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4 The Medical Costs of the Young and Old: A Forty-Year Perspective

David M. Cutler and Ellen Meara

It is widely known that medical costs have increased over time. In the United States, as in most of the developed world, medical spending growth has exceeded income growth by several percentage points per year for three decades or longer (Levit et al. 1994). In country after country, the cost of medical care has become a major public sector issue.

But much less is known about what medical spending is buying us. Is medical spending valuable or wasteful? Should we want to limit total spending or increase it? The answer to this question is by no means clear. On the one hand is voluminous evidence that medical spending conveys great value. Randomized clinical trials, for example, routinely document the benefits of new pharmaceuticals and medical devices. And we would venture to guess that most people would prefer today's medical system to the medical system of 30 years ago, even given the much higher cost of medical care today. This suggests that people are on net better off with the additional medical care spending than they would be without it.

On the other hand is a great sense that medical care often brings little in the way of health benefit. Nearly one-third of Medicare spending occurs in the last six months of life (Lubitz and Riley 1993), which has been interpreted as evidence that a lot of medical care is wasted on those who will not in any case survive.[1] Other studies, such as the RAND Health Insurance Experiment (Newhouse et al. 1992), show that putting people in less generous insurance

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1. Of course, since people who are sick are more likely to die than people who are healthy, medical care spending will naturally be skewed to those near death. Still, the magnitude of the skewness is large.

policies reduces their spending on medical services but does not affect their health. And direct estimates of the value of medical care typically find that, at the margin, a substantial amount of medical care has little or no health benefit (Chassin et al. 1987; Greenspan et al. 1988; Winslow et al. 1988a, 1988b; Kahn et al. 1990; Newhouse et al. 1992; Cutler 1995; Staiger and Gaumer 1994; McClellan and Newhouse 1995).[2]

Our goal is to understand why medical care has become so expensive over time and what has been its value to society. We focus particularly on medical spending by age. Many of the concerns about the medical care system are associated with changes in the age distribution of medical resources and an increase in the share of resources going to the elderly (Lubitz et al. 1995). And the most pressing cost problem in the medical care economy is the pending insolvency of trust funds to provide medical care for the elderly. Further, growth in spending by age is important in forecasting medical costs as society ages (Lubitz et al. 1995). If patterns of medical spending by age are changing over time, projections of spending based solely on the number of people of different ages will be inaccurate.

Our analysis is based on periodic surveys of national health expenditures conducted in 1953, 1963, 1970, 1977, and 1987. The surveys have large numbers of people (from 8,000 to 40,000 people per survey) and aggregate all of acute care spending.

Our analysis of age-based spending documents two conclusions. First, there has been a dramatic change in the distribution of medical spending over time. While spending on medical care has increased for all people, it has increased disproportionately for the very young (those under 1 year old) and the old (those 65 years old or older). Over the 24-year period from 1963 through 1987, per person spending on infants increased by 9.8 percent per year, and per person spending on the elderly increased by 8.0 percent per year, compared to a rise of only 4.7 percent per year for the "middle-aged" (1–64 years old). The share of medical care spending for infants and the elderly doubled from 17 to 36 percent.

We further show that essentially all of the disproportionate growth of spending for the very young and the old is accounted for by high-cost users within those groups. For infants, 89 percent of the excess spending increase over the middle-aged is accounted for by the top 10 percent of the spending distribution. For the elderly, the equivalent share is 66 percent. Thus, in understanding the concentration of medical spending by age, we need to understand the concentration of spending among high-cost users.

In section 4.3, we consider who are the high-cost users of medical care. We show that a substantial amount of high-cost medical use is associated with the

2. Cutler and Staiger (1996) review the evidence on the marginal and average value of medical spending.

increasing technological capability of medicine. Among infants, high-cost users are premature babies with substantial respiratory or other acute conditions. For the elderly, high-cost users are generally patients with severe cardiovascular problems or cancer. For both infants and the elderly, the capacity to devote many more resources to the most pressing cases has increased over time.

In section 4.4, we look at how health outcomes for premature infants and the sick elderly have changed over time. We find substantial health improvements in most of the categories of high-cost medical care. Infant mortality among very low birth weight infants has fallen substantially at exactly the time when the cost of these infants has risen most rapidly. And mortality improvements among the elderly have been especially prominent in cardiovascular care, where spending increases have been dramatic. Our analysis is not causal; we do not have any direct link between the technologies we discuss in section 4.3 and the outcomes we analyze in section 4.4. But our results suggest such a link is plausible.

We begin in the next section with some basic facts about the distribution of medical spending over time. In section 4.2, we look at the age distribution of medical care utilization. Section 4.3 focuses in more detail on high-cost users of medical care. Section 4.4 looks at trends in medical outcomes over time. Section 4.5 concludes.

4.1 The Basics of Medical Spending

Much of our knowledge about individual spending on medical services is based on periodic surveys of national medical expenditures that have been conducted over time. In the post–World War II period, there have been seven such surveys: the 1953 and 1958 National Surveys of Family Medical Costs and Voluntary Health Insurance in the United States; the 1963 and 1970 Surveys of Health Services Utilization and Expenditures; the 1977 and 1980 National Medical Care Utilization and Expenditure Surveys; and the 1987 National Medical Expenditure Survey (NMES). Beginning with the 1963 survey, all of the surveys are available in machine-readable form; for data from the 1950s, we are forced to use published tabulations from the survey authors (Anderson, Collette, and Feldman 1963; Anderson and Feldman 1956). In the absence of microdata, we omit consideration of the 1958 survey. We also omit the 1980 survey because we are interested in long-term trends, so differences between 1977 and 1980 data are less important for this analysis. We would clearly like to have more recent data for our analysis; while there is a more recent survey being conducted (the 1996 NMES), these data are not yet available.

The surveys all gather information on the range of acute care medical expenditures in a one-year period. Several features of the data are important to note. Newborn hospital admissions for delivery are counted as part the mother's admission unless the newborn is discharged on a later date than the mother, in

Table 4.1 Characteristics of Medical Spending

Year	Number of Observations	Average Spending[a]	Average Spending Change (%)	Share of Spending by Percentile (%)		
				Below 50th	50th–90th	90th+
1953	8,846	278	–	–	–	<43[b]
1963	7,803	385	3.3	5	36	59
		(17)				
1970	11,619	668	7.9	4	30	66
		(43)	(0.7)			
1977	38,815	874	3.8	3	27	70
		(16)	(0.9)			
1987	34,456	1,521	5.5	3	25	72
		(40)	(0.4)			

Note: Numbers in parentheses are standard errors.

[a]Average spending is in real (1987) dollars adjusted using the GDP deflator.

[b]According to Anderson and Feldman (1956), the top 11 percent of the health spending distribution consumed 43 percent of all health care dollars in 1953. Without microdata it is impossible to know exactly what share of medical spending the top 10 percent consumed.

which case the newborn is recorded as having a separate admission.[3] In all cases, the institutionalized population is not included in the survey, and any information on long-term care is excluded. With the exception of the 1987 NMES long-term care supplement, the surveys give no information about nursing home spending, including spending on nursing homes for those now living in the community.

Table 4.1 shows summary statistics about the data. The sample sizes are large: 8,846 in 1953, 7,803 in 1963, 11,619 in 1970, 38,815 in 1977, and 34,456 in 1987. Table 4.1 also shows basic statistics about medical care spending. In real (1987 dollar) terms, medical spending rose from $278 per person in 1953 to $1,521 per person in 1987. Growth was 3.3 percent per year in the 1953–63 period. Growth was most rapid in the 1963–70 period (7.9 percent per year), when Medicare and Medicaid were created and insurance coverage for the privately insured population expanded as well. In the next seven years, growth slowed to 3.8 percent per year. In the 1980s, spending growth increased again, to 5.5 percent per year. The average change over the entire period is 5.0 percent per year.

The remaining columns of table 4.1 document another frequently noted fact about medical spending (Berk and Monheit 1992): medical spending has become more concentrated among high-cost users over time. In 1953, the top 10 percent of the spending distribution accounted for less than 43 percent of total spending; by 1987, that share was 72 percent. Most of the increase occurred in

3. In the 1987 data, attempts were made to assign costs separately to newborns and mothers in all cases, but there are cost variables that assign the newborn's costs to the mother for normal deliveries where the newborn's stay does not exceed that of the mother.

the 1950s and 1960s; since 1970, the distribution of overall medical spending has been relatively stable.

