SPECIAL ARTICLE

Increased Ambulatory Care Copayments and Hospitalizations among the Elderly

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ABSTRACT

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BACKGROUND

When copayments for ambulatory care are increased, elderly patients may forgo important outpatient care, leading to increased use of hospital care.

METHODS

We compared longitudinal changes in the use of outpatient and inpatient care between enrollees in Medicare plans that increased copayments for ambulatory care and enrollees in matched control plans — similar plans that made no changes in these copayments. The study population included 899,060 beneficiaries enrolled in 36 Medicare plans during the period from 2001 through 2006.

RESULTS

In plans that increased copayments for ambulatory care, mean copayments nearly doubled for both primary care ($7.38 to $14.38) and specialty care ($12.66 to $22.05). In control plans, mean copayments for primary care and specialty care remained unchanged at $8.33 and $11.38, respectively. In the year after the rise in copayments, plans that increased cost sharing had 19.8 fewer annual outpatient visits per 100 enrollees (95% confidence interval [CI], 16.6 to 23.1), 2.2 additional annual hospital admissions per 100 enrollees (95% CI, 1.8 to 2.6), 13.4 more annual inpatient days per 100 enrollees (95% CI, 10.2 to 16.6), and an increase of 0.7 percentage points in the proportion of enrollees who were hospitalized (95% CI, 0.51 to 0.95), as compared with concurrent trends in control plans. These estimates were consistent among a cohort of continuously enrolled beneficiaries. The effects of increases in copayments for ambulatory care were magnified among enrollees living in areas of lower income and education and among enrollees who had hypertension, diabetes, or a history of myocardial infarction.

CONCLUSIONS

Raising cost sharing for ambulatory care among elderly patients may have adverse health consequences and may increase total spending on health care.

ECONOMIC THEORY AND EMPIRICAL EVIdence suggest that patients will use fewer health services when they have to pay more for them.[1,2] Increasing the copayment for ambulatory care, for instance, has been shown to reduce the number of outpatient visits.[2-7]

In response to rapidly rising health care costs, many public and private insurers have increased the patient's share of the cost of ambulatory care. The typical copayment for an office visit in employer-based health plans doubled between 2001 and 2006.[8] An expanding number of state Medicaid programs have introduced or raised outpatient cost sharing for their enrollees.[9] The proportion of Medicare enrollees in health plans requiring a copayment of more than $15 for an outpatient visit increased from 0.3 to 24% for primary care visits and from 1.2% to 63% for specialist visits between 1999 and 2003.[10]

One concern about requiring copayments for ambulatory care is that they may deter patients from obtaining effective outpatient medical care, leading to greater offsetting use of acute care in the hospital. If this is true, then increasing the patient's share of the cost for ambulatory care may not reduce (or may even increase) total health care spending and may result in worse health outcomes. Elderly patients may be particularly sensitive to cost sharing because they have lower incomes, are more likely to be in poor health, and have greater out-of-pocket spending on health care than nonelderly populations.[11,12]

There have been remarkably few studies of the consequences of increasing copayments for ambulatory care, and even these studies have been limited because they have excluded elderly patients[2] or have evaluated concurrent changes in cost sharing for ambulatory care and prescription drugs.[12,13] We therefore examined the effect of increasing copayments for ambulatory care on the use of acute care in the hospital among a large, nationally representative cohort of elderly Medicare enrollees in managed-care plans. Using a quasi-experimental design, we compared longitudinal changes in the use of outpatient and inpatient care in Medicare plans that increased copayments for ambulatory care with concurrent trends in control plans — similar Medicare plans that did not change ambulatory care copayments. We also determined whether increased copayments for ambulatory care had differential effects among enrollees with chronic disease, black enrollees, and enrollees from areas of lower socioeconomic status.

METHODS

DATA SOURCES AND STUDY POPULATION

We obtained individual-level data from the Medicare Healthcare Effectiveness Data and Information Set (HEDIS) maintained by the Centers for Medicare and Medicaid Services (CMS) for the years 2001 through 2006. Information about data collection, variable specifications, and CMS-sponsored audits has been published previously.[14,15] We matched 97% of the observations in the HEDIS data set to the Medicare enrollment file to determine the demographic characteristics of enrollees.

We obtained monthly information on health plan benefits for all Medicare plans from 2001 through 2006 from the CMS. This information included each plan's cost-sharing requirement for outpatient visits, prescription drugs, and inpatient hospitalizations. To obtain information on health plan characteristics, we linked these data to the Interstudy Competitive Edge database[16] or contacted the health plans directly.

