, if so, whether payor–expenditure relationships might be due to the influence of payor status on particular components of service use that contribute to total expenditures.

Multivariate analyses were conducted for total expenditures and the eight components of service use, adjusting for important covariates that might account for the relationships observed between payor and expenditures or payor and utilization in bivariate analyses conducted previously. The covariates used in the multivariate analyses were selected from an initial list of 53 demographic, socioeconomic, health status, functional status, clinical, and needs-related factors that the literature has suggested may influence total expenditures of service use.[26,27] Selected variables were those that are significantly related to expenditures or service use, as demonstrated by ANOVAs that adjusted for payor source as a main effect. (Results from this model-building task are available upon request.)

Ordinary least squares regression analyses were conducted to estimate relationships between payor type and the natural logarithms of (1) total health care expenditures, (2) the total number of inpatient hospital days among users, and (3) the total number of subsequent home health visits among users, adjusting for the influence of the relevant covariates. Logistic regression analyses were used to estimate relationships between payor status and having one or more inpatient admissions (separately), one or more emergency room visits (separately), the use of home health care after the index episode, and the use of long-term skilled nursing care.

Variance inflation factor tests were used to determine if multicollinearity problems existed.[28] ANOVA on studentized residuals from the ordinary least squares expenditure regression was used to determine if heteroskedasticity existed in the form of nonconstant variance among the regression residuals associated with the three payor categories. Neither heteroskedasticity nor multicollinearity were problematic in the full regression model.

TABLE 2—The Impact of Payor/Provider Type and Control Variables on Total Expenditures for Health Care Services by Frail Elderly Persons (n = 450), in Percentage Terms[a]

Variable	% Impact	95% Confidence Intervals
Type of coverage		
Medicare HMO vs. Medicare-Medicaid	−46.8*	−68.2, −10.9
Medicare FFS vs. Medicare-Medicaid	−52.2*	−72.3, −17.4
Medicare FFS vs. Medicare HMO[b]	−10.0	−27.3, 11.3
Control variables		
Sociodemographics		
Age 75–84 years	3.2	−33.0, 59.2
Age 85 years and over	41.3	−25.5, 167.8
Female	0.0	−35.1, 54.2
Clinical status[c]		
Self-assessed "poor" or "fair" health status	68.0*	7.9, 161.5
1–3 prescribed medications	118.9	−1.8, 388.0
4 or more prescription medications	254.8*	58.3, 695.3
Clinical assessment of underweight	26.0	−34.5, 142.5
1 or more falls in the prior month	−54.7	−80.1, 3.4
Moderate to severe vision impairment	53.7	−18.9, 191.6
Use of ambulatory device	38.2	−12.7, 118.8
Bladder incontinence	14.9	−30.9, 90.8
CES-D score 16 or higher	53.1	−0.7, 136.2
Cardiovascular disease	36.4	−13.3, 114.6
Diabetes	44.7	−24.4, 177.2
Functional status		
1 or more independent ADL dependencies only	−14.3	−52.6, 55.2
1–2 ADL dependencies	−4.8	−51.4, 86.7
3–6 ADL dependencies	−6.4	−55.9, 98.5
Prior year utilization		
2 or more inpatient admissions	74.1*	8.3, 179.7
Emergency room use	22.0	−26.9, 103.7
Hospital inpatient hip or knee surgery	−38.9	−66.4, 11.1
Self-reported unmet needs		
Custodial care	29.2	−25.7, 124.6
Homemaker services	66.7	−8.3, 202.8
Instrumental ADL assistance	39.1	−23.2, 151.9

Adjusted R^2 = .19; F = 5.3210; P = .0000.

Note. HMO = health maintenance organization; FFS = fee-for-service; ADL = activity of daily living; CES-D = Center for Epidemiological Studies–Depression.

[a]The phrase "in percentage terms" is best explained by example. The value of −46.8% for the Medicare HMO vs Medicare–Medicaid variable indicates that, on average and adjusting for the impact of all the other variables in the regression model, total expenditures for the HMO beneficiaries were 46.8% lower than those for the Medicare–Medicaid beneficiaries. The 95% confidence interval around this percentage is given as −68.2%, −10.9%.

[b]The data displayed here come from a separate regression equation, which used Medicare HMO as the reference payor/provider category.