4.2 Medical Spending by Age

While the aggregate facts about medical spending are well known, much less is known about the distribution of medical spending by age or disease. Ideally, we would construct a set of "national disease accounts"—accounts that measure spending on particular diseases over time.[4] But the surveys do not include detailed diagnosis codes for spending prior to 1977. Instead, we consider first medical spending by age.

We denote spending for age group a at time t by $C_t(a)$. We divide the population into 11 age groups: under 1, 1–4, 5–14, 15–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75–84, and 85+.[5] Table 4A.1 in the appendix shows average spending for survey years between 1963 and 1987, as well as average annual growth rates within age groups. To examine differential spending by age over time, we define relative age-specific spending as

$$C_t^r(a) = \frac{C_t(a)}{C_t(35\text{–}44)}. \tag{1}$$

Figure 4.1*A* shows relative medical spending by age for each of the five surveys. The data show a clear pattern: relative to spending on 35–44-year-olds, spending for the very young (those less than age 1) and the old (those above age 65) has increased dramatically over time. The trend for infants is startling. In 1953, per capita spending on those under age 5 was less than half of per capita spending on middle-aged adults. In 1963, this figure was 53 percent, and in 1970, 64 percent. By 1977, per capita spending on infants was 97 percent of spending on middle-aged adults. After 1977, spending on infants soared. By 1987, the average infant used 2.3 times the medical services that middle-aged adults did. Figure 4.1*B* shows relative spending plus or minus one standard error for 1963 and 1987. Given that there are relatively few infants in each survey year (200 to 500), it is not surprising that relative spending for infants is measured imprecisely. Still, the dollar amounts are staggering; real average spending for high-cost infants above the 90th percentile tripled in the 1977–87 period, from $6,690 to $21,505.

Figure 4.2 shows the implied growth rates of spending. If we define the "middle-aged" as those aged 1–64, spending on the middle-aged rose 4.7 percentage points per year between 1963 and 1987, while spending on infants rose by 9.8 percentage points per year.

4. The current national health accounts tabulate spending by payer and sector of medical care provision (hospitals, physicians, etc.). For a set of disease accounts for 1995, see Triplett (1997).

5. The 1953 data are only available for more aggregated age groups: 0–5, 6–17, 18–24, 25–34, 35–54, 55–64, and 65+.

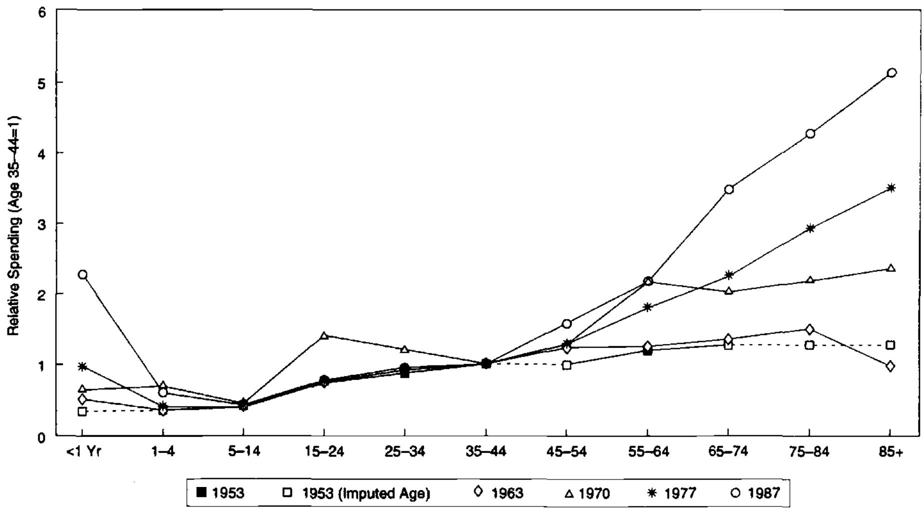


Fig. 4.1*A* Age distribution of medical spending, 1953–87

Note: The 1953 age groups are 0–5, 6–17, 18–24, 25–34, 35–54, 55–64, and 65+. Relative spending for 5–24-year-olds was constructed assuming a uniform age distribution. Dashed lines for 1953 connect all age groups that were combined when calculating relative spending.

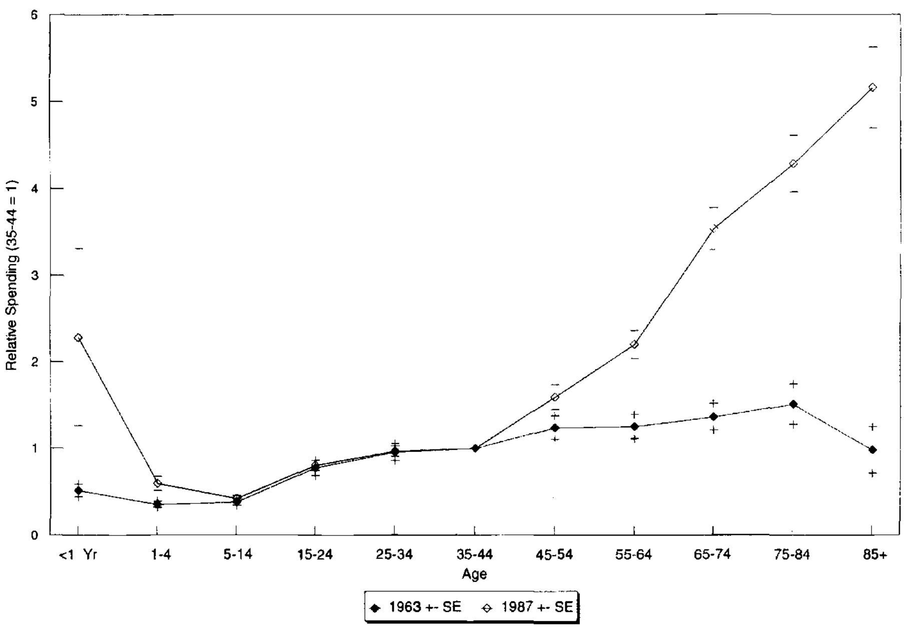


Fig. 4.1*B* Age distribution of medical spending (plus or minus one standard error), 1963 and 1987

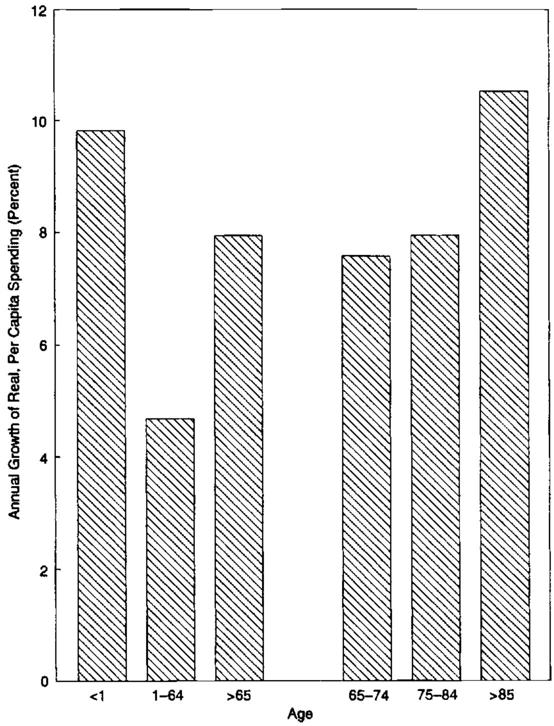


Fig. 4.2 Growth of medical spending, 1963–87

The change in relative spending for the elderly is equally dramatic but less concentrated in time. In 1953 and 1963, spending on the elderly was less than 30 percent higher than spending on the middle-aged. In addition, among the elderly population, spending declined at increasingly older ages during our sample period. Where the 75–84-year-olds used $689 per person in 1963, those aged 85 or over used only $447 per person. Over time, spending for the elderly has increased, particularly among the oldest old. By 1970, average spending on the elderly was twice the amount for 35–44-year-olds, by 1977 it was 2.6 times, and by 1987 it was 4 times. Further, within the elderly population, spending on the population aged 85 and over increased even more dramatically than spending among the younger old. In 1963 per capita spending on those aged 85 or over equaled average spending on 35–44-year-olds. By 1987, spending for the average person over age 85 was 5.2 times average spending for 35–44-year-olds. As figure 4.2 shows, the growth of per person spending on the elderly averaged 8.0 percent annually between 1963 and 1987, including a rate of over 10 percent annually for the oldest old.

Recall that spending on the elderly excludes long-term care services, which have also increased over time; total medical spending has thus become even more skewed than these data suggest.[6]

Figure 4.1*A* also shows a temporary increase in spending on 15–24-year-olds in 1970 that is eliminated by 1977. In the 1970 sample, two young men aged 19 and 20 have unusually high charges, which causes average spending for this group to be skewed.

