

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: *Frontiers in Health Policy Research*, volume 1

Volume Author/Editor: Alan M. Garber, editor

Volume Publisher: MIT

Volume ISBN: 0-262-57120-X

Volume URL: <http://www.nber.org/books/garb98-1>

Publication Date: January 1998

Chapter Title: Persistence of Medicare Expenditures among Elderly Beneficiaries

Chapter Author: Alan M. Garber, Thomas E. MaCurdy, Mark B. McClellan

Chapter URL: <http://www.nber.org/chapters/c9826>

Chapter pages in book: (p. 153 - 180)

Persistence of Medicare Expenditures among Elderly Beneficiaries

Alan M. Garber, *Veterans Affairs Palo Alto Health Care System, Stanford University, National Bureau of Economic Research, Inc.*

Thomas E. MaCurdy, *Stanford University, National Bureau of Economic Research, Inc.*

Mark B. McClellan, *Stanford University, National Bureau of Economic Research, Inc.*

Executive Summary

The highly uneven distribution of Medicare payments among elderly beneficiaries, combined with the predictability of some of the expenditures, poses several challenges to the Medicare program. We present information about the distribution of Medicare expenditures among beneficiaries in specific years, accompanied by new evidence on the extent to which Medicare payments for the care of individual beneficiaries persist over long time periods. Our analysis is based on a longitudinal population of Medicare enrollees during the years 1987 to 1995. We find that high-cost users accounted for a disproportionate share of the growth of Medicare Part A (hospital) payments during this period, but that an increase in the number of beneficiaries using covered services was largely responsible for the growth of Medicare Part B payments. Few beneficiaries are in the highest-cost categories for multiple years; the high mortality rates of individuals who use medical services heavily, whether the expenditures occur in one year or repeatedly, limits the extent of expenditure persistence. Even among survivors, it is unusual to remain in the highest-cost categories for multiple years. Nevertheless, individuals with high expenditures in one year are likely to have higher than average expenditures in other years, and expenditures are highly skewed even over a period of nine years. Any policy to reform Medicare will need to accommodate expenditure persistence to provide adequate coverage for all beneficiaries.

I. Introduction

Policy debates about controlling health care costs and about the value of medical expenditures necessarily focus on the minority of individuals who incur high costs. These debates are particularly pressing for

This work was supported in part by the Commonwealth Fund, the National Institute on Aging, and the Olin Foundation. We are grateful for the assistance of Hoon Byun, Jean-Paul Sursock, and John Johnson.

the Medicare program for several reasons. First, because it covers the elderly and individuals with long-term disabilities, Medicare has a disproportionate share of high-cost users of health care: Even though Medicare covers only one-sixth of the population, those covered account for around one-third of U.S. health care expenditures. Second, Medicare is an enormous entitlement program whose expenditures have been rising rapidly. Substantial reform of the program appears inevitable: According to current projections of the Medicare trustees, the Medicare Part A trust fund will become insolvent by 2001. Although the Medicare recipients we study are somewhat homogeneous because all are elderly, even within this population expenditures are highly skewed. In 1994, for example, 62% of Medicare beneficiaries had reimbursements averaging less than \$1,000, whereas 4% had claims of \$25,000 or more, and an additional 4% had reimbursements of between \$15,000 and \$25,000 (Gornick et al. 1996). Every year, approximately 10% of Medicare beneficiaries account for three-fourths of program outlays; health expenditures in the general population are similarly skewed (Berk and Monheit 1992). Judgments about some of the most difficult issues for Medicare reform involve the persistence of expenditures for this subset of beneficiaries.

Considerable empirical research, along with the prevalence of chronic health problems in the Medicare population, suggest that an individual's past use of medical services helps predict future use. The 46% of the general population that has at least one chronic condition generates about three-quarters of all health expenditures; about 88% of Americans 65 and older have at least one chronic condition (Hoffman, Rice, and Sung 1996). Not all chronic conditions are serious enough to require extensive, ongoing medical treatment. But once a person has been treated for end-stage renal disease, severe congestive heart failure, cancer, emphysema, or many other serious conditions, we know that he or she is likely to use medical care more frequently and incur higher costs than individuals without a serious chronic illness. For similar reasons, a man or woman who has high medical expenditures in one year is likely to generate significantly higher than average health expenditures in future years. This does not mean that it is possible to predict any single person's health expenditures with precision, but it does imply that entire classes of people can be identified as potentially high-cost patients on the basis of such characteristics as their age, sex, race, and medical diagnoses as well as their prior treatments and expenditure history. Even though these features are associated with

substantial predictable differences in expenditures, however, the individuals involved often know more than insurers or health care providers about their likelihood of experiencing high costs. It is difficult to capture all of the subtle factors that may influence use of medical care in even detailed databases, and some uses of medical care by individuals—such as elective surgical procedures in previously healthy beneficiaries—may be expected yet not predictable on the basis of any characteristics that a payor or an analyst can observe.

These distinctive features of health care use combine to create some very difficult and complex policy problems for Medicare, with contradictory solutions. The fact that health involves small risks of potentially serious and costly diseases implies that individuals ordinarily want to obtain some kind of insurance against the possibility of these adverse events. Insurance works best when its potential purchasers have no special information about their risk of an adverse event and when they all face similar risks—whether the risk of loss involves a fire, an automobile accident, a flood, or a health problem. If risks differ, and if the potential purchaser knows more about his or her risk than the insurer, then risk selection is likely to create problems for insurance markets (Pauly 1986). At any price, an insurance plan appears to be a better value for someone who expects to use a lot of medical care than for someone who does not plan to use much care. If each health plan can charge only one price to enrollees, and if different kinds of health plans are available, individuals may end up with too little insurance. Lower-risk individuals may buy less generous insurance than they would prefer to avoid plans with higher-risk enrollees (Rothschild and Stiglitz 1976). This phenomenon may even cause “death spirals” of unstable premium growth in the most generous insurance plan choices (Price and Mays 1985).

One solution to this problem is to restrict plan choice: If everyone must join a single plan, there is little potential for risk segmentation. Indeed, when nearly all Medicare beneficiaries belonged to “traditional” Medicare, risk selection was not an issue. Although restricting choice limits the adverse selection problem, many critics have argued that it creates other serious problems. With a captive audience, an insurer does not need to make sure that it is producing the benefits and services that its enrollees most desire for the cost. Enrollees also have little incentive to consider whether the services they receive in the plan are worth the expenditures involved. For these reasons, Alain Enthoven (Enthoven and Singer 1996) and others have advocated reforms

that increase health plan choice and thus competition to increase efficiency in Medicare. Among other things, such reforms would give individuals more alternative plans (and more useful information about those choices) and stronger financial incentives to choose a plan that is worth the cost. For example, Medicare might pay a fixed amount per year toward a beneficiary's purchase of any of a range of accepted plans. But such reforms could increase pressures for adverse selection and substantially increase many beneficiaries' out-of-pocket costs of care. Healthy beneficiaries would have stronger incentives to select less generous plans, and individuals with chronic illnesses might have to pay considerably more for plans that provided better coverage for their conditions. The system of plan choice that Medicare uses today may have developed in part to avoid such problems. Beneficiaries can choose to join managed-care plans, but in contrast to the choice system used by many private firms, price competition among such plans is severely limited. As a result, plans must compete largely on the basis of benefits, which limits one of the dimensions on which selection can occur (McClellan 1997).