We analyzed benefits for 172 Medicare plans with more than 1 year of participation in Medicare. From this sample, we identified 18 plans that between December 2001 and January 2006 raised copayments for ambulatory care without increasing cost sharing for prescription drugs. We hereafter refer to these plans as case plans.

We matched these 18 case plans to 18 control plans that changed neither copayments for ambulatory care nor coverage of prescription drugs during the identical years in which cost-sharing plans increased copayments for ambulatory care. Each case plan was matched to a control plan on the basis of census region, model type, and tax status. If a case plan could be matched with two or more control plans, we randomly selected one of the control plans. If a control plan was matched with a case plan, it could not serve as a control for another case plan.

After observations for Medicare beneficiaries younger than 65 years of age had been excluded, our main analytic sample included 1,522,067 observations for 899,060 beneficiaries who were enrolled during the period from January 2001 through December 2006.

VARIABLES

The main outcome variables were three measures of utilization of inpatient hospital care: the number of annual inpatient admissions, the number of annual inpatient days, and the probability of any use of inpatient care. Use of inpatient care was defined as including hospital stays for all medical and surgical acute care but excluded hospitalizations for mental health conditions. We also assessed the number of annual outpatient visits. We annualized utilization rates for 13% of observations from enrollees who were members of their plan for less than 12 months.

The primary independent variables were an indicator variable for whether the health plan increased copayments for ambulatory care, an indicator variable for time (0 in the year before the copayments were raised, 1 in the year after), and a term of interaction between these two variables.

Covariates included age (65 to 74 years, 75 to 84 years, or older than 84 years), sex, race or ethnic group (black, white, or other), proportion of persons 65 years of age or older who were living in the enrollee's ZIP Code area and had an income below the federal poverty level, proportion of persons 65 years of age or older who were living in the enrollee's ZIP Code area and had attended college (whether or not they graduated), and year in which the variables were measured.

STATISTICAL ANALYSIS

We used a difference-in-differences approach to assess the effect of increased copayments for ambulatory care on utilization of inpatient and outpatient services. This method accounts for secular trends in outcomes by subtracting the change in utilization in control plans from the concurrent change in plans that increased cost sharing (hereafter referred to as difference-in-differences estimates).

We fitted generalized linear models that included the independent variables and covariates described above. We included an indicator variable for the health plan to account for clustering of observations in health plans and used generalized estimating equations to account for multiple observations for one enrollee. Our model therefore estimates the mean within-plan effect of increased copayments for ambulatory care.

We used a one-part generalized linear model and an identity link with PROC GENMOD

(SAS).[17,18] Our results were not appreciably changed by using a two-part model (which first estimates the probability of any use of care among all enrollees and then estimates the magnitude of utilization for those persons who did receive services), using a log-link, or excluding observations from enrollees who were plan members for less than 12 months. All models were weighted by the number of months subjects were enrolled in their plan.[17]

To account for the exit of enrollees from health plans, we also analyzed data for a cohort of subjects who were continuously enrolled in their plan and assessed the baseline utilization patterns among those who exited the plan as compared with those who remained. This analysis was restricted to persons who were enrolled in a plan for at least 9 months and who did not die during the year before the copayment increase.

We separately estimated difference-in-differences effects for continuously enrolled beneficiaries in three strata of area-level income and education, for three racial or ethnic groups (white, black, other), and for subjects who had hypertension, diabetes, or myocardial infarction in the year before the copayment increase. Enrollees with these conditions were identified with the use of specifications for HEDIS effectiveness-of-care measures pertaining to hypertension, diabetes, and acute myocardial infarction.

To determine whether our results were sensitive to the inclusion of multiple years of data before copayments for ambulatory care were changed, we assessed utilization in eight plans in which no changes in benefits had been made in the 2 years before copayments for ambulatory care were increased and in eight concurrent control plans.

To determine national trends in the Medicare managed-care program, we assessed utilization in all plans with 2 or more years of participation in Medicare. Among the plans in this sample, utilization of inpatient care was stable during the study years, whereas annual outpatient visits increased by an average of 4.7% per year between January 2001 and December 2006. These trends in utilization were similar to those observed in control plans.

All analyses were performed with the use of SAS software, version 9.2. Results are reported with two-tailed P values or 95% confidence in-

tervals. The Brown University Human Research Protections Office and the CMS Privacy Board approved the study protocol.