[c]For the control variables, reference categories are age 65–74, male, health self-assessed as being very good or good, no prescribed medications, clinically assessed as normal weight or overweight, no falls in the prior month, no or mild vision impairment, no use of ambulatory equipment, no bladder incontinence, CES-D score below 16, no cardiovascular disease, and no diabetes.

*The asterisk denotes coefficients that are significantly different from zero (i.e., the 95% confidence interval excludes 0%).

Results

Figure 1 provides baseline characteristics of the analytic sample by payor group. Results of one-way ANOVAs are presented so that comparisons between groups can be made according to sociodemographic factors, physical and mental health, and functional status. The most significant differences were between the Medicare–Medicaid beneficiaries and one or both of the other two groups (fee for service and HMO), which tended to be similar. The Medicare–Medicaid beneficiaries were more likely to be female, not white, not married, and less educated, and to have self-assessed inadequate income

TABLE 3—Regression Results of the Effect of Payor/Provider on Specific Service Use[a] by Frail Elderly Persons (n = 450)[b]

Variable	Medicare FFS vs Medicare–Medicaid		HMO vs Medicare–Medicaid		Medicare FFS vs HMO	
	Coefficient	OR[c]	Coefficient	OR[c]	Coefficient	OR[c]
Hospital inpatient						
Any admission(s)	−0.7071	0.49*	−0.4087	0.66	−0.2984	0.74
≥2 admissions	−0.7002	0.50	0.1432	1.15	−0.8434	0.43*
Ln of no. of user days	−0.2545		−0.2466		−0.0080	
Emergency room						
Any visit(s)	−0.2917	0.75	−0.7217	0.49*	0.4301	1.54
≥2 visits	−0.9165	0.40	−1.1589	0.31	0.2424	1.27
Nursing home						
Long-term stay(s) (≥100 days)	−1.6201	0.20*	−1.6848	0.19*	0.0648	1.07
Subsequent home health care						
Any admission(s)	−0.0728	0.93	0.2903	1.34	−0.3630	0.70
Ln of no. of user visits	0.2584		−0.9788*		−1.2372*	

Note. FFS = fee for service; HMO = health maintenance organization; ln = natural logarithm.
[a]Data were obtained from logistic regression analyses that adjusted for factors related to sociodemographics, physical and mental health status, diagnosis, and perceptions of unmet service needs.
[b]All multivariate regression analyses were conducted for a total sample of 450 subjects, except for the regression on the natural logarithm (Ln) of the number of hospital days, which was based on a subsample of 190 users, and the regression on the Ln of the number of subsequent home health visits, which was based on a subsample of 143 users.
[c]Odds ratios (ORs) followed by asterisks (*) are significant ($P < .05$). Odds ratios for total number of hospital days and total number of subsequent home health visits are not provided, as the coefficients are the result of ordinary least squares regression. Significant coefficients ($P < .05$) are indicated by asterisks (*).

and no paid help. Medicare–Medicaid beneficiaries were also more likely to rate their health as poor or fair, and to have poorer cognitive mental health status, as measured by the Short Portable Mental Status Questionaire.[20] Medicare fee-for-service beneficiaries perceived themselves as having significantly more disabling physical conditions, on average, than the other types of beneficiaries, but Medicare–Medicaid beneficiaries were more likely than others to be dependent for the performance of activities of daily living.

Table 1 provides annualized expenditures for health care services by payor group for inspection. The results of statistical tests are not presented in this table because, as demonstrated in Figure 1, baseline differences related to payor/provider type are sufficient enough to require multivariate analyses that control for these differences before inferences can be drawn.

Table 2 presents the results of the multiple regression analysis of the natural logarithm of total health care expenditures on payor/provider type and control variables. The control variables adjusted for the concurrent impact of demographics, physical and mental health status, functional status, diagnosis, and self-reported unmet needs for care so that the influence of payor/provider type on total expenditures could be estimated with minimal bias. Rather than report regression coefficients and standard errors that show the impact of payor/provider type and other variables on the natural logarithm of total expenditures, Table 2 reports the impact of those variables in percentage terms. These percentages and their 95% confidence intervals were derived from the regression coefficients and standard errors with the use of a formula provided by Halverson and Palmquist.[29]

The first entry in Table 2 shows that, on average and adjusting for the influence of the remaining variables included in the regression, total expenditures for HMO beneficiaries were 46.8% lower than those for elders dually enrolled in Medicare and Medicaid. This was a statistically significant difference (i.e., the 95% confidence interval excludes 0%). Total expenditures for fee-for-service beneficiaries were found to be 52.2% lower, on average, than those for the dually enrolled.