One approach to address the adverse selection problem while allowing health plan choice is to risk adjust the premiums that health insurers and health plans receive. Improving risk adjustment methods has become a major research and policy concern (Iezzoni 1994). A principal goal of risk adjustment methods is to compensate health plans and providers for the intrinsically higher costs of care associated with higher-risk enrollees and conversely to limit the financial rewards from attracting relatively healthy enrollees. A perfect risk adjustment system would feature premiums that matched an individual enrollee's risk, so that health plans and providers would compete on the basis of quality of care rather than risk selection.

Risk adjustment, however, is not currently able to overcome adverse selection and the problems it causes. First, perfect risk adjustment is not feasible. State-of-the-art risk adjustment methods based on diagnoses typically explain about 7% of the variation in medical expenditures from one year to the next. Although much of the remaining 93% may not be predictable, and thus is not a problem for insurance markets, a considerable fraction of it is likely to be predictable, in the sense that beneficiaries know it when they are choosing plans. For example, many intensive medical procedures such as elective joint replacements or cataract operations are largely predictable, in that an enrollee may be able to wait several months from the time that he or she suspects

that the operation would be beneficial, so that the need for the procedure is known well in advance. In addition, prior use of intensive procedures such as hospitalizations or major operations, as well as prior expenditures, have considerably more predictive power for explaining expenditures compared to diagnoses alone. But if intensive treatments and prior expenditures are included in risk adjustment methods, they introduce another incentive problem: An individual or a plan would be more willing to provide higher-cost treatments, because they would know that providing those treatments today would increase the payments they would receive in the future.¹

Finally, risk adjustment may have substantial distributional implications, which many economists have argued should be addressed directly, or at least should be understood explicitly when they are undertaken implicitly in social programs. To the extent that expenditure differences in the future are known and Medicare compensates beneficiaries for these differences, then Medicare is redistributing wealth from low- to high-risk individuals rather than simply providing insurance. For example, if I know that I am likely to develop chronic lung disease, because it runs in my family or because I smoke, it might make sense for me to save money now in anticipation of the costs of hospitalization or higher costs of my insurance in the future. Such precautionary saving is expected when future events are certain and compensation through an insurance program is not available. Without risk adjustment, I might save more, because I would not expect as much compensation from Medicare over my lifetime; with risk adjustment, I would probably be better off, but those with lower risks of chronic illnesses—who would presumably receive fewer benefits or would contribute to the risk adjustment payments—might be worse off. Every policy option for Medicare has distributional implications for those with and without high risk of illness, and the potential magnitudes of predictable differences in health costs across individuals imply that such redistribution may be large.

This review of some of the conflicting efficiency and distributional problems facing potential reforms in the Medicare program highlights our surprisingly limited understanding of a crucial topic for balancing all of these concerns: the persistence of expenditures for Medicare beneficiaries over long time periods. Virtually all the studies of risk adjustment and adverse selection in Medicare assess differences in risk

1. This is another form of the moral hazard problem.

from one year to the next—a relatively brief portion of most beneficiaries' years enrolled in Medicare. This limited perspective can lead to a correspondingly limited and potentially misleading perspective on Medicare reforms. For example, the presence of a chronic illness such as cancer in one year may predict expenditures much higher than average in the next year, as the patient receives followup therapies to consolidate the initial cancer treatment. But if the cancer goes into remission or is cured, then the patient's expenditures may not be very much higher than average in subsequent years. Alternatively, an individual with very high expenditures due to a severe chronic illness such as advanced heart failure may die within several years of developing the condition, again limiting the illness's importance from the standpoint of long-term risk selection. The fact that 27% of Medicare expenditures occur in the last year of life suggests that this limitation on long-term persistence is important. Consequently, single-year expenditures or expenditure persistence over two years may give a misleading picture of longer-term expenditure persistence in Medicare; beneficiaries who have the highest expenditures over many years may look quite different from beneficiaries who have high expenditures over only two or three years. Thus policies based on year-to-year persistence may have unintended effects. They may target efforts to provide long-term access to adequate insurance and compensation on individuals who experience high-cost episodes of care for a year or two, rather than those who face the greatest problems of long-term expenditure persistence.

Another important reason to assess differences in Medicare expenditures over longer time periods concerns the "moving target" nature of Medicare policy problems. Treatments available for health problems change, with potentially important consequences for the concentration of expenditures and their persistence over time. For example, as new but costly treatments for irregular heart rhythms and heart failure become available, persistence may increase if individuals who would have died from the condition now survive longer with a costly chronic illness. If changes in treatment affect low- and high-cost patients differently, the concentration of expenditures in Medicare in 1992—and the reasons for the concentration—may be quite different from the concentration in 1997. Thus risk adjustment methods may become outdated as novel treatments are introduced, but there is little information with which to assess the performance of specific risk adjustment methods over time.

Moreover, to the extent that Medicare expenditure growth is a policy concern, understanding the sources of expenditure growth is critically important. Although a small fraction of individuals may account for a large share of expenditures at a given point in time, they may account for a relatively larger or smaller share of expenditure growth, suggesting that efforts to address expenditure growth should be adjusted accordingly.

For all of these reasons, a longer-term perspective on expenditure persistence can provide crucial evidence for policy. We present new evidence on the extent to which expenditures persist over long time periods in the Medicare program and on the contribution of high-cost beneficiaries to Medicare expenditure growth. Our analysis of persistently high medical expenditures is based on a longitudinal population of Medicare enrollees. The sample is representative of all Americans 65 years of age and older. We focus on the persistence of expenditures for services the Medicare program covers. However, we also consider these beneficiaries' out-of-pocket payments and thus total expenditures for Medicare-covered services. Certain medical expenditures not covered by Medicare, in particular outpatient pharmaceuticals and long-term nursing home stays, are not included.

In the next section, we describe our data set in more detail. The section after that presents results on expenditure persistence over long time periods. We review the concentration of expenditure growth in high-cost users leading to significant increases in the skewness of Medicare expenditures over time. We also describe in detail how expenditures persist over time periods as long as a decade and analyze the contribution of death and returns to lower expenditure levels in limiting long-term persistence. We find that expenditure persistence over long time periods is actually quite different from that suggested by year-to-year persistence. In the final section, we discuss some implications of these results for a range of proposed Medicare policy reforms and highlight some further questions for research.

II. Data

To study expenditure persistence, we compiled longitudinal summary data from all Medicare claims filed by a random sample of approximately 37,000 beneficiaries (0.08% of all Medicare beneficiaries) over the nine-year period from 1987 through 1995. We focused on total Medicare expenditures and their major components: Part A hospital

expenditures (including both acute and nonacute admissions covered by Medicare), hospice expenditures (Part A), home health expenditures (mainly Part A), outpatient hospital expenditures (Part B), and physician and other supplier expenditures (Part B).² We considered two principal measures of each of these types of expenditures: actual Medicare program expenditures (Medicare reimbursement) for the care of beneficiaries and total expenditures for these services, inclusive of patient payments. Thus total expenditures included the beneficiary's liabilities due to copayments, deductibles, and maximum limits for Medicare payments. Expenditures for services Medicaid does not cover at all, such as outpatient prescription drugs, were not included.³ For the most part, beneficiary payments track Medicare reimbursements closely. Although we focus primarily on Medicare program payments in the results below, results for total reimbursement and patient payments were quite similar.

We calculated annual expenditures by summing up all valid claims of each type. We excluded all beneficiaries younger than 65 years of age as well as beneficiaries who resided outside the United States or were enrolled in health maintenance organizations.⁴ We converted all costs into constant 1996 dollars using the general Consumer Price Index (CPI).