RESULTS

Case plans increased copayments for primary care visits by 95% (interquartile range, 50 to 150%) and increased copayments for specialist visits by 74% (interquartile range, 33 to 150%). The interquartile range for the absolute value of the increase was $5 to $10 for primary care copayments and $5 to $15 for specialty care copayments. Inpatient cost sharing increased in both case and control plans, although the increase was much larger in the case plans. As compared with enrollees in control plans, enrollees in case plans were more likely to be black and living in areas with slightly lower income and educational attainment (Table 1).

Over time, there was an increase in ambulatory visits in both the case and control plans (Table 2). However, the increase was smaller in case plans than in control plans. In contrast, case plans had significant increases in annual inpatient days, annual inpatient admissions, and the probability of any use of inpatient care, as compared with control plans. Of the 18 case plans, 13 had declines in annual outpatient visits and 15 had increases in annual inpatient admissions, as compared with the concurrent trends in the matched control plans. (See Fig. 1 and 2 in the Supplementary Appendix, available with the full text of this article at NEJM.org.)

Among enrollees with at least 9 months of participation in their plans before the copayment increase, 12.2% exited the case plan after the increase. The concurrent dropout rate in control plans was 11.1% (P<0.001) (Table 3). Enrollees who exited case plans had greater utilization of inpatient care than those who remained. In contrast, enrollees who exited controls plan had lower utilization of inpatient care than enrollees who remained (Table 3).

In a cohort of beneficiaries who were continuously enrolled in their plans, the rate of visits made for ambulatory care increased by a smaller amount in case plans than in control plans (Table 4). However, the use of inpatient care increased by a greater amount in case plans than in control plans. The number of annual inpatient admissions was lower among enrollees in case plans than among those in control plans before the copayment increase but was higher than the

Table 1. Cost Sharing and Enrollee Characteristics in Case and Control Medicare Plans.*

Variable	Case Plans (N=18)		Control Plans (N=18)	
	Year before Copayment Increase	Year after Copayment Increase	Year before Case Plans Increased Copayment	Year after Case Plans Increased Copayment
Mean copayment (range) — $				
Primary care	7.38 (5–15)	14.38 (10–25)	8.33 (0–15)	Unchanged
Specialty care	12.66 (5–25)	22.05 (10–40)	11.38 (0–25)	Unchanged
Inpatient care†	148.33 (0–670)	329.17 (0–1,200)	111.11 (0–500)	177.08 (0–900)
Age — yr	74.2±0.8	74.4±0.8	74.5±1.2	74.7±1.3
Female sex — %	59	59	57	57
Race — %				
White	81	81	91	91
Black	12	11	5	5
Other	7	8	4	4
Income below federal poverty level — %	10	10	9	9
College attendance — %	30	30	33	32

* Plus–minus values are means ±SD.
† The amounts listed represent the expected copayments for a 4-day hospital stay.

Table 2. Change in Rates of Use of Outpatient and Inpatient Care in Case and Control Plans.*

Variable	Case Plans			Control Plans			Between-Group Difference	
	Year before Copayment Increase	Year after Copayment Increase	Change	Year before Case Plans Increased Copayments	Year after Case Plans Increased Copayments	Change	Unadjusted	Adjusted (95% CI)
Annual outpatient visits per 100 enrollees	702.0	720.5	18.5	753.4	798.9	45.5	−27.0	−19.8 (−23.1 to −16.6)
Annual hospital admissions per 100 enrollees	25.3	27.6	2.3	25.8	26.1	0.3	2.0	2.2 (1.8 to 2.6)
Annual hospital days per 100 enrollees	133.5	145.9	12.4	125.6	126.7	1.1	11.3	13.4 (10.2 to 16.6)
Percentage of enrollees with any use of inpatient care	15.4	16.3	0.9	15.9	16.2	0.3	0.6	0.7 (0.5 to 1.0)

* CI denotes confidence interval.