In addition to comparisons between the dually enrolled and other beneficiaries, we generated a comparison between fee-for-service and HMO beneficiaries. This was done by estimating another regression, this time using the HMO beneficiaries as the comparison payor/provider group. This second regression was identical in all other respects to the regression that used the dually enrolled as the comparison group; thus, the control variables' associated percentages and 95% confidence intervals are identical to the data presented in Table 2 and need not be shown here. The results of this regression showed no significant differences in total expenditures between fee-for-service and HMO beneficiaries.

Among the control variables, we found that perception of health status as poor or fair resulted in total health expenditures that were 68.0% higher, on average, than better self-assessed health status. We also found that those who took four or more prescribed medications had total expenditures that were 254.8% higher, on average, than those who took no prescribed medications. Finally, those with two or more inpatient hospitalizations during the previous year had total expenditures that were 74.1% higher, on average, than those with fewer admissions. No other significant differences were associated with the control variables we used.

Table 3 presents a summary of the results of the logistic and ordinary least squares regressions of various types of service use by payor category and covariates. The table presents the regression coefficients and relative odds (when applicable) of using specific types of services, first comparing fee-for-service vs Medicare–Medicaid beneficiaries, then comparing HMO enrollees vs the dually enrolled, and finally comparing the fee-for-service vs the HMO enrollees. The results are as follows:

- Fee-for-service participants were about half as likely as the Medicare–Medicaid beneficiaries to have any hospital admission. No differences between the fee-for-service and HMO groups or between HMO enrollees and the dually enrolled beneficiaries were found on this measure.
- Fee-for-service participants were less than half as likely as HMO enrollees to have two or more hospital admissions during the study period.
- There were no payor/provider differences in the total number of inpatient hospital days among users.
- HMO enrollees were about half as likely as the Medicare–Medicaid benefi-

ciaries to have any emergency room visits.

- HMO and fee-for-service participants were only about 20% as likely as Medicare–Medicaid beneficiaries to use long-term nursing home care.
- No payor/provider differences were found in access to subsequent home health care. However, a Halverson and Palmquist transformation of coefficients provided in Table 3 shows that HMO beneficiaries used 71% fewer subsequent home health visits than fee-for-service beneficiaries and 62% fewer subsequent visits than Medicare–Medicaid home health users.

Discussion

This study has addressed the need for multivariate analyses of expenditures and usage among different components of the delivery system, focusing on a population of frail elderly. We selected this population because (1) previous studies examining Medicare HMO usage and performance have not focused on the special needs of the frail elderly, and (2) frail elderly typically use extensive acute and long-term care services.

Analyses of the data show little difference between Medicare HMO enrollees and fee-for-service participants in terms of total expenditures and usage for most service areas. However, differences were observed in the mean subsequent home health expenditure per user, which was significantly less for HMO enrollees than for fee-for-service participants (Table 1). The basis for this difference can be traced to the significantly lower number of home health visits per admission for HMO enrollees beyond the index episode, rather than to access to the service per se. Thus, even though this study focused on a frail elderly population exclusively, our findings are consistent with those of Brown et al.[6] with respect to the use of home health services—namely, that HMOs do not reduce the proportion of individuals receiving some home health care but rather reduce the number of home health visits by 50%. In our study, the HMO enrollees had 71% fewer visits than fee-for-service participants and 62% fewer visits than Medicare–Medicaid beneficiaries.