III. Results

Contribution of High-Cost Beneficiaries to Expenditure Growth

Early in the 1980s, the Health Care Financing Administration addressed rising hospital costs by introducing the Prospective Payment System (PPS) for Medicare-financed hospital care covered by Part A.

2. We integrated information from the five major administrative data files the Health Care Financing Administration maintains: claims for hospital and skilled nursing facility stays (MEDPAR, or Medical Provider Analysis and Review files), home health care (HHA, or Home Health Agency), hospice care, and outpatient visits and other Part B services (from the "Outpatient 5% Bill Skeleton File" and BMAD, or the Part B Medicare Annual Data files).

3. The other major type of uncovered service is long-term stays in nursing homes. Nursing home admissions after an acute-care admission are covered for the first 100 days, so that Medicare now covers the vast majority of shorter, nonacute hospital stays for the elderly.

4. We excluded these patients because detailed claims information—which we intend to use in later work—is not reliably available for them. Assigning the relevant Medicare Annual Adjusted Per Capita Cost (AAPCC) rate for the HMO beneficiaries and including them in the analysis does not appreciably alter our results.

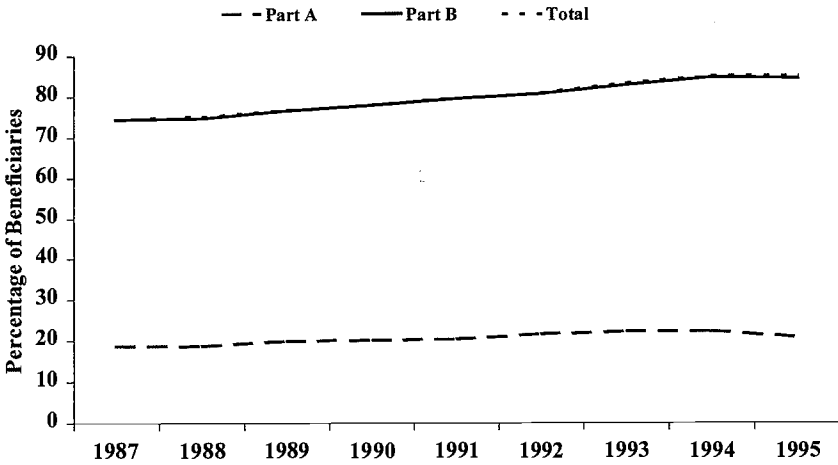


Figure 5.1
Percentage of beneficiaries who receive Part A and Part B services

Subsequently, it introduced changes in payments for Part B (primarily physician) services as well, although none represented as dramatic a change in the basic payment approach as the introduction of PPS. By the late 1980s and early 1990s, Part B drew more attention because its expenditures were rising. Although Part B claims are usually much smaller than Part A claims, many more Medicare recipients have Part B claims. As figure 5.1 shows, essentially all Medicare recipients who have any claim in a given year will have at least one Part B claim. Any other result would be surprising, because it is difficult to be hospitalized (largely reimbursed by Part A) without receiving the services of a physician (reimbursed by Part B). In addition, the fraction of Medicare recipients using Part B services has traditionally been large and grew substantially from 1987, when the fraction was 74%, to 1995, when 84% had claims.

An immediately apparent group of “high-cost users” of Medicare-covered services consists of all beneficiaries who were hospitalized, that is, who had a Part A claim. Between 1987 and 1993, the fraction using Part A services grew slowly, from 19% to 22%, and actually declined to 21% in 1995. Despite the slow growth and late decline in the fraction with hospital claims, inflation-adjusted Part A expenditures among hospitalized patients grew more rapidly than the Part B claims among those who used Part B services. Real Part A reimbursements per individual with a Part A claim rose by 58% between 1987

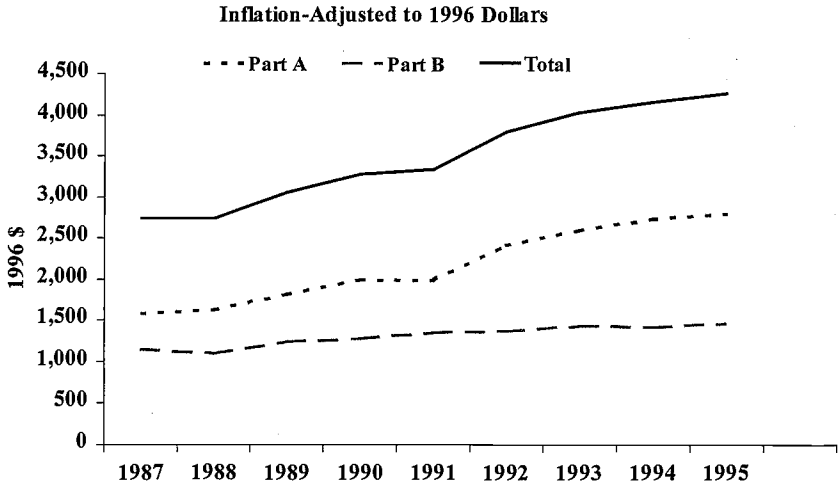


Figure 5.2

Average Medicare payments per elderly beneficiary, 1987–1995

and 1995, while reimbursements for Part B patients with claims rose by only 12%. Overall Medicare reimbursements for patients receiving services rose by 37%. Thus, in a period when Medicare's PPS for hospital care had been in place and when hospital use generally declined, the cost of each hospital admission, rather than growth in the fraction with hospital claims, drove Part A expenditure growth. In contrast, the number using services, rather than the total value of claims per recipient using services, explained most of the growth in Part B expenditures.

As can be seen in figure 5.2, combined Part A and Part B expenditures per Medicare beneficiary rose substantially from 1987 to 1995. In 1996 constant dollars, expenditures per enrollee were \$2,736 (of which \$1,153 was Part B) in 1987 and \$4,267 (\$1,471 Part B) in 1995, a 56% increase. The beneficiaries who had Part A claims used Part B–reimbursed services more than twice as heavily as average Medicare beneficiaries. These services include both office visits and physician services administered during hospitalization.

During this period expenditure growth was concentrated among the high-cost users of Medicare-reimbursed services (figure 5.3). Although few Medicare enrollees had no claims (about a quarter in 1987, and only 15% in 1995), the typical enrollee's claims were modest. Median expenditures rose from \$647 in 1987 to \$884 in 1995, a 37% cumulative rate of growth. The group with the top 2% of expenditures, however,

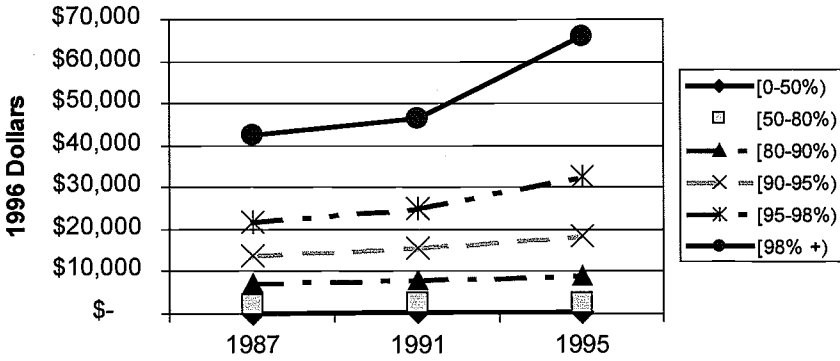


Figure 5.3
Average combined Part A and Part B Medicare expenditures by percentile groups in selected years