The disproportionate growth of medical care spending for the elderly and the very young is substantively quite large. In 1963, spending on infants and the elderly accounted for 17 percent of total spending (1.6 percent for infants and 15.1 percent for the elderly). By 1987, spending on these two groups accounted for 36 percent of total spending (2.7 percent for infants and 33.2 percent for the elderly). We are not the first to document such a trend. Anderson et al. (1963) document a similar trend over the 1953–58 period. In the 1953 and 1958 surveys, spending grew most rapidly for those under age 6 and those over age 65. Although the authors are unsure about the causes of this rapid growth, they note that insurance enrollment grew more rapidly for the aged than for others over this period. The trend of rapid spending growth for the young and the old has continued throughout our sample.

As an alternative metric, figure 4.3 shows a simulation of medical spending if growth for the elderly and infants had matched growth for the middle-aged. The upper line graphs actual per capita medical spending. The lower line graphs spending under the alternative scenario. By 1987, the disproportionate growth of spending for infants and the elderly accounted for over $300 in spending per person, or over one-quarter of the total increase in medical spending since 1953.

Why has spending for infants and the elderly increased so rapidly? Has the increase been concentrated among high-cost users or has it been spread more uniformly through the distribution? The views about wasteful spending suggest that disproportionate spending growth ought to be concentrated among the very high cost users in these groups.

We address this question by considering aspects of the distribution of spending broader than just the mean. Suppose we consider percentile q of the distribution of spending within each age group. That is, $C_t^q(a)$ is spending at the qth percentile of age group a at time t. We can define relative spending at the qth percentile of the distribution as

$$C_t^{r,q}(a) = \frac{C_t^q(a)}{C_t^q(35\text{–}44)}. \tag{2}$$

Figure 4.4 shows relative spending at the 50th and 90th percentiles of the spending distribution. For infants, neither the 50th nor the 90th percentile of

6. Real spending on nursing homes has increased from $3.9 billion in 1960 to $41.9 billion in 1985. Since 90 percent of nursing home residents are 65 years old or older, this implies that spending has become even more skewed toward the elderly.

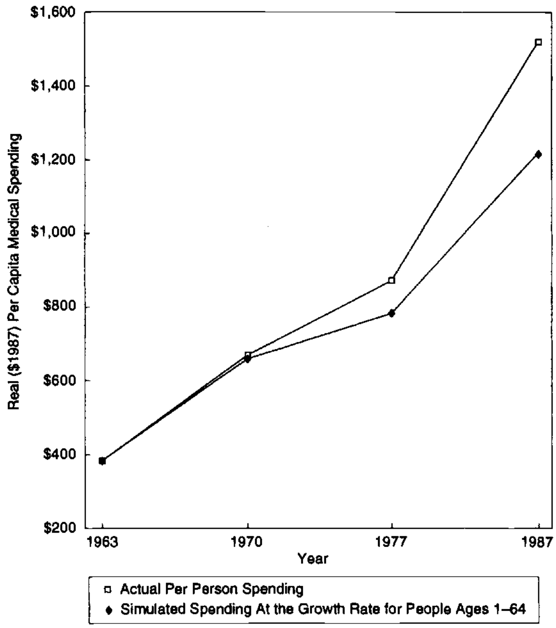
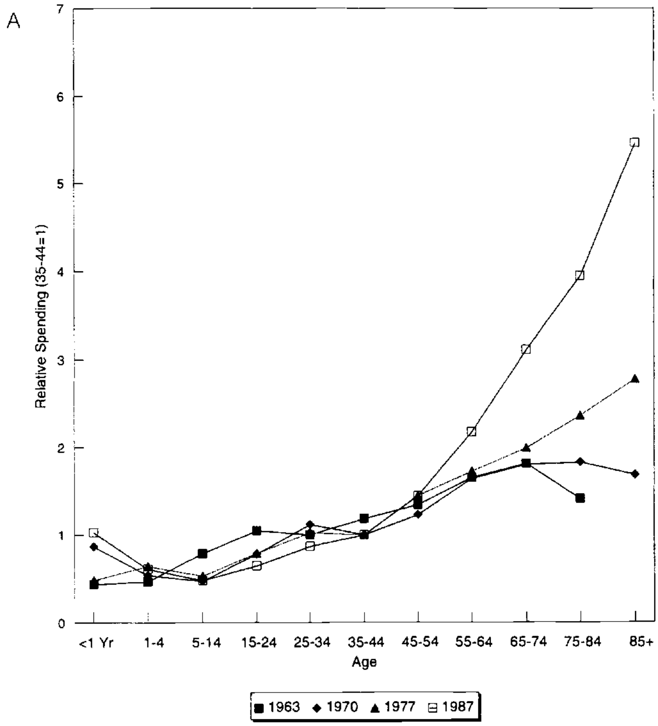


Fig. 4.3 Medical spending with less rapid cost growth for infants and elderly

spending increases much relative to middle-aged adults. Even in 1987, the 90th percentile of spending for infants is only just above spending for 35–44-year-olds, while the mean was over two times higher. The implication is that essentially all of the growth in spending occurs among the very high cost users—those above the 90th percentile. For the elderly, spending for the median person increases substantially less than spending for the mean person, and spending at the 90th percentile increases by only the amount of the mean. Thus, for the elderly as well there appears to be an increasing concentration of the distribution among high-cost users.

We can be more precise about how much spending at different points in the distribution contributes to overall growth in spending. To do this, we first divide the sample into three age groups: under 1, or infants; 1–64, or "middle-aged"; and 65 and older, or elderly. We then define "excess spending growth" as the increase in per capita spending resulting from more rapid growth of spending for infants (or the elderly) than for the middle-aged population. In other words, we ask the question, What would spending on infants (or the elderly) be in 1987 if it grew at the same rate as spending on the middle-aged over the 1963–87 period? The difference between actual spending on infants (or the elderly) in 1987 and this hypothetical spending at middle-aged growth rates is total excess spending growth for an age group. Using infants as an example:



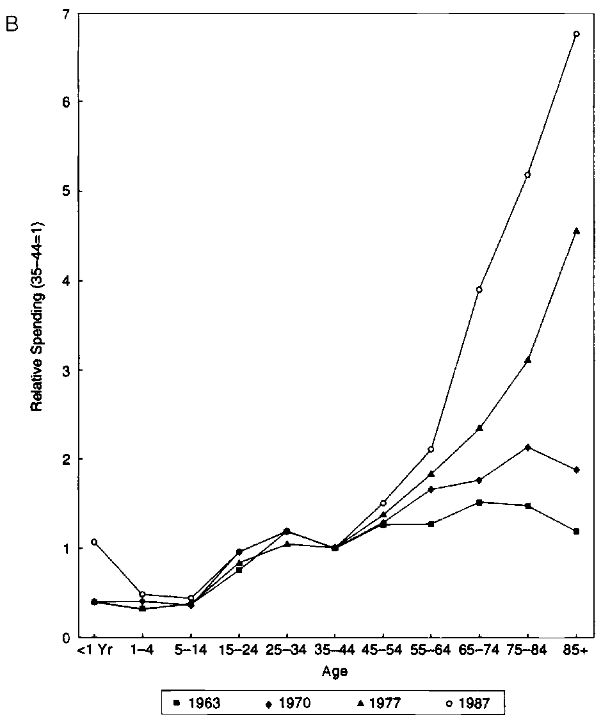


Fig. 4.4 Age distribution of medical spending at 50th percentile (*A*) and 90th percentile (*B*), 1963–87

$$(3) \qquad \text{Excess spending} (< 1) = \text{Spend}_{1987}(< 1) - \text{Spend}_{1963}(< 1)\left(\frac{\text{Spend}_{1987}(1\text{–}64)}{\text{Spend}_{1963}(1\text{–}64)}\right),$$

where $\text{Spend}_t(a)$ is average spending in age group a in year t. We then divide each age group into four subgroups: those in the bottom 50 percent of the spending distribution, those in the 50th to 75th percentiles of the spending distribution, those in the 75th to 90th percentiles of the distribution, and those above the 90th percentile. For each age group, we calculate what share of excess spending is attributable to different parts of the spending distribution.