Our findings are also consistent with the Mathematica Policy Research's Medicare HMO evaluation[6] relative to inpatient admission. We observed no difference between Medicare HMO enrollees and fee-for-service participants with respect to the percentage of subjects with any hospital admissions. However, in contrast to the Mathematica Policy Research evaluation finding that Medicare HMOs shortened the average hospital length of stay, we also observed no significant difference in the number of hospital days between the HMO and fee-for-service groups. This finding may be because inpatient admissions are already so tightly monitored in both the fee-for-service and HMO populations that little more can be done to reduce them, especially when considering a frail elderly population. Also, contrary to Hill et al.,[9] our analyses showed that HMO enrollees have a significantly higher rate of multiple hospital admissions than fee-for-service participants. Whether this higher rate for HMO enrollees relates to the lower intensity of home health services provided to this patient group or to other factors warrants further evaluation.

A noteworthy finding is the substantially higher use of services by the Medicare–Medicaid beneficiaries compared with the other two groups, even after controlling for preexisting differences. The dual enrollees were twice as likely as Medicare fee-for-service participants to have any hospital admissions, twice as likely as Medicare HMO enrollees to have any emergency room visits, and five times as likely as the Medicare HMO or Medicare fee-for-service enrollees to have a long-term nursing home stay.

Every study has some data limitations, and this is no exception. Two potential limitations merit special attention. First, this study used an intact group design rather than random assignment to the payor source, so the results are subject to plausible rival hypotheses emanating from self-selection bias. We have minimized the effect of such selection bias by focusing our analyses on frail elders who may represent a more homogenous population than the whole Medicare population, and by controlling statistically for preexisting differences among payor sources that are related to any of the outcome measures.

Second, some components of total health care expenditures (i.e., physician and other outpatient services, prescription medications, and durable medical equipment) are missing. In aggregate, these components typically account for more than 25% of Medicare expenditures, which is not insignificant.[30] These limitations notwithstanding, our findings can help to clarify the role of payor type on the use of health services among the frail elderly.

In summary, these data provide no indication that HMOs are restricting access to services or constraining service intensity, except in the area of home health care. For this population of frail elderly, no differences were observed between fee-for-service and HMO enrollees in total expenditures, acute hospital use except for multiple hospital admissions, emergency room use, or skilled nursing and rehabilitation use. The real usage differences that were observed were the greatly elevated use of services by the frail elders enrolled in both Medicare and Medicaid compared with those served by either traditional fee-for-service or HMO delivery modes. For this California population of frail elders, the trend is evident. Medicare–Medicaid beneficiaries have substantially higher usage rates than the other two groups, even after statistically controlling for the preexisting differences among the three subgroups. However, when we look at mean expenditures across the three payor/provider groups, the only significant differences are for home health care expenditures between HMO and Medicare–Medicaid beneficiaries and between HMO and fee-for-service enrollees.

The constrained intensity observed by the Mathematica Policy Research's Medicare HMO evaluation was seen only in the area of home care. Overall, HMOs spent 46.8% less and fee-for-service providers spent 52.2% less in total expenditures for these frail elders than Medicare–Medicaid spent after controlling for baseline differences. Additional research focusing on outcomes is needed to clarify the reasons for this discrepancy; such research should examine whether the usage rate for the Medicare–Medicaid beneficiaries is inappropriate relative to efficiency and effectiveness compared with that for the fee-for-service and HMO systems. Examining the difference in the intensity of home health use among the HMO vs fee-for-service and Medicare–Medicaid beneficiaries and the effect of that difference on outcome is an important area for further investigation relative to the needs of the frail elderly and the impact on the health care delivery system. □

Acknowledgments

This study was supported by grant numbers 89130-G and 93339-G from the John A. Hartford Foundation, Inc, in New York City.

We gratefully acknowledge the assistance of Sharon Thompson, PhD, and Susan Hoekenga, MSG, for their assistance in the preparation of this manuscript.