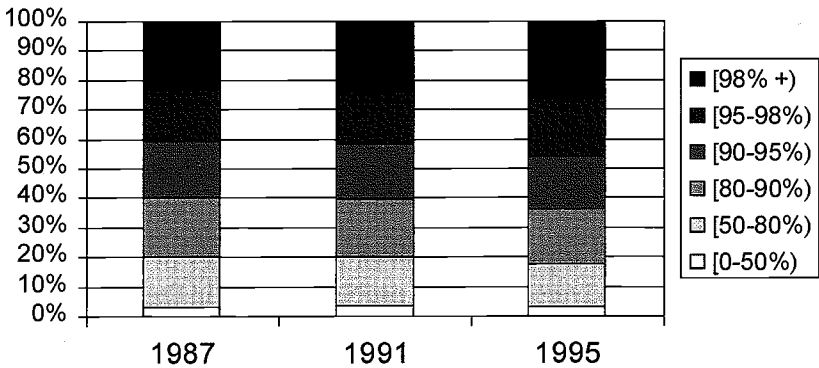


Figure 5.4
Shares of combined Part A and Part B Medicare expenditures by percentile groups in selected years

experienced a cumulative rate of growth of 52%, as average expenditures rose from \$28,000 in 1987 to \$42,000 in 1995. Changes in the share of expenditures attributable to each percentile group also reflected this concentration of growth in the upper percentiles of expenditures, as figure 5.4 shows. This figure plots the proportion of combined Part A and Part B expenditures due to each percentile group by expenditure and shows that by 1995 the top 2% of Medicare recipients, ranked by expenditure levels, accounted for about the same fraction of overall expenditures as the lower 90%. The percentage of expenditures falling into the very highest percentiles, not shown in figure 5.4, suggests an

even more dramatic concentration of expenditures among the highest cost users. In 1995, the group falling between the 99th and 99.5th percentile accounted for 7% of all expenditures, the group from 99.5th to 99.9th percentile accounted for an additional 8%, and the top one-tenth of one percent of recipients accounted for nearly 4% of Medicare expenditures. Overall, therefore, the top 1% accounted for about 19% of Medicare expenditures; the portion of expenditures attributable to the highest percentiles tended to rise with time.

The upper percentiles were also responsible for a rising share of Part A expenditures. The 80th percentile is a particularly interesting group because this very crudely approximates the percentile that would result from having a hospitalization during the calendar year. The 80th–90th percentile group's share of total expenditures declined slightly, from about 20% to 18%, between 1987 and 1995. Although average Medicare expenditures for this group rose by 15% over these years, average expenditures for the 95th percentile rose by 39%, and average expenditures for the 98th percentile rose by 52%. Thus high-cost users of Medicare services were disproportionately responsible for both the level and the rate of growth of Medicare expenditures.

Persistence of Expenditures over Multiple Years

Skewness in annual expenditures, even if it increases over time, does not imply that the adverse selection problems noted in the introduction will occur. Such problems occur only if variation in expenditures is predictable. One aspect of predictability is persistence: Do Medicare beneficiaries with high expenditures in one year tend to have high expenditures subsequently? The answer, according to the results in tables 5.1a to 5.1d, is yes. Each of these tables presents information about beneficiaries according to their expenditure group in 1989 (top set of rows) and 1993. Figures 5.5a (for 1989) and 5.5b (for 1993) illustrate graphically some of the findings from table 5.1a. Figure 5.5a shows that if a beneficiary was in a high expenditure group in 1989, his or her expenditures one or two years before, or one or two years later, were expected to be higher than average. Similarly, a person in the low expenditure group in 1989 could be expected to have lower than average expenditures in the years immediately preceding or following 1989. Figure 5.5b demonstrates that these results also apply to 1993 categories and are especially pronounced for the top percentiles. In both 1987 and 1991, for example, the mean expenditures for

Table 5.1a
Persistence of expenditures for beneficiaries in various expenditure categories (average Medicare expenditures over time for surviving persons in category, in 1996\$)

Expenditure category	Year									
	1987	1988	1989	1990	1991	1992	1993	1994	1995	
Beneficiary rank in 1989										
Low (0-50 th percentile)	1,233	1,076	165	1,969	2,352	—	—	—	—	—
Middle (50 th -95 th percentile)	3,322	3,712	4,771	5,244	5,418	—	—	—	—	—
50 th -80 th percentile	2,998	3,167	2,235	4,474	4,909	—	—	—	—	—
80 th -95 th percentile	3,955	4,786	9,846	6,993	6,658	—	—	—	—	—
High (95 th + percentile)	5,139	8,343	34,015	13,132	9,539	—	—	—	—	—
Beneficiary rank in 1993										
Low (0-50 th percentile)	—	—	—	—	1,416	1,352	211	2,364	2,896	—
Middle (50 th -95 th percentile)	—	—	—	—	3,880	5,186	5,758	6,280	6,536	—
50 th -80 th percentile	—	—	—	—	3,321	4,055	2,509	4,926	5,628	—
80 th -95 th percentile	—	—	—	—	4,978	7,428	12,256	9,399	8,829	—
High (95 th + percentile)	—	—	—	—	6,965	11,627	41,921	16,164	13,636	—

Table 5.1b
 Persistence of expenditures for beneficiaries in various expenditure categories (average Medicare expenditures over time for survivors and decedents in category, in 1996\$)

Expenditure category	Year									
	1987	1988	1989	1990	1991	1992	1993	1994	1995	
Beneficiary rank in 1989										
Low (0-50 th percentile)	1,233	1,076	165	1,932	2,238	—	—	—	—	—
Middle (50 th -95 th percentile)	3,322	3,712	4,771	4,817	4,633	—	—	—	—	—
50 th -80 th percentile	2,998	3,167	2,235	4,283	4,464	—	—	—	—	—
80 th -95 th percentile	3,955	4,786	9,846	5,884	4,969	—	—	—	—	—
High (95 th + percentile)	5,139	8,343	34,015	9,439	5,501	—	—	—	—	—
Beneficiary rank in 1993										
Low (0-50 th percentile)	—	—	—	—	1,416	1,352	211	2,322	2,752	—
Middle (50 th -95 th percentile)	—	—	—	—	3,880	5,186	5,758	5,740	5,477	—
50 th -80 th percentile	—	—	—	—	3,321	4,055	2,509	4,718	5,087	—
80 th -95 th percentile	—	—	—	—	4,978	7,428	12,256	7,775	6,247	—
High (95 th + percentile)	—	—	—	—	6,965	11,627	41,921	12,441	8,320	—

Table 5.1c
Cumulative percentage of beneficiaries in various expenditure categories who die in subsequent years

Expenditure category	Year									
	1987	1988	1989	1990	1991	1992	1993	1994	1995	
Beneficiary rank in 1989										
Low (0-50 th percentile)	—	—	1.9	4.9	8.4	12.2	16.5	20.8	25.0	
Middle (50 th -95 th percentile)	—	—	8.1	14.5	21.2	27.1	32.7	38.1	43.1	
50 th -80 th percentile	—	—	4.2	9.0	15.2	20.2	25.5	31.0	35.9	
80 th -95 th percentile	—	—	15.8	25.3	33.2	40.8	47.0	52.3	57.5	
High (95 th + percentile)	—	—	28.0	42.1	48.8	55.8	61.0	64.7	68.9	
Beneficiary rank in 1993										
Low (0-50 th percentile)	—	—	—	—	—	—	1.7	4.7	8.0	
Middle (50 th -95 th percentile)	—	—	—	—	—	—	8.5	15.6	22.4	
50 th -80 th percentile	—	—	—	—	—	—	4.2	9.2	15.4	
80 th -95 th percentile	—	—	—	—	—	—	17.0	28.3	36.3	
High (95 th + percentile)	—	—	—	—	—	—	22.6	37.7	49.2	