Consider spending on the bottom 50 percent of the distribution. For infants, this is

$$(4) \qquad \text{Spend}_t^{0\text{–}50}(< 1) = \frac{1}{N_t(< 1)} \int_{q=0}^{50} C_t^q(< 1),$$

where we have divided total spending in the bottom half of the distribution by the total number of infants $N_t(<1)$ so that this amount is the contribution of this set of infants to average spending. If spending for the bottom 50 percent of the distribution had increased at the same rate as spending for the bottom 50 percent of the middle-aged population, in 1987 this group would have spent

$$(5) \qquad \text{Hypothetical Spend}_{1987}^{0\text{–}50}(< 1) = \text{Spend}_{1963}^{0\text{–}50}(< 1)\left(\frac{\text{Spend}_{1987}^{0\text{–}50}(1\text{–}64)}{\text{Spend}_{1963}^{0\text{–}50}(1\text{–}64)}\right).$$

We subtract this figure from $\text{Spend}_{1987}^{0\text{–}50}$ and divide the result by total excess spending growth for infants to determine what share of excess spending growth for infants is attributable to infants in the bottom half of the distribution.

Figure 4.5*A* shows the contribution to excess spending growth for infants and the elderly made by faster growth in different parts of the distribution. In both cases, the excess growth in medical care spending is particularly concentrated among high-cost users. For infants, 89 percent of the excess spending growth is a result of excess spending increases in the top 10 percent of the population.[7] For the elderly, 66 percent of excess spending growth results from higher cost growth in the top 10 percent of the distribution.

The highly concentrated spending growth at the top of the distribution for infants and the elderly reflects concentrated spending growth on the very ill in all age groups. Figure 4.5*B* shows the annual percentage change in spending from 1963 to 1987 for different age groups and at different points in the spending distribution within each age group. In all age groups, spending growth rises with percentile in the spending distribution. For those aged 1–64, spending

7. Indeed, 60 percent of spending growth is attributable to above average growth in the top 2 percent of the distribution. Because the number of infants is so small, however, the uncertainty about this estimate is high.

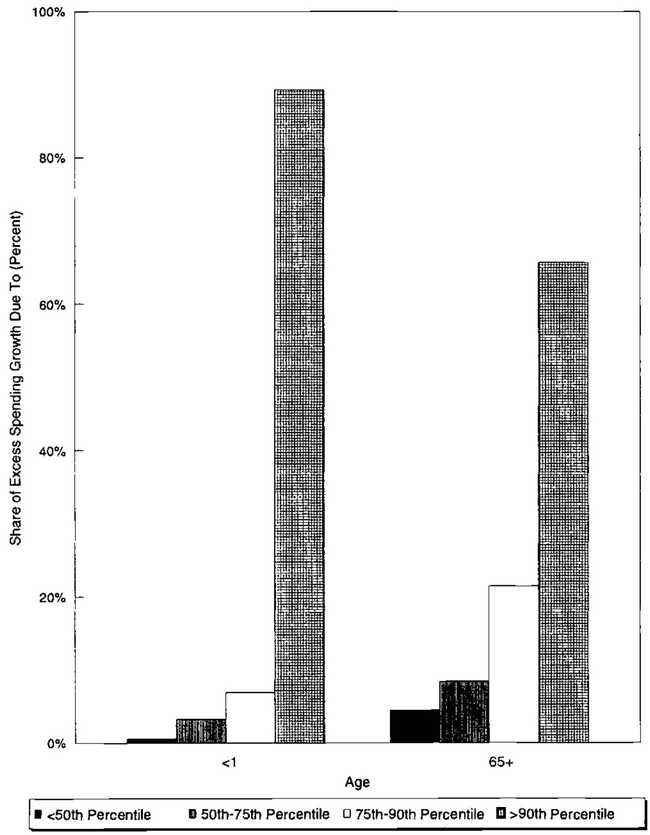


Fig. 4.5A Accounting for excess medical spending growth among infants and elderly

grew at an average rate of 4.7 percent per year, yet even at the 95th percentile, spending is growing more slowly, at 4.6 percent per year. This implies that as for infants and the elderly, spending growth for the middle-aged is highly concentrated at the top of the distribution. However, spending growth is much slower for the middle-aged than for infants and the elderly, even above the 90th percentile of spending.

An alternative way to examine whether our trends reflect rapid spending growth for the ill of all ages is to choose a constant dollar amount and compare spending growth for all those who spend more than this amount. This allows us to look only at the most severely ill respondents in all age groups. Because the 1–64-year-old population is a healthier group than infants and the elderly, even those in the 95th percentile of the distribution are likely to be relatively healthy and therefore spend little. We want to examine the tendency for spending on the very ill at all ages to grow much more rapidly than per capita spend-

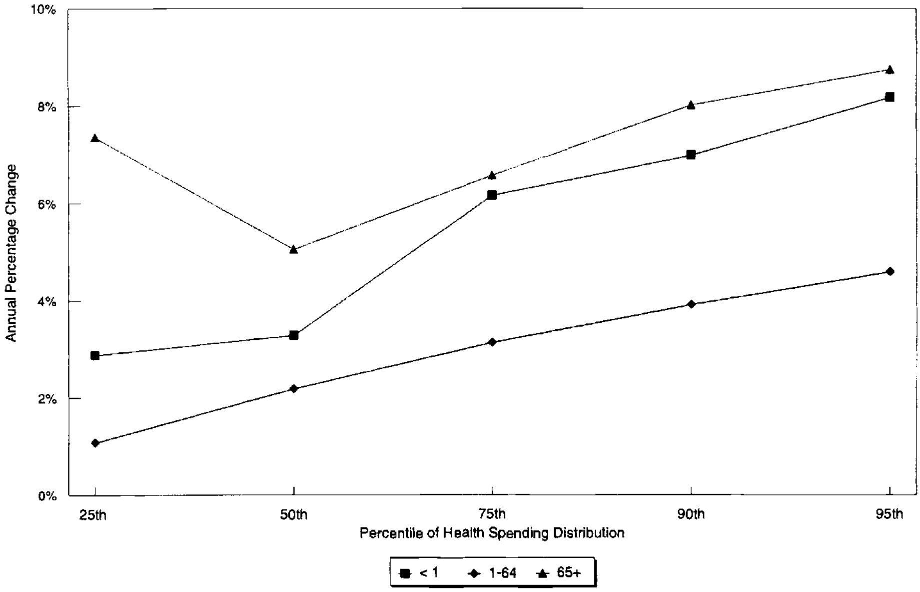


Fig. 4.5*B* Annual percentage change in spending by age group and percentile of spending, 1963–87

ing in an age group. We looked at spending growth for those with real spending over $2,000. Measured in 1987 dollars, this is well above 90th percentile spending for all three groups in 1963 but below 90th percentile spending for all groups in 1987. Average spending for all infants spending over $2,000 grew 7.8 percent annually between 1963 and 1987. The figure was 4.9 percent for the elderly and 2.4 percent for those aged 1–64. The differences in growth rates among the very ill of different ages show that, although the trend of highly concentrated spending growth at the top of the spending distribution may occur within all age groups, it is most striking for infants and the elderly.

It is thus clear that in understanding why medical care has become so concentrated by age, we need to understand why it has become so much more concentrated among high-cost users within any age. We turn to this next.

4.3 Who Are the High-Cost Users?

Understanding why high-cost users spend more than they used to is hampered by data problems. Only the 1977 and 1987 surveys contain detailed information about diagnoses. Thus, we cannot look at the distribution of high-cost users over more than a 10-year period. Still, there was a substantial increase in concentration among high-cost users between 1977 and 1987, and we proceed with this analysis.