Table 3. Baseline Use of Care among Enrollees Who Exited and Those Who Remained in Case and Control Plans.*

Variable	Case Plans			Control Plans			Between-Group Difference (95% CI)
	Exited Plan (N=43,641)	Remained in Plan (N=314,245)	Difference (95% CI)	Exited Plan (N=35,307)	Remained in Plan (N=281,505)	Difference (95%CI)	
Annual outpatient visits per 100 enrollees	571.3	694.8	−123.5 (−129.7 to −117.2)	526.8	752.8	−226.0 (−233.5 to −18.6)	102.6 (92.9 to 112.2)
Annual hospital admissions per 100 enrollees	22.0	20.2	1.8 (1.2 to 2.4)	18.9	20.9	−2.0 (−2.7 to −1.3)	3.8 (2.9 to 4.7)
Annual hospital days per 100 enrollees	107.1	95.5	11.6 (7.4 to 15.8)	86.8	91.0	−4.2 (−8.5 to 0)	15.8 (9.8 to 21.8)
Percentage of enrollees with any use of inpatient care	14.9	14.0	0.8 (0.5 to −1.2)	12.3	14.8	−2.6 (−3.0 to −2.2)	3.4 (2.9 to 3.9)

* CI denotes confidence interval.

Table 4. Change in Rates of Use of Outpatient and Inpatient Care among Beneficiaries Who Were Continuously Enrolled in Case and Control Plans.*

Variable	Case Plans			Control Plans			Between-Group Difference	
	Year before Copayment Increase	Year after Copayment Increase	Change	Year before Case Plans Increased Copayments	Year after Case Plans Increased Copayments	Change	Unadjusted	Adjusted (95% CI)
Annual outpatient visits per 100 enrollees	699.3	747.1	47.8	766.2	825.5	59.3	−11.5	−10.2 (−13.4 to −7.0)
Annual hospital admissions per 100 enrollees	20.2	28.5	8.3	20.9	27.3	6.4	1.9	2.0 (1.6 to 2.4)
Annual hospital days per 100 enrollees	95.6	151.5	55.9	91.0	132.8	41.8	14.1	14.4 (11.3 to 17.7)
Percentage of enrollees with any use of inpatient care	13.9	16.9	2.9	14.8	16.9	2.2	0.8	0.8 (0.6 to 1.0)

* CI denotes confidence interval.

rate for enrollees in control plans after the copayment increase (adjusted difference-in-difference estimate, 2.0 admissions per 100 enrollees; 95% confidence interval, 1.6 to 2.4).

The effects of increased ambulatory cost sharing on utilization of care were increased for enrollees living in areas of low income and education and for enrollees who had diabetes, hypertension, or a history of myocardial infarction. Increases in the utilization of inpatient and outpatient care were greater among black enrollees in case plans than among black enrollees in control plans; difference-in-difference estimates for utilization of inpatient care were greater for black enrollees than for white enrollees (Fig. 1).

In a sensitivity analysis of eight case plans in which copayments for ambulatory care and for prescription drugs had been constant for 2 years before being increased, the mean (±SE) rates of annual inpatient admissions in case plans were 26.1±1.0 per 100 enrollees 2 years before the copayment increase, 26.1±1.0 per 100 enrollees 1 year before the copayment increase, and 27.9±1.0 per 100 enrollees 1 year after the copayment increase. The corresponding rates in control plans were 27.3±0.7, 27.7±0.7, and 27.5±0.7.

DISCUSSION

We examined the consequences of increasing copayments for ambulatory care in a large, nationally representative sample of elderly Medicare enrollees in managed-care plans. As compared with matched control plans in which copayments for ambulatory care were unchanged, Medicare plans that increased these copayments by an average of 95% for primary care and 74% for specialty care had a reduction in the number of outpatient visits but an increase in hospital admissions, in the number of days of hospital care, and in the proportion of enrollees who used hospital care. According to our estimates, for every 100 elderly enrollees exposed to this level of increased cost sharing for ambulatory care, there would be 20 fewer outpatient visits during the first year after the increase but more than 2 additional admissions for acute care and approximately 13 additional inpatient days in the year after the increase. The effects of copayment increases on the subsequent use of inpatient care were magnified for enrollees living in areas with low income and low educational levels, for black enrollees, and for