Table 5.1d
 Persistence of expenditures for beneficiaries in various expenditure categories (percentage of beneficiaries occupying particular categories)

Expenditure category	Year																			
	Two years before				One year before				Current year				One year after				Two years after			
	H*	M	L	D	H	M	L	D	H	M	L	D	H	M	L	D	H	M	L	D
Beneficiary rank in 1989																				
Low (0-50 th percentile)	1.2	21.1	77.7		1.0	19.9	79.2		L	2.1	23.9	72.1	1.9	2.5	27.0	65.7	4.9			
Middle (50 th -95 th percentile)	4.2	46.7	49.1		4.9	51.8	43.2		M	5.7	52.1	34.1	8.2	5.9	46.6	33.0	14.6			
High (95 th + percentile)	8.1	49.6	42.3		14.4	57.1	28.6		H	15.2	43.5	13.1	28.2	8.8	34.2	14.5	42.5			
Beneficiary rank in 1993																				
Low (0-50 th percentile)	1.2	22.4	76.4		0.8	21.4	77.8		L	2.1	24.8	71.3	1.8	2.5	28.4	64.1	5.0			
Middle (50 th -95 th percentile)	4.3	49.3	46.4		5.4	53.7	40.9		M	5.7	54.4	31.2	8.7	5.6	46.8	31.2	16.4			
High (95 th + percentile)	10.2	53.7	36.1		18.0	54.8	27.1		H	17.9	47.5	11.5	23.0	10.5	36.0	14.4	39.2			

*H = high expenditure (95th+ percentile); D = dead; L = low expenditure (0-50th percentile); M = middle expenditure (50th-95th percentile).

the group that fell between the 50th and 80th percentiles in 1989 were more than double those of the low-ranking group from 1989. As expected when expenditures are moderately persistent, although high (low) expenditures in 1989 are associated with high (low) expenditures in the years before and after, the variation in expenditures by percentile group is greatest during 1989. This observation merely reflects the fact that the percentile groups are based on 1989 expenditures, not that the overall skewness in expenditures was different in the other years. It is consistent with simple regression to the mean.

These results, which also appear in table 5.1a, are calculated by assuming that decedents are no longer considered part of the population generating costs. Thus, after they die they are not included in the denominator (i.e., population size) used to calculate average expenditures. For most purposes, this is the most appropriate way to view decedents. However, in other circumstances one might want to consider decedents part of the relevant population even after they die. Suppose that health insurance contracts are written for three years, so that premiums are paid at the outset to provide coverage for the entire three years. In effect, a person who dies during the first year continues to be part of the relevant population and has contributed to insurer revenues for the entire three years but is certain to generate no further costs after death. From this perspective, from the time of death a decedent is the same as a survivor with zero medical expenses. Table 5.1b presents results like those of table 5.1a, except that decedents continue to be treated as part of the population and are assigned zero expenditures after death. Figure 5.6 displays these results graphically as they apply to the 1993 base year. As expected, inclusion of decedents reduces the amount of apparent persistence; in the years following 1989 and 1993, the high-group average expenditures are not as high as when only survivors are included. The approach of death is associated with high expenditures, but death itself blunts the persistence of high expenditures.

Since decedents have disproportionately high costs, high-cost users must have relatively high mortality rates. Figure 5.7 (and table 5.1c) show that mortality rates are relatively high for Medicare recipients in the top percentiles of expenditures and that the excess mortality is concentrated in the first years after the high expenditures. Cumulative mortality during the succeeding two years is about three times as high for those in the high-expenditure group as for those in the low-expenditure group. The excess mortality is particularly great during

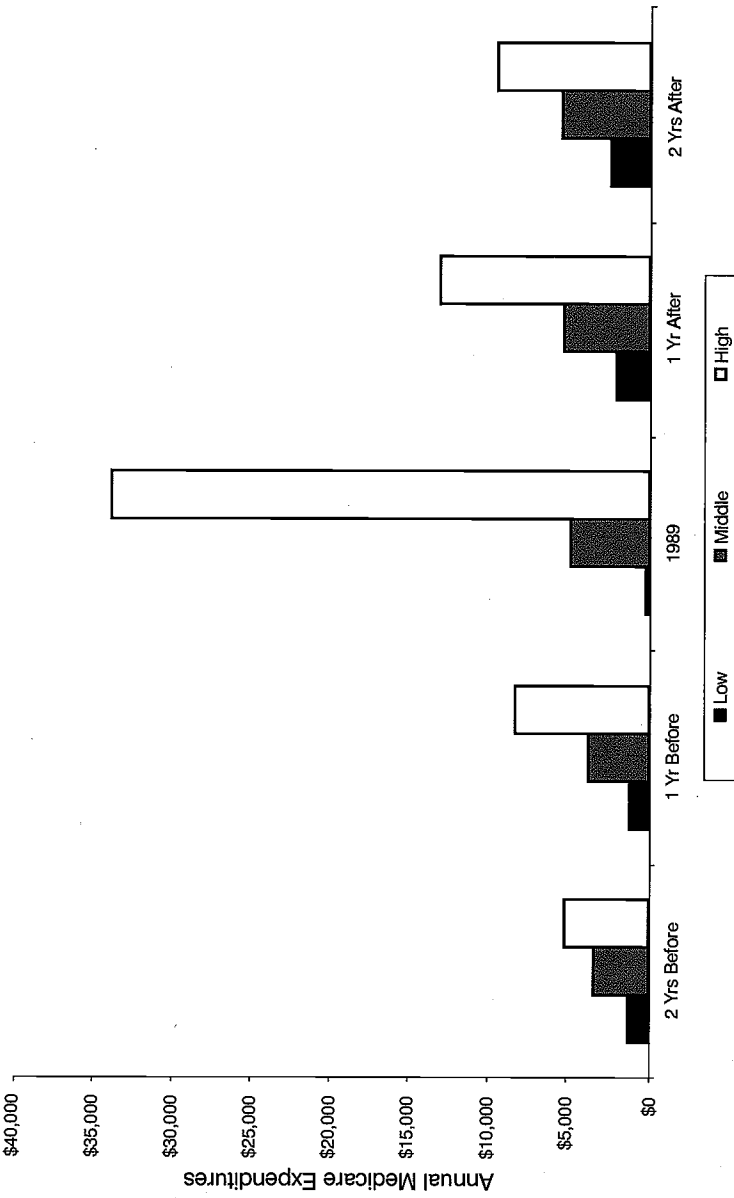


Figure 5.5a
Average expenditures over time for beneficiaries in the low (0-50th percentile), middle (50-95th percentile), and high (95%+ percentile) expenditure categories in 1989