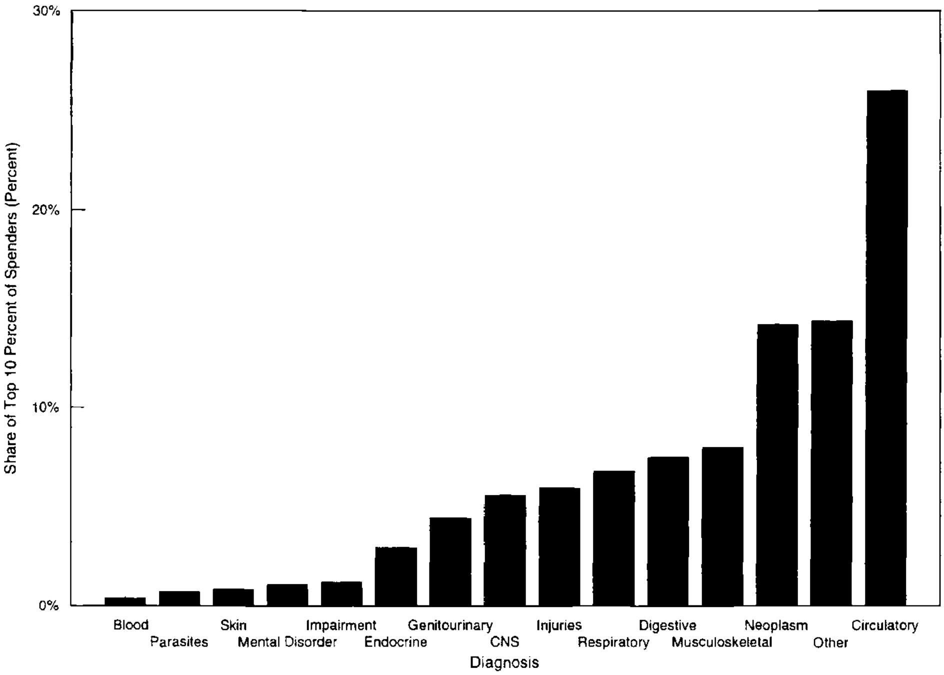


Fig. 4.6 High-cost elderly by primary diagnosis, 1987

4.3.1 High-Cost Elderly

We begin with an analysis of the high-cost elderly. We divide acute care spending and spending on prescription medicines for the elderly into 14 groups and one category for other diagnoses based on the chapters of the *International Classification of Diseases,* 9th rev., as adapted for use in the Health Interview Survey (National Center for Health Statistics 1979). The categories include parasites and infections, neoplasms, endocrine, blood, mental disorders, central nervous system (CNS), circulatory system, respiratory system, digestive system, genitourinary system, skin, musculoskeletal system, injuries and poisoning, impairments, and other. Because the surveys use impairment codes and often do not code congenital anomalies, we omit the congenital anomaly category and use the NMES category for impairments. Because we are focusing on those over age 65, conditions relating to pregnancy and the perinatal period are omitted. For each person, we sum all costs associated with each diagnosis group. We then assign each person a "primary diagnosis," or the diagnosis group that accounts for the largest amount of spending. In most cases (particularly for high-cost users), this is a fairly clear delineation.

Figure 4.6 shows the distribution of primary diagnoses for the top 10 percent of elderly spenders in 1987. The most common diagnosis in this group is cir-

Table 4.2 Growth Rate of Costs for Primary Diagnosis of Circulatory Disorders or Neoplasms

Percentile	Average Spending[a] 1977	Average Spending[a] 1987	Annual Growth Rate of Real Average Spending (%)
	Circulatory Disorders		
All	2,001	8,634	14.6
	(259)	(721)	(1.4)
Below 50th	126	706	17.2
	(3)	(49)	(0.7)
50th–75th	449	5,171	24.4
	(11)	(155)	(0.4)
75th–90th	2,443	15,203	18.3
	(103)	(493)	(0.5)
Above 90th	14,546	46,593	11.6
	(2,045)	(3,579)	(1.6)
	Neoplasms		
All	5,552	8,590	4.4
	(611)	(946)	(1.6)
Below 50th	492	788	4.7
	(56)	(54)	(1.3)
50th–75th	4,232	5,610	2.8
	(401)	(298)	(1.1)
75th–90th	10.689	15,657	3.8
	(438)	(595)	(0.6)
Above 90th	25,079	43,886	5.6
	(2,281)	(4,272)	(1.3)

Note: Numbers in parentheses are standard errors.
[a]Spending is in real (1987) dollars adjusted using the GDP deflator.

culatory system disorders, accounting for 26.1 percent of the top spenders. Next in importance is other, then neoplasms (which includes benign and cancerous growths), with 14.4 and 14.2 percent, respectively. The other diagnoses generally have 5 to 10 percent of the top spenders.

The primary diagnoses of top spenders did not change substantially over the 1977–87 period. In 1977, the most common diagnosis was also circulatory system disorders (25.7 percent of high cost users), followed by other (11.4 percent) and neoplasms (11.3 percent). We suspect, however, that if we were able to look at spending in the 1950s or 1960s, we would observe more change in primary diagnoses.

We examined growth in spending on circulatory disorders and cancers to see how it contributed to overall spending growth. We wanted to know whether costs grew more rapidly for these conditions than for overall spending. In addition, we examined whether cost growth differed at different points in the spending distributions for these conditions. The top panel of table 4.2 shows growth in spending for individuals with a primary diagnosis of circulatory system disorder.[8] Costs for the average patient with this primary diagnosis grew 14.6 percent per year. This rapid growth occurred throughout the distribution of spending on circulatory disorders, with growth in spending ranging from 11.6 to 24.4 percent at different parts of the distribution. The bottom panel of table 4.2 shows a similar trend for patients with a primary diagnosis of neoplasm. Overall spending for patients with this primary diagnosis grew at an average annual rate of 4.4 percent. Growth was highest among the top 10 percent of spenders with a primary diagnosis of neoplasm, where real growth averaged 5.6 percent per year.

Since circulatory disorders were by far the most common primary diagnosis among the high-cost elderly, we examined them more closely by dividing circulatory disorder diagnoses into 16 detailed groups using the Clinical Classifications for Health Policy Research (CCHPR). We were forced to collapse categories relating to ischemic heart disease into a single category and categories relating to cerebrovascular disease into a single category because coding procedures used for the NMES did not distinguish between these groups. Table 4.3 shows the individual CCHPR categories included under ischemic heart disease and cerebrovascular disease. Figure 4.7 shows the distribution of detailed diagnoses for the high-cost elderly with a primary diagnosis of circulatory disorder. Within this group, half had a diagnosis of ischemic heart disease in connection with their most expensive medical event. Cerebrovascular disease was diagnosed for 8.4 percent of the high-cost elderly during their most expensive medical event. In 1987, the average cost for an expensive medical event relating to ischemic heart disease was $18,548 among the high-cost elderly. Cerebrovascular conditions were slightly less costly, averaging $16,566 for expensive medical events among the high-cost elderly.

To gain a clearer picture of why these diseases are so costly, we looked at procedure codes in 1987. Unfortunately, most expensive medical events have no procedure codes. For the 30 percent of expensive events with procedure codes, the most common procedures are unspecified "other operations on vessels" occurring during 39.9 percent of these expensive medical events. "Other operations on heart and pericardium" and "operations on vessels of heart" are also common, occurring during 20.7 percent and 19.8 percent of coded expensive medical events, respectively. These procedure categories are broad, but they include bypass surgery, peripheral bypass surgery, and other operations performed to treat ischemic heart disease. Not surprisingly, the procedures that make circulatory disorders expensive are operations to treat circulatory diseases, particularly ischemic heart disease and other vascular diseases.

Using high-technology care to treat even common diagnoses contributes to

8. The trends shown in table 4.2 do not change when one looks at all respondents with a circulatory disorder instead of limiting the sample to those with a primary diagnosis of circulatory disorder.

Table 4.3 Individual Diagnoses Included in Ischemic Heart and Cerebrovascular Diseases

Diagnosis Group[a]	CCHPR Recode[b]	Examples
Ischemic heart disease	Acute myocardial infarction (heart attack)	
	Coronary atherosclerosis (hardening of arteries)	Postmyocardial infarction syndrome Intermediate coronary syndrome Old myocardial infarction Angina pectoris Other specified forms of chronic ischemic heart disease
	Other and ill-defined heart disease	Aneurysm of heart Myocardial degeneration Cardiovascular disease, unspecified Cardiomegaly Rupture of chordae tendinae Rupture of papillary muscle Acquired cardiac septal defect
Cerebrovascular disease	Acute cerebrovascular disease	Subarachnoid hemorrhage Intracerebral hemorrhage Other and unspecified intracranial hemorrhage
	Occlusion or stenosis of precerebral arteries	
	Other and ill-defined cerebrovascular disease	Cerebral atherosclerosis Other generalized ischemic cerebrovascular disease Hypertensive encephalopathy Cerebral aneurysm, nonruptured Cerebral arteritis Moyamoya disease Nonpyogenic thrombosis of intracranial venous sinus Transient global amnesia
	Transient cerebral ischemia	
	Late effects of cerebrovascular disease	

[a]Used in the 1987 National Medical Expenditure Survey.

[b]Based on Clinical Classifications for Health Policy Research (CCHPR) recodes from the Agency for Health Care Policy and Research.

the growth in relative spending for the elderly. For example, during the period 1984–91, the share of Medicare patients with acute myocardial infarctions receiving catheterization, angioplasty, bypass surgery, or some combination of these, grew from 11 percent to 41 percent (Cutler et al. 1996). The proliferation of technology to treat cardiovascular disease probably drives much of the spending growth for the high-cost elderly with circulatory disorders.