References

1. Davis K. Paying the health care bills of an aging population. In: Pifer A, Bronte L, eds. *Our Aging Society.* New York, NY: WW Norton & Co.; 1986:299–318.
2. Clement DG, Retchin SM, Brown RS, Stegall MH. Access and outcomes of elderly patients enrolled in managed care. *JAMA.* 1994;271:1487–1492.
3. Vladeck BC, Miller NA, Clauser SB. The changing face of long-term care. *Health Care Financing Rev.* 1993;14:5.
4. Langwell K, Hadley JP. Evaluation of the Medicare competition demonstrations. *Health Care Financing Rev.* 1989;11:65.
5. Retchin SM, Clement DG, Rossiter LF, Brown B, Nelson L. How the elderly fare in HMOs: outcomes from the Medicare demonstrations. *Health Serv Res.* 1992;25: 651.
6. Brown RS, Clement DG, Hill JW, et al. Do health maintenance organizations work for Medicare? *Health Care Financing Rev.* 1993;15:7.
7. Hill JW, Brown RS. *Biased Selection in the TEFRA HMO/CMP Program.* Princeton, NJ: Mathematica Policy Research; 1990.
8. Dowd B, Christianson J, Feldman R, et al. Issues regarding health plan payments under Medicare and recommendations for reform. *Milbank Q.* 1992;70:423.
9. Hill JW, Brown RS, Chu D, et al. *The Impact of the Medicare Risk Program on the Use of Services and Cost to Medicare.* Princeton, NJ: Mathematica Policy Research; 1992.
10. Stern RS, Juhn PI, Gertler PJ, Epstein AM. A comparison of length of stay and costs for health maintenance organizations and fee-for-service patients. *Arch Intern Med.* 1989;149:1185.
11. Densen PM. *Tracing the Elderly through the Health Care System: An Update.* Washington, DC: Agency for Health Care Policy Research; 1991. Monograph 91-11.
12. Lubitz JD, Riley GF. Trends in Medicare payments in the last year of life. *N Engl J Med.* 1993;328:1092–1096.
13. Gaumer GL, Stavins J. Medicare use in the last ninety days of life. *Health Serv Res.* 1992;26:725.
14. McCoy JL, Iams HM, Packard M, et al. Health of retired workers: survival status and Medicare service use. *Health Care Financing Rev.* 1992;13:65.
15. McCall N. Utilization and costs of Medicare services by beneficiaries in their last year of life. *Med Care.* 1984;22:329.
16. Scitovsky AA. The high cost of dying: what do the data show? *Milbank Q.* 1984;62:591.
17. Experton B, Ozminkowski R, Branch L, Li Z. A comparison by payor/provider type of the cost of dying among frail older adults. *J Am Geriatr Soc.* 1996;44:1098.
18. Jette AM, Branch LG, Sleeper LA, et al. High-risk profiles for nursing home admission. *Gerontologist.* 1992;32:634.
19. Holloway JJ, Thomas JW, Shapiro L. Clinical and sociodemographic risk factors for readmission of Medicare beneficiaries. *Health Care Financing Rev.* 1988;10:27.
20. Pfeiffer EA. A short portable mental status questionnaire for the assessment of organic brain deficit in elderly patients. *J Am Geriatr Soc.* 1975;23:433.
21. Berkman LF, Berkman CS, Kasl S, et al. Depressive symptoms in relation to physical health and functioning in the elderly. *Am J Epidemiol.* 1986;24:372–388.
22. Bogdonoff MD, Hughes SL, Weissert WG, Paulsen E. *The Living-at-Home Program: Innovations in Service Access and Case Management.* New York, NY: Springer Publishing Company; 1990:157–159.
23. Carle Clinical Association. *Carle Outreach Program for the Elderly.* Urbana, Ill: Center for Research in Ambulatory Health Care Administration, Medical Group Management Association; 1987. Demonstration grant funded by W.K. Kellogg Foundation.
24. Fillenbaum G. *Multidimensional Functional Assessment of Older Adults: The Duke Older Americans Resources and Services procedures.* Hillsdale, NJ: Lawrence Erlbaum Associates; 1988.
25. *Arizona Minimum Assessment.* Phoenix, Ariz: Arizona Department of Economic Security, Aging and Adult Administration; 1987.
26. Stoller EP, Cutler SJ. Predictors of use of paid help among older people living in the community. *Gerontologist.* 1993;33:31.
27. Liu K, Coughlin T, McBride T. Predicting nursing-home admission and length of stay: a duration analysis. *Med Care.* 1991;29:125.
28. Kennedy P. *A Guide to Econometrics.* 3rd ed. Cambridge, Mass: MIT Press; 1992.
29. Halverson R, Palmquist R. Interpretation of dummy variables in semilogarithmic equations. *Am Econ Rev.* 1980;70:474–475.
30. *Health Care Financing Review, 1992* (annual supplement). Health Care Financing Administration, Baltimore, Md: US Dept of Health and Human Services; 1993.