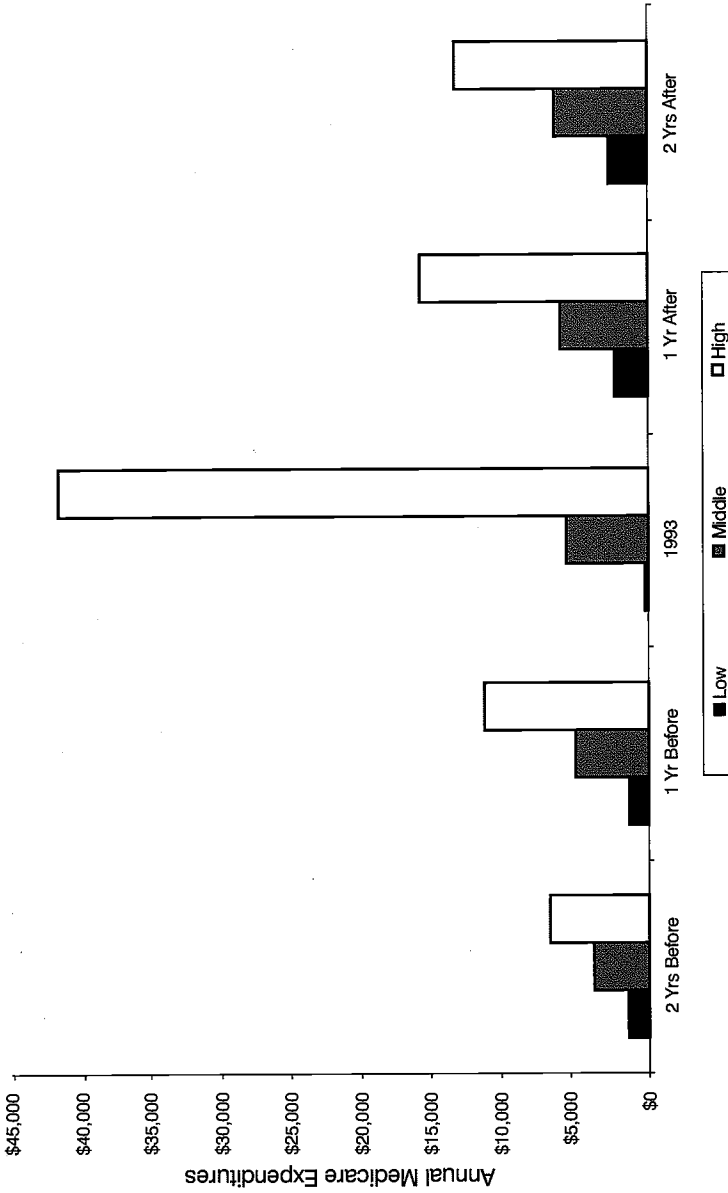


Figure 5.5b
Average expenditures over time for beneficiaries in the low, middle, and high expenditure categories in 1993

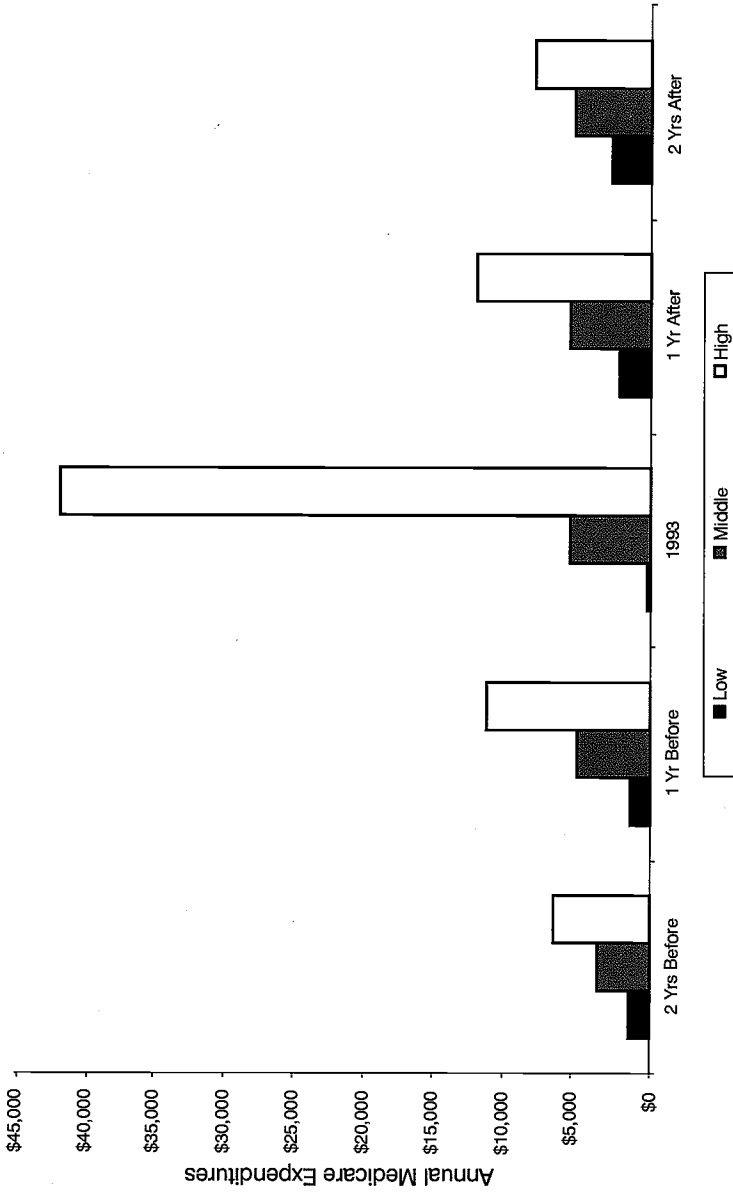


Figure 5.6 Average expenditures over time for beneficiaries in the low, middle, and high expenditure categories in 1993, decedents included

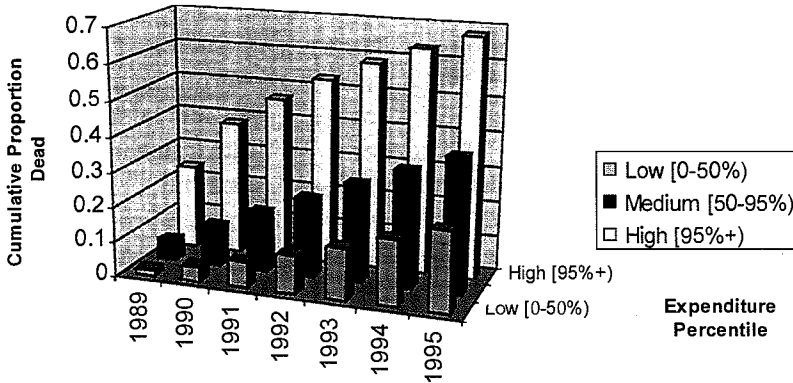


Figure 5.7
Cumulative death rates of the 1989 expenditure groups

the year of high expenditures; for example, during 1989, the highest percentile group had more than 14 times the mortality rate of the lower half of the Medicare beneficiaries. Although the dramatic difference in mortality rates narrows over time, in every subsequent year the annual mortality rate of the beneficiary group that had high expenditures in 1989 equals or exceeds that of the group that had low expenditures in 1989. A similar phenomenon can be seen in the lower panel of the table, which gives results by 1993 expenditure rank. Mortality rates increase with the expenditure level, even several years after the high expenditures are incurred.