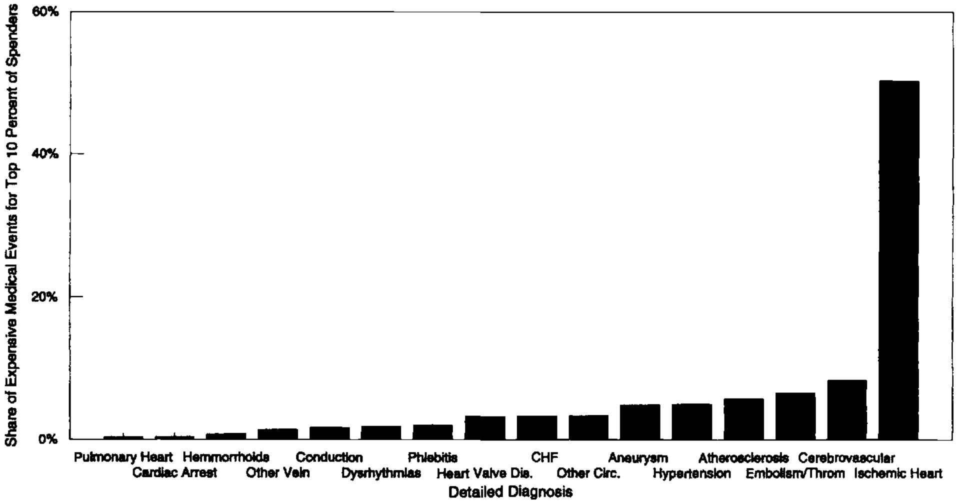


Fig. 4.7 Detailed diagnoses for high-cost elderly with primary diagnosis of circulatory disorder, 1987

4.3.2 High-Cost Infants

Understanding the reasons for increased spending among high-cost infants is more difficult than it is for the high-cost elderly. Generally, the surveys omit diagnosis codes for infants, and procedure codes are rarely used. This makes it impossible for us to use the "primary diagnosis" approach to understand high-cost users. Nor does the survey contain information such as birth weight of the infant or subsequent infant death.

However, the survey does provide some clues about what makes high-cost infants different from other infants. Sixty percent of high-cost infants experienced their most expensive medical event at the time of birth. It is much rarer for postbirth medical problems to lead to high spending. Two-thirds of high-cost infants did not undergo any surgery during their most expensive medical event.

Perhaps most striking is how long high-cost infants were in the hospital. The average length of stay for high-cost infants during their most expensive medical event was 23 nights in 1987. That was a dramatic increase over 1977, when high-cost infants stayed in the hospital only 13 nights during their most expensive stay.

Indeed, figure 4.8 shows the distribution of lengths of stay for all infants at the time of birth. Although the share of births requiring one-night or zero-night stays increased in 1987 compared with 1977, the upper tail of the distribution also increased in 1987 compared to 1977. For example, only 1 percent of births in 1977 were in the hospital over 30 days, compared to 6 percent in 1987.

The reason for a long stay at birth is generally complications related to pre-

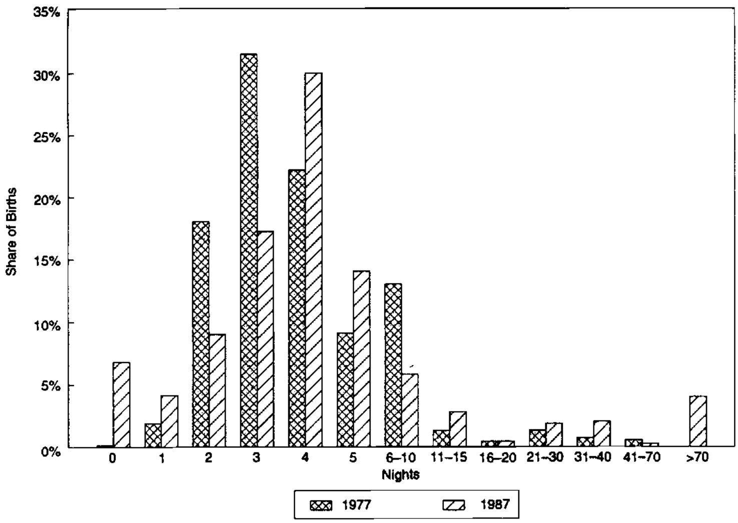


Fig. 4.8 Length of stay at time of birth, 1977–87

mature delivery. Infants born very prematurely tend to have respiratory or other developmental problems that either result in immediate death or require long hospital stays. Over time, as the technology available to treat these infants has improved, more of them may be surviving premature birth but requiring longer hospital stays.

This is consistent with the sketchy evidence that is available on the diagnosis of high-cost infants. Fifty-seven percent of high-cost episodes had a diagnosis code. Of these events, 24 percent had a condition code indicating that the baby was born prematurely—between 1,000 and 2,400 grams at birth. Among babies who were not high cost, less than 1 percent have a diagnosis code indicating that they were born prematurely.

The most common conditions among high-cost infants were disorders involving the respiratory system. Thirty-five percent of the high-cost sample had a respiratory condition in connection with their most expensive medical event. These ranged from postbirth respiratory disease to congenital respiratory anomalies and a variety of lower respiratory diseases. Respiratory conditions (pneumonia excepted) are a frequent complication of premature birth.

The evidence seems consistent with a story of increasing costs related to low birth weight. As technology to treat premature babies has improved, the costs of low-birth-weight children—and thus the overall costs of infants—have increased.

Historical trends in the proliferation of neonatal care support this contention. In particular, the increasing cost of infants after the mid-1970s is consistent with the major technological innovation of this period—the diffusion of neonatal intensive care units (NICUs). NICUs are intensive care facilities specially designed for complications arising shortly after birth, such as respiratory failure or incomplete physical development. In 1976, the first year that the American Hospital Association kept data on this technology, 8 percent of hospitals had an NICU, and there were 5,630 NICU beds in total. By 1990, 19 percent of hospitals had an NICU, and the number of NICU beds had nearly doubled.[9] Among the largest hospitals (those with 400 or more beds), two-thirds had an NICU in 1990.

Although we cannot be certain with our data, we suspect that the diffusion of NICUs and their associated technologies explains much of the cost explosion for infants. Medical technology is buying us, in the crudest sense, care for infants who previously died at birth.

4.4 The Value of Medical Spending

Understanding the sources of cost growth is only one concern; determining the value of this spending is a second. In this section, we look at crude measures of outcomes to see whether there is some contemporaneous relation between spending increases and health. We do not interpret these data as causal. Instead, we are interested in examining whether the basic facts about health outcomes are consistent with the cost trends. If increased spending on cardiovascular disease and neoplasms in the elderly is not associated with better outcomes for patients with these diseases in the aggregate, it will be hard to argue that medical spending is buying much in the way of improved health. In future work, we intend to examine the causality issue in more detail.

4.4.1 The Health of the Elderly

Given that over 40 percent of the high-cost elderly have primary diagnoses relating to circulatory disorders or malignant neoplasms, one can look to mortality rates for these diseases for evidence on how outcomes for patients with these diseases have changed over time.

Figure 4.9 shows death rates for four groups of diagnoses: diseases of the heart, cerebrovascular disease, malignant neoplasms, and all other diagnoses. Over the three decades between 1960 and 1990, death rates for heart disease and cerebrovascular disease have plummeted. In 1960, the age-adjusted death rate due to heart disease was 287 per 100,000. This figure fell by nearly half, to 152 per 100,000, by 1990. Similarly, deaths due to cerebrovascular disease fell by 60 percent, from 80 per 100,000 in 1960 to 28 per 100,000 in 1990. This is certainly consistent with improved, but high-cost, medical care.

9. In both of these years, the number of NICUs is slightly understated because hospitals that had neonatal intensive care services as part of their medical/surgical ICU were not counted. The understatement is not likely to be large, however.