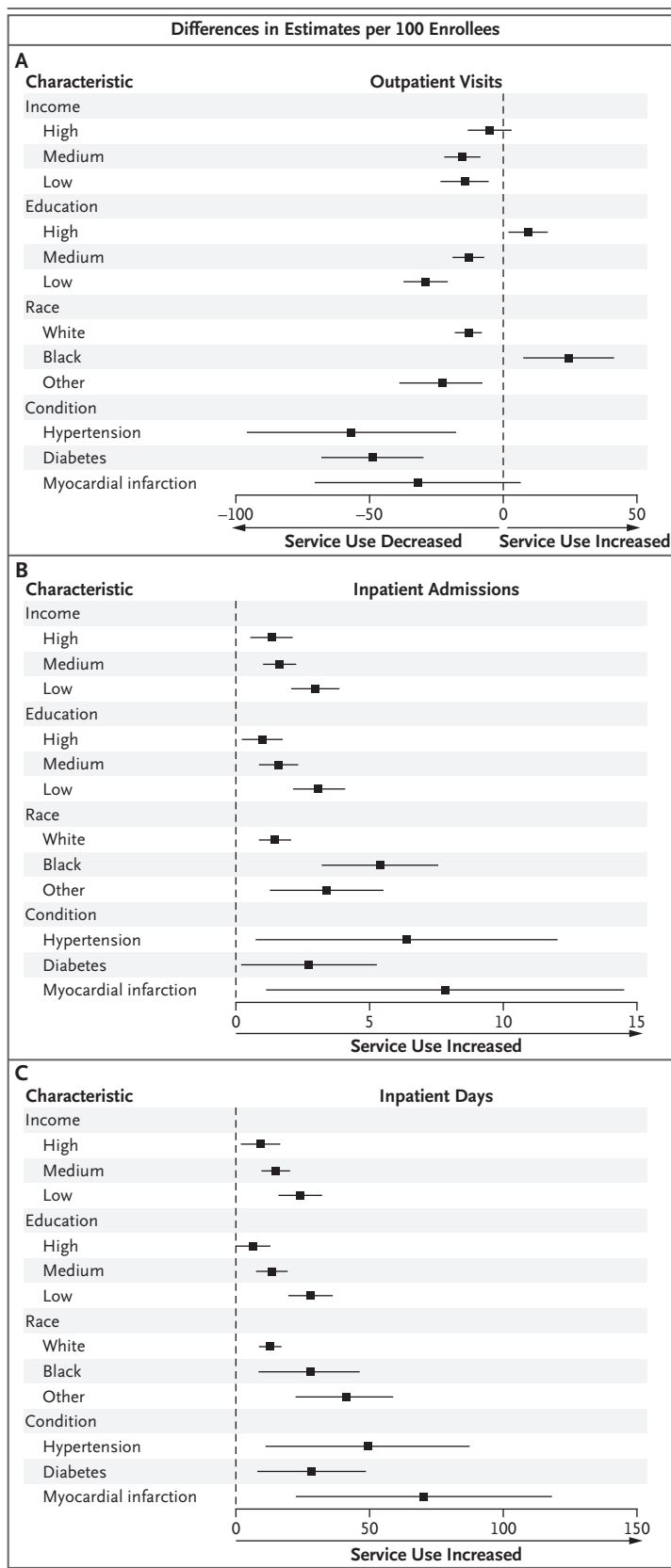**Differences in Estimates per 100 Enrollees**

A

Figure 1. Difference-in-Differences Estimates per 100 Enrollees for Annual Outpatient and Inpatient Services in Case Plans as Compared with Control Plans, According to Income, Education, Race, and Presence of Chronic Conditions.

Estimates are shown for outpatient visits (Panel A), inpatient admissions (Panel B), and inpatient days (Panel C). Income denotes the percentage of persons in an enrollee's ZIP Code area who were 65 years of age or older and had an annual income below the federal poverty level. High refers to the ZIP Code areas in the highest quartile for income above the poverty level, medium to the middle two quartiles, and low to the lowest quartile. Education denotes the percentage of persons in an enrollee's ZIP Code area who were 65 years of age or older and had attended college. High refers to the ZIP Code areas in the highest quartile of college attendance, medium to the middle two quartiles, and low to the lowest quartile. "Service use increased" refers to an increase in the use of services in case plans as compared with the concurrent trend in control plans, and "service use decreased" refers to a decrease in the use of services in case plans as compared with the concurrent trend in control plans.

enrollees who had hypertension, diabetes, or a history of acute myocardial infarction as compared with the effects observed for the entire study cohort.

These changes occurred despite two trends that would have been likely to reduce utilization of inpatient care in plans that increased copayments for ambulatory care. First, enrollees with historically higher use of inpatient care exited the plan after copayments increased, whereas this pattern was reversed in control plans, which maintained lower copayments. This result is consistent with the expected selection effects in response to increased cost sharing — namely, sicker enrollees avoid health plans with higher copayments.[19] Second, health plans that increased copayments for ambulatory care simultaneously increased copayments for inpatient care, which has been found in other studies to discourage use of hospital care.[7,20] By examining the benefit structure of each health plan, we excluded the possibility that changes in utilization of inpatient care were the result of other changes in the insurance-benefit design in case or control health plans.