Perhaps the simplest view of persistence of expenditures across years appears in table 5.1d, which shows the rank group in various years according to the rank group in either 1989 or 1993. For example, about 78% of the beneficiaries who were in the low-expenditure group in 1989 had been in the low-expenditure group two years before, and about 66% of them remained in the low group two years after. Of the beneficiaries in the high-expenditure group in 1989, only 42% had been in the low group two years before, and only 43% were in the low group two years later. The general pattern of persistence was the same for the 1993 groups. Note that high-expenditure individuals are more likely to be in the high-expenditure group than either the middle or the low groups, either two years before or two years after the baseline year of 1989 or 1993. But the 40% mortality rate within two years of being in the high-expenditure group necessarily limits the persistence of high expenditures.

Expenditures for the care of Medicare beneficiaries, according to these results, are neither highly persistent nor uncorrelated from one year to the next. Beneficiaries who have high expenditures in one year are likely to have high expenditures the next year and in subsequent years and are likely to have had higher expenditures in the past. Yet past expenditures only predict future expenditures moderately well, and the fact that expenditures rise sharply before death limits persistence, so that many of the high-cost users of Medicare services cannot continue to have high expenditures. We now explore in greater detail the characteristics of high-cost users, particularly those whose high costs extend over more than one year.

Implications for the Long-Term Concentration of Expenditures

We can define persistently high-cost users as beneficiaries whose Medicare expenditures place them in the upper percentiles for multiple years. Table 5.2 displays the characteristics of Medicare recipients who can be considered to have high expenditures over more than one year during our nine-year period of observation. The first row, which shows the percentage of beneficiaries in various categories of persistently high expenditures, suggests that it is unusual for a beneficiary to have multiple years of very high medical expenditures. Over the period, 47% were in the top quintile at some year in the nine-year period. About 30% were in the top decile for one year, but few beneficiaries remained in the top decile for multiple years. For example, only 10% of beneficiaries were in the top decile for two or more years and only 1.2% were in the top decile for four or more of the nine years. Less than 4% were in the top 5% of expenditures for two or more years.

Individuals in high-expenditure categories, especially for multiple years, have very high mortality rates. The two-year mortality rate exceeds 50% for individuals in the top decile for two years or more. It is nearly as high for beneficiaries in the top 20% in two different years. High-cost use in multiple years is associated with greater mortality than very heavy utilization in one year; for example, one- and two-year mortality rates are higher for individuals in the top 20% in any two years than for those in the top 5% in a single year, even though expenditures are much higher in the top 5%. Most deaths occur within one year of the high-cost use (i.e., following the period called "expense sequence" in the table).

Table 5.2 High-cost users of Medicare and their share of expenditures: reimbursements

		Intensity and duration of utilization							
		Top 5% in at least one year	Top 5% in at least two years	Top 10% in at least one year	Top 10% in at least two years	Top 10% in at least three years	Top 20% in at least one year	Top 20% in at least two years	Top 20% in at least three years
Percentage of all beneficiaries		17.1%	3.9%	29.5%	10.0%	3.4%	46.9%	23.0%	11.1%
Percentage who die:									
Within one year of expense sequence		31.1%	37.4%	32.6%	38.3%	40.1%	34.7%	39.8%	41.6%
Within two years of expense sequence		44.0%	53.8%	43.4%	50.6%	53.8%	41.6%	47.4%	49.7%
Percentage in age categories:									
65-69		23.2%	26.7%	24.0%	24.5%	27.2%	15.1%	17.5%	18.9%
70-74		24.3%	25.6%	23.1%	25.3%	26.0%	14.5%	19.4%	22.2%
75-79		22.0%	23.0%	21.2%	21.8%	22.4%	13.3%	17.5%	20.4%
80-84		15.9%	14.5%	16.4%	16.4%	14.6%	10.4%	14.0%	15.6%
85-89		9.9%	7.6%	10.0%	8.9%	8.3%	6.3%	8.3%	9.1%
90-100		4.8%	2.7%	5.4%	3.2%	1.7%	3.3%	3.8%	3.5%
Mean annual reimbursements within percentile group (1996\$):									
10 th percentile		4,756	9,193	3,203	5,920	8,630	1,743	3,271	4,674
25 th percentile		6,593	11,556	4,577	7,527	10,665	2,766	4,509	6,193
50 th percentile		9,743	15,120	7,084	10,535	13,738	4,856	6,886	8,794
75 th percentile		15,119	20,953	11,777	15,193	18,639	8,785	10,951	12,982
90 th percentile		23,439	30,990	18,664	22,617	26,922	14,962	16,910	18,923
Mean annual reimbursements		12,798	18,178	9,769	12,953	16,119	7,259	9,074	10,790
Percentage of total reimbursements group accounts for		58.9%	22.3%	78.1%	41.9%	20.0%	92.5%	66.8%	42.8%

Note: Data are from HCFA (1987-95).

Even though long-term expenditure persistence has a limited extent, the high concentration of expenditures at any given time implies that this small share of beneficiaries may still account for a large portion of long-term Medicare expenditures. The last rows of table 5.2 demonstrate that this is indeed the case. For example, the 30% of beneficiaries in the top decile in any year had average annual expenditures of almost \$10,000 over the nine years, and they accounted for 78% of total expenditures during this long period. Similarly, the 3.9% of beneficiaries in the top 5% of expenditures for two or more years accounted for more than one-fifth of Medicare expenditures over the nine year period. These concentrations are considerably lower than a one- or two-year perspective would suggest. For example, beneficiaries in the top decile for one of the nine years have mean expenditures of about \$27,000 during that year. Individuals in the top decile for four of the nine years have mean expenditures of more than \$29,000 during each of the four years of high expenditures. Although expenditures during a single year are more highly concentrated, these results confirm that a relatively small share of beneficiaries accounts for a large portion of Medicare expenditures over a period of several years.

IV. Discussion

The challenges raised by the existence of a group of patients with predictably high expenditures become greater if those expenditures remain high for prolonged periods. The very fact that a Medicare beneficiary has high expenditures one year, we saw, increases the likelihood that he or she will have high expenditures in a subsequent year. The consequences are many, including the possibility that providers and insurance plans can use information about prior utilization to estimate a potential enrollee's risk of having excessive future expenditures. The challenge is not limited to competitive health insurance or health care markets, either; risk selection at the provider level can occur in any system of regional or national health insurance, whether in the traditional British National Health Service model, a Canadian-style single payor system, or in recently modified versions of these systems that introduce limited capitation at the primary-care physician level and greater financial sensitivity.

Risk selection does not require highly accurate prediction of costs. Any ability to distinguish among groups of patients or beneficiaries expected to have differing average costs is sufficient. Many individuals

assigned to a high-cost group could turn out to have below-average costs, and some individuals assigned to low-cost groups subsequently have very high costs. Such group assignment might be inaccurate because only limited relevant information is available or because much of the variation in health costs is truly random. Whatever the reason for the inability to predict health expenditures precisely, adverse selection will occur as long as expected costs can be distinguished.

We analyzed costs over prolonged periods of time among the elderly Medicare population. For the results presented here, we did not use clinical data (such as diagnostic information or previous use of specific procedures) to identify individuals with persistently high costs. But we found that the level of prior utilization, with or without demographic information, strongly predicted future expenses. Heavy use of health services is unlikely to cause heavy use in the future; instead, it is a marker for ill health and other characteristics that lead to consumption of health care. Additional information from the claims files and detailed clinical characteristics would have greatly enhanced our ability to predict expenditures in this population. Most insurers have much more information available in evaluating potential enrollees, and the potential enrollees themselves may know even more about how their health care consumption is likely to deviate from average.