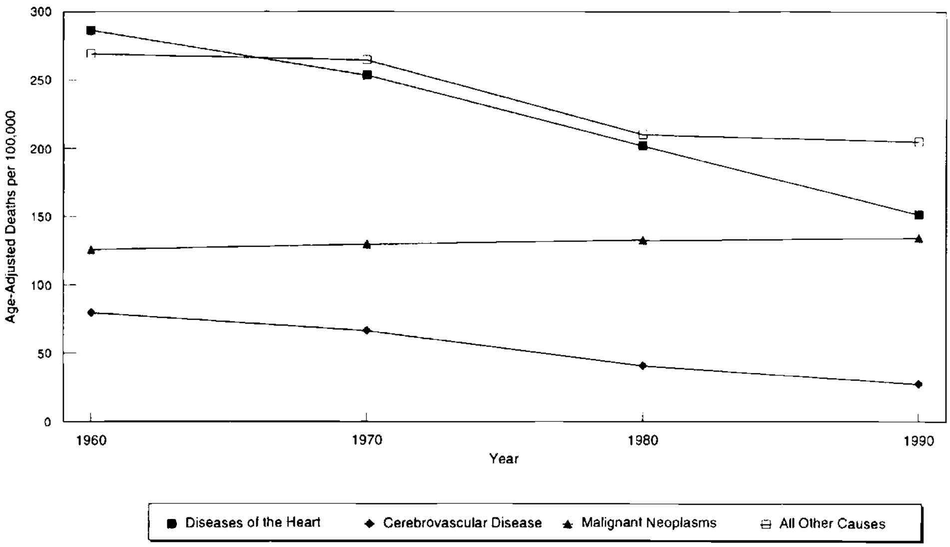


Fig. 4.9 Changes in death rates for high-cost diagnoses, 1960–90
Source: National Center for Health Statistics, *Trends in the Health of Older Americans: United States, 1994* (Hyattsville, Md., 1994).

In contrast to the improvements in outcomes for major circulatory diseases, deaths attributable to malignant neoplasms followed a slow but steady rising trend during this period, with deaths per 100,000 rising from 125 to 135. While mortality due to neoplasm has declined for younger ages, mortality rates have increased for those over age 50 (Cohen and Van Nostrand 1995). Similar trends in cancer mortality have been documented in Canada (Berkel 1995). Clearly, we have made little progress in preventing death from cancer over this period.

Of course, the technologies that have increased costs may not have been the ones that extended life. The source of reduced mortality for cardiovascular disease is the subject of great debate. The general consensus in the literature (Hunink et al. 1997) is that high-tech medicine has been less important in improved health than have been lifestyle modifications and pharmaceuticals that provide better primary prevention (reduced incidence of disease at all) and secondary prevention (reduced incidence of disease reoccurrence). But the contributions of these different factors are likely to change over time, and there has been much less analysis of the reasons for improved health over the past decade than in previous periods.

4.4.2 The Health of Infants

The most readily available measure of health outcomes for infants is infant mortality; we consider what has happened to mortality in the first year of life as spending has increased. Rather than look at overall infant mortality, how-

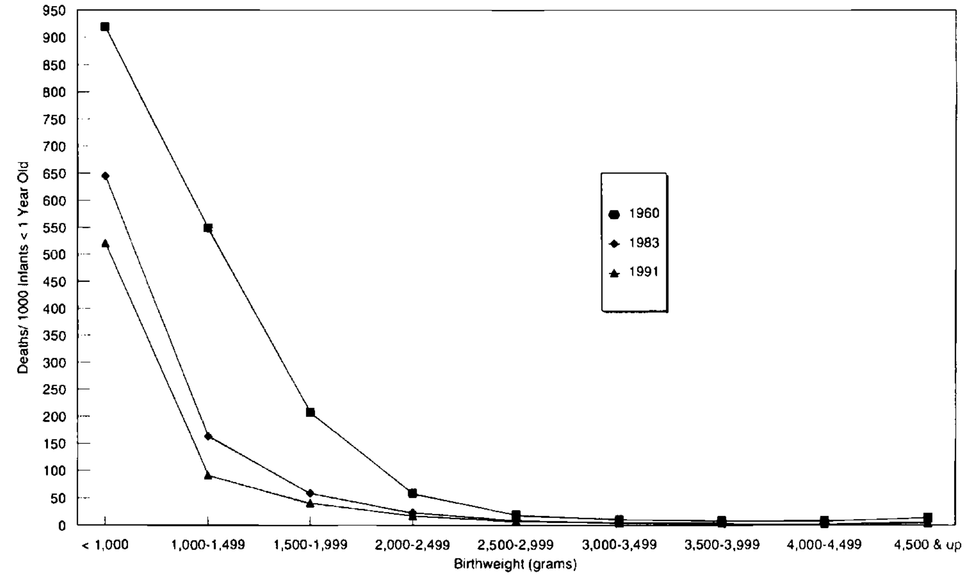


Fig. 4.10 Infant mortality by birth weight, 1960–91

Sources: National Center for Health Statistics, "A Study of Infant Mortality from Linked Records by Birth Weight, Period of Gestation and Other Variables: United States, 1960 Live Birth Cohort" (Rockville, Md., 1972); National Center for Health Statistics, *Health: United States 1995* (Hyattsville, Md., 1972).

ever, we examine infant mortality by birth weight. There are two reasons for this. First, to the extent that technological changes are concentrated among premature infants, mortality reductions should be concentrated in this group as well. In addition, exogenous changes in birth weights for infants will naturally affect infant mortality, and we want to purge these from our estimates.

Figure 4.10 shows infant mortality rates (deaths per 1,000 live births) in the years 1960, 1983, and 1991. Over the period 1960–91, dramatic gains were made in mortality outcomes for low-birth-weight babies, particularly those under 2,000 grams. Among babies born between 1,500 and 1,999 grams, deaths per 1,000 dropped 75 percent, from 207 to 40. Among the 1,000–1,499 gram babies, deaths per 1,000 dropped by 80 percent, from 549 to 91, over these three decades. Among those born under 1,000 grams, deaths per 1,000 fell by half, from 919 to 521.

In Figure 4.11 we show the annual percentage decline in infant mortality by birth weight from 1960 to 1983 and from 1983 to 1991. The most prominent feature in this graph is the way the decline in infant deaths occurs most rapidly in the low-birth-weight ranges, particularly in the 1,000–1,999 gram range. This is especially pronounced for the 1983–91 period. From 1960 to 1983, infant mortality reductions were greater among lighter infants but not by a large amount. The decline was about 5.5 percent per year for the lighter infants

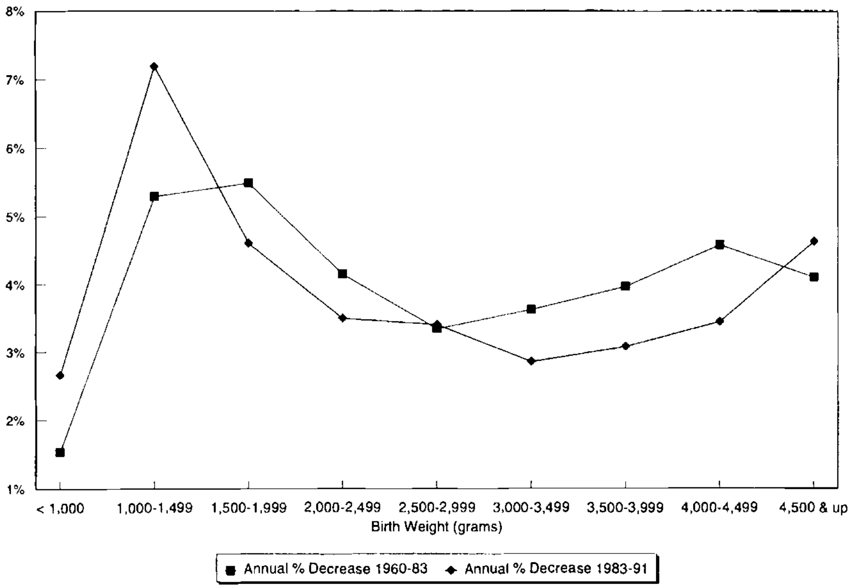


Fig. 4.11 Decline in infant mortality by birth weight, 1960–91
Sources: National Center for Health Statistics, "A Study of Infant Mortality from Linked Records by Birth Weight, Period of Gestation and Other Variables: United States, 1960 Live Birth Cohort" (Rockville, Md., 1972); National Center for Health Statistics, *Health: United States 1995* (Hyattsville, Md., 1972).

and perhaps 4 percent per year for the normal-birth-weight infants. After 1983, however, infant mortality reductions were particularly concentrated among the lightest infants. Mortality for infants born between 1,000 and 1,499 grams, for example, declined by 7 percent per year, compared to 3 percent per year for normal-birth-weight infants.

The increasing emphasis on mortality reductions for the lightest infants over the 1980s is consistent with the diffusion of medical care designed for very low birth weight infants. Recall that the costs of very expensive infant care increased most rapidly from the late 1970s to the late 1980s and that NICUs expanded most rapidly in this period. Thus, the evidence is certainly consistent with a fair return to medical spending.