Few studies have assessed the consequences of increased outpatient copayments on subsequent utilization of inpatient care. In the RAND Health Insurance Experiment, persons who had to pay an annual deductible for outpatient care made fewer outpatient visits and also had fewer

inpatient admissions than did persons who received free care, suggesting that increased cost sharing for outpatient care does not promote greater use of hospital care.[2] However, the RAND experiment excluded elderly patients and ended in 1982. Therefore, these findings may not be generalizable to contemporary elderly populations. For example, the rates of use of inpatient care in our study were approximately twice as great as the rates reported for the cohort in the RAND experiment.

Our results are broadly consistent with the results of two studies of copayment increases for outpatient care among Medicaid and Medicare enrollees. The introduction of a $1 copayment in California's Medicaid program in 1972 was associated with an 8% reduction in physician visits and a 17% increase in hospital days.[13] Similarly, the introduction of a $10 copayment among elderly beneficiaries receiving supplemental insurance benefits through the California Public Employees Retirement System resulted in substantial declines in outpatient visits but increased utilization of hospital care.[12] In both studies, there was a concurrent rise in cost sharing for prescription drugs, making it difficult to isolate the effect of the new copayments for outpatient care.

Our findings are also consistent with an increasing body of research showing that uniform increases in cost sharing for prescription drugs without consideration of the value of the medication or the clinical and socioeconomic status of the affected patients can have deleterious effects on health.[21-24] The results also extend our previous work showing that elderly enrollees in managed-care plans reduce their use of effective medical care in response to copayments as low as $10.[25,26]

According to the findings of the RAND Health Insurance Experiment and other studies of non-elderly insured populations, cost sharing has generally been thought to reduce total health care spending without harming health for the average person.[2,27-32] Our results, however, suggest that increasing copayments for ambulatory care among elderly Medicare beneficiaries may be a particularly ill-advised cost-containment strategy. Assuming an average reimbursement of $60 for an outpatient visit,[33] seven annual outpatient visits per enrollee, and an average copayment increase of $8.50 per visit, a Medicare plan would receive an additional $5,950 in patient copayments and avert $1,200 in spending on outpatient visits for every 100 enrollees, for a total of $7,150 in savings for the health plan. However, assuming an average cost of $11,065 for hospitalization of a person 65 to 84 years of age in 2006,[34] our estimates suggest that expenditures for inpatient care will increase by $24,000 for every 100 health plan enrollees in the year after copayments for ambulatory care are increased. Even if we used the upper bound of the 95% confidence interval for the estimate of outpatient visits, used the lower bound of the 95% confidence interval for the estimate of inpatient admissions, and doubled the average reimbursement for an outpatient visit, additional expenditures for hospital care would still exceed any savings from the copayment increase by a factor of nearly two.

The main limitation of our study is that enrollees were not randomly assigned to case and control plans. However, our findings were observed in a cohort of continuously enrolled beneficiaries, suggesting that our results were not biased by selective enrollment in and exit from health plans in response to changes in cost sharing. In addition, utilization of inpatient care was lower in case plans than in control plans during the year before the copayment increase, indicating that enrollees in case plans were not inherently more likely to use hospital care. However, we cannot fully exclude the possibility that unmeasured differences between case and control plans influenced our results.

We observed the use of care over a short period of time. Different patterns might have emerged if we had been able to follow a sizable cohort for more than 3 years. We were unable to match case plans with control plans in a geographic area smaller than a census region, given the relatively small number of Medicare plans in the country.

Our analysis did not include data on the diagnoses, procedures, and costs associated with hospital admissions and outpatient visits. We could not assess the timing of forgone outpatient visits in relation to hospital admissions. Finally, because of the small number of case plans, we were unable to evaluate separately the effects of increasing cost sharing for primary care visits as opposed to specialty care visits or the relationship between the magnitude of cost-sharing increases and subsequent use of hospital care.

In conclusion, increasing copayments for ambulatory care reduced the use of outpatient care among elderly enrollees in managed-care plans, but this decline was offset by an increase in hos-

pitalizations, particularly among enrollees with low socioeconomic status and those with chronic disease. Increasing copayments for ambulatory care among elderly patients may have adverse health consequences and may increase spending for health care.

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