Our major purpose was not to assess predictability, however. We sought to learn whether persistence of high health expenditures is an important phenomenon in the Medicare population. Our results show that it is significant, particularly if we consider the upper quintile of expenditures, but that very few Medicare recipients fall into the top percentiles of expenditures for many years. Thus, the high skewness of expenditures in cross sections of Medicare recipients is not caused by a small group of enrollees who use extraordinary amounts of care year after year. Many of the highest-expenditure beneficiaries die soon thereafter, and many survivors have more modest expenditures in the succeeding years. Individuals who do have persistently high expenditures, however, account for a disproportionately large share of expenditures.

The importance of persistence must be considered in any health care financing reform. For example, financing based on medical savings accounts (MSAs) usually consists of a combination of catastrophic health insurance (i.e., insurance—usually indemnity—with a very high deductible) and a tax-advantaged savings plan to pay for high expenses. Although many of the MSA plans that have been offered by

individual employers in the United States have very weak savings features (limited or no ability to carry over unspent funds from one year to the next and no ability to allow returns on balances to accumulate on a tax-deferred basis), the current MSA demonstration and most versions seriously proposed strongly encourage savings. As MSA balances grow large, the funds available for catastrophic deductibles (as well as copayments for the catastrophic insurance component) grow. Whether a given balance is adequate, of course, depends on the level of out-of-pocket expenses an individual bears. These expenses would be high if, for example, an individual approached or reached the catastrophic deductible level for several years. The deductible or catastrophic threshold can be lowered and the copayment rate (or the ceiling on copayments) lowered to provide more insurance and require less reliance on the MSA funds or on non-MSA personal funds.

The features of MSAs allowed for testing under the Health Insurance Portability and Availability Act (HIPAA), which went into effect in 1997, are instructive in this regard. The deductible for qualifying insurance plans is at least \$1,500 and no more than \$2,250, and the out-of-pocket maximum cannot exceed \$3,000. For family accounts, the allowable deductibles range from \$3,000 to \$4,500 and the out-of-pocket limit is \$5,500. An MSA plan directed toward the elderly might feature different deductibles, copayments, or limits than these. But note that the average annual Medicare expenditure exceeds the catastrophic deductible, and that essentially every Medicare recipient with a hospitalization would exceed the deductible that year. Furthermore, our results suggest that many would also reach the ceiling on copayments. If the deductibles and copayments were set so that only the top decile of Medicare recipients would reach the ceiling in any year, about 1% of all beneficiaries would reach the ceiling more than four times over a nine-year period, and nearly a third would reach the ceiling at least once during the nine-year period. For individuals who had contributed to MSAs for decades before reaching these ages, the accumulated funds might readily accommodate such expenses. During a phase-in to MSAs, however, or for individuals who had not been able to build fund balances (for example, because of ongoing medical expenses or inability to make adequate contributions), such expenses might be difficult to bear. The consequences of the moderate degree of persistence in expenditures within the Medicare population depend on the specific features of any MSA plan.

These results are based on a sample of patients whose care was reimbursed on a cost basis (i.e., not on a capitated or "risk" basis). Capitated payments change provider behavior and are expected to modify the amount of care that individuals with persistently high expenses receive. Managed care features might reduce the skewness in expenditures by limiting the amount of care that the highest-cost beneficiaries receive, but this is not certain. For example, the original literature comparing costs of health maintenance organizations (HMOs) and fee-for-service care suggested that HMOs, then the sole example of capitated health care plans, achieved savings by reducing hospitalization rates. Less evidence is available about the costs for hospitalized patients under HMO and fee-for-service plans, but given that a hospitalization has occurred, hospitals treating Medicare patients face incentives very similar to those faced by an HMO. Under PPS, they receive a fixed payment per hospitalization, so there is no incentive to overuse services. In recent years, the routine practice of utilization review and the threat of claims denial have reduced the physicians' and hospitals' discretion to admit patients who could be easily treated on an outpatient basis. For each of these reasons, the growth in Medicare risk contracts, that is, the increased acceptance of capitated payment, may not reduce hospital utilization dramatically, and utilization among Medicare beneficiaries would then remain highly skewed.

If utilization does change, it will be important to learn how it influences outcomes among the sickest Medicare beneficiaries. Our analysis was not designed to assess the appropriateness or effectiveness of expenditures for health care among Medicare recipients. It will be important to learn about their characteristics in much greater clinical detail. We found that individuals with high expenditures have high mortality rates, whether such expenditures are limited to a single year or occur repeatedly. But the majority of patients who reach the top decile of expenditures survive at least two years, and about half the beneficiaries in the top decile for multiple years survive for at least two years. These results clearly show that not all high-cost care is given to individuals who will die soon, reinforcing the concern that dramatic reductions in such care could lead to worsened outcomes among those who now survive after receiving such care. Definitive information about these issues will come only from detailed investigations of the care that severely ill Medicare beneficiaries receive, but these findings suggest that such care cannot be readily dismissed as futile.

References

- Ash, Arlene, Frank Porell, Leonard Gruenberg, Eric Sawitz, and Alexa Beiser. 1989. "Adjusting Medicare Capitation Payments Using Prior Hospitalization Data." *Health Care Financing Review* 10(4):17-29.
- Berk, Marc L., and Alan C. Monheit. 1992. "The Concentration of Health Expenditures: An Update." *Health Affairs* 11(4):145-9.
- Ellis, Randall, Gregory Pope, Lisa Iezzoni, John Ayanian, David Bates, Helen Burstin, and Arlene Ash. 1996. "Diagnosis-Based Risk Adjustment for Medicare Capitation Payments." *Health Care Financing Review* 17(3):101-26.
- Enthoven, Alain C., and Sara J. Singer. 1996. "Managed Competition and California's Health Care Economy." *Health Affairs* 15(1):39-57.
- Gornick, Marian E., Joan L. Warren, Paul W. Eggers, James D. Lubitz, Nancy DeLew, Margaret H. Davis, and Barbara S. Cooper. 1996. "Thirty Years of Medicare: Impact on the Covered Population." *Health Care Financing Review* 18(2):179-237.
- Hoffman, Catherine, Dorothy Rice, and Hai-Yen Sung. 1996. "Persons with Chronic Conditions: Their Prevalence and Costs." *Journal of the American Medical Association* 276(18):1473-9.
- Iezzoni, Lisa I., ed. 1994. *Risk Adjustment for Measuring Health Care Outcomes*. Ann Arbor, MI: Health Administration Press.
- McClellan, Mark. 1997. "Price and Quality Competition in Health Plan Choice." Stanford University, Stanford, CA. Manuscript.
- Pauly, Mark V. 1986. "Taxation, Health Insurance, and Market Failure in the Medical Economy." *Journal of Economic Literature* 24:629-75.
- Price, James R., and James W. Mays. 1985. "Selection and the Competitive Standing of Health Plans in a Multiple-Choice, Multiple-Insurer Market." In *Advances in Health Economics and Health Services Research*, eds. Richard M. Scheffler and Louis R. Rossiter, 47-72.
- Rothschild, Michael, and Joseph Stiglitz. 1976. "Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information." *Quarterly Journal of Economics* 90:629-50.
- Weiner, Jonathan, Allen Dobson, Stephanie Maxwell, Kevin Coleman, Barbara Starfield, and Gerard Anderson. 1996. "Risk-Adjusted Medicare Capitation Rates Using Ambulatory and Inpatient Diagnoses." *Health Care Financing Review* 17(3):77-99.