The one exception to this story is the very lightest group—those born under 1,000 grams. For these infants, reductions in mortality have been low in all periods. We suspect that one reason we do not observe such rapid improvements in infant mortality for babies born under 1,000 grams is the way live births were counted. Although nothing changed in the official definition of live births over the 1960–91 period, it is plausible that very premature infants who died minutes after birth were not counted as live births when there was no technology available to treat them. Now that technology offers more possibilities for saving very low birth weight babies, these babies are more likely to be counted as live births so that the number of live births has increased in low-birth-weight ranges.[10]

Some evidence for this is provided by the increasing number of very low birth weight live births over time. The ratio of births below 1,000 grams to births between 1,000 and 1,499 grams has been increasing over time, even as the ratio of births between 1,000 and 1,499 grams and 1,500 and 1,999 grams has been relatively constant.

One drawback of using infant mortality to measure gains in infant health is that it provides no evidence about long-term outcomes for low-birth-weight babies. There is considerable evidence that low-birth-weight babies who survive the neonatal period are much more likely than heavier infants to have problems that continue throughout childhood and later in life (Institute of Medicine 1985; Saigal et al. 1996). The evidence presented here does not capture this component, which should be included in any evaluation of the costs and benefits of increased medical spending on infants.

4.5 Conclusions

Although growth and concentration in health care spending have been well documented, until now we have known little about the nature of this growth and the high-cost spenders that drive it. Our analysis shows a striking trend in the growth of health care spending. Not only is spending at a point in time highly concentrated at the top of the spending distribution, but growth in health care spending is highly concentrated as well. We find that growth is most rapid among the young, those less than 1 year old, and the old, those 65 years old or older. Within these rapid growth groups, increased spending is largely driven by those at the top of the spending distribution. We find that 89 percent of excess spending growth for infants originates from tremendous growth in health care spending for the top 10 percent of the spending distribution of infants. For the elderly, 66 percent of excess spending growth originates from high-cost users. Among the young, this spending often is associated with birth, and a connection with premature birth seems likely. Among the old, circulatory disorders and neoplasms are the most common primary, or high-cost, diagnoses.

In our initial attempts to see whether gains in health outcomes are consistent with increased spending, we find that high spending growth on a particular population or condition is accompanied by gains in health outcomes for these conditions over time. While overall infant mortality has plummeted since 1960, the reductions are largest among low-birth-weight babies. In our analysis of diseases driving high-cost elderly spending, we find that deaths due to circula-

10. Across types of medical care, diagnosis of a disease is strongly associated with ability to treat the disease. See Cutler and Richardson (1997).

tory disorders have decreased dramatically over time, even during periods when mortality due to other causes is relatively constant. The trend in mortality for malignant neoplasms is an exception to the broad finding that where spending is most concentrated gains in health outcomes are great. Future research should try to determine whether the correlation between high spending and health gains is causal. Regardless of whether this relationship is causal, our findings suggest that one can understand more about the growth in health care spending by learning more about technologies aimed at helping very ill infants and elderly.

Our results also have implications for forecasting medical spending growth over time. Common forecasts of medical spending do not account for changes in relative spending by age over time. Our results suggest that this understates the future growth of costs, since the fastest growing age group, the population aged 85 and over, is also the group whose costs are growing most rapidly.

Finally, determining what caused the shift in resources toward infants and the elderly is important. Clearly, the advent of Medicare and Medicaid and the increased generosity of private health insurance coverage have played a role in raising the share of medical spending on infants and the elderly. However, little is known about the mechanism that transforms increased insurance coverage into technological improvements, and ultimately gains in health. Answering these questions should be part of any agenda to contribute to debates on medical spending.

Appendix

Table 4A.1 **Average Spending by Age Group 1963–87**

Age Group	1953[a]	1963	1970	1977	1987	Average Annual Percentage Change 1953–87	Average Annual Percentage Change 1963–1987
Under 1	119.32	236.12	353.45	789.71	2,502.64	9.0	9.8
		(28.06)	(56.37)	(273.84)	(1,117.01)		(1.9)
1–4	119.32	163.53	391.09	333.80	654.75	5.0	5.8
		(11.41)	(137.23)	(20.63)	(82.33)		(0.5)
5–14	157.68	175.17	246.91	322.56	465.51	3.2	4.1
		(11.94)	(21.93)	(17.67)	(27.80)		(0.3)
15–24	257.40	353.48	791.35	588.03	880.55	3.6	3.8
		(28.77)	(218.94)	(19.25)	(49.74)		(0.4)
25–34	298.31	434.84	672.93	773.44	1,057.75	3.7	3.7
		(28.87)	(51.63)	(30.21)	(45.22)		(0.3)
35–44	340.92	456.33	553.70	810.53	1,095.19	3.4	3.6
		(35.56)	(48.46)	(37.84)	(51.33)		(0.4)
45–54	340.92	566.35	728.57	1,043.4	1,742.03	4.8	4.7
		(44.70)	(62.80)	(46.44)	(135.66)		(0.5)
55–64	409.11	570.96	1,207.54	1,476.35	2,410.35	5.2	6.0
		(56.29)	(209.88)	(86.06)	(137.86)		(0.4)
65–74	434.68	622.08	1,124.76	1,835.15	3,874.34	6.4	7.6
		(49.62)	(82.19)	(96.26)	(191.32)		(0.4)
75–84	434.68	688.66	1,217.90	2,400.05	4,694.39	7.0	8.0
		(92.64)	(147.28)	(207.79)	(280.08)		(0.6)
85+	434.68	447.46	1,310.52	2,845.54	5,650.04	7.5	10.6
		(117.04)	(508.05)	(357.94)	(433.79)		(1.1)

Notes: Average spending is in real (1987) dollars using the GDP deflator. Numbers in parentheses are standard errors.

[a]The 1953 age groups are 0–5, 6–17, 18–24, 25–34, 35–54, 55–64, and 65+. Average spending for 5–24-year-olds was constructed assuming a uniform age distribution.

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Comment David Meltzer

This paper examines the distribution of medical care costs among and within age groups over a 40-year period in order to try to better understand why medical care has become so expensive over time and what its value to society has been. It comes to three basic conclusions:

1. Costs have increased disproportionately for the young and the very old.
2. Most of these costs are associated with "technically" intensive aspects of medicine—the care of premature babies and adults with cardiovascular disease or cancer.
3. With respect to the value of these treatments, there is some evidence that mortality has decreased in the areas where expenditures have increased.

The first part of the paper makes two basic points. The first is that costs have increased disproportionately for the very young and old compared to the "middle-aged" (ages 1–64!). The second is that essentially all of the disproportionate growth in spending on the very young and old is accounted for by high-cost users in those groups.

These are important facts and may suggest where we will need to look if we are to control health care costs. Nevertheless, it seems possible that the two points may really be condensed into just one: that health care expenditures in all age groups have risen because of a few high-cost users. The growth in costs among the middle-aged may be relatively smaller because there may be pro-

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portionately fewer very sick people in the middle-aged group—yet just as much rapid growth in costs among those who are very sick. It is hard to distinguish these two possibilities from the paper because all the results are normalized relative to that middle group.

This suggests that it would be useful to break down spending at each point in time by age group and percentile within each age group then trace the growth in these amounts over time. This procedure would describe, for example, the annual percentage growth in expenditures for the 90th percentile of middle-aged individuals—a rate that is hidden by the normalization in the current calculations. These numbers could be reported either in per capita terms or as total spending for the age group. If reported as changes in total spending, the changes could then be decomposed into changes in the numbers of people in the age group and changes in per capita expenditures conditional on age and percentile in the spending distribution within that age group.

I suspect that this would show that the sickest middle-aged people have also had extremely fast growth in costs. Such a finding could help provide some further insight into why spending among middle-aged people has grown less quickly than spending among the very young and old. One possibility is that we have increased our aggressiveness in treating the very young and old. However, it is equally plausible that, if a smaller percentage of middle-aged people tend to be sick than of the very young or the elderly, a given percentile among the middle-aged will be healthier than the same percentile among the other age groups. The middle-aged group would thus be less likely to have rapid growth in costs if most cost growth is among the very sick. Examination of the growth of expenditures among the highest percentiles across these age groups might help distinguish these hypotheses.

This also suggests that it may be useful to analyze cost growth across the life cycle over time by examining the percentage of costs due to people with costs above some level in real terms (e.g., $1,000 in 1994 dollars). Another approach would be to look at growth in the costs of treating specific conditions arising at different ages—for example, heart attacks at ages 40, 50, 60, 70, and so on. The comparison would then change from an age-normalized one to an objective one not affected by the relative health of others of the same age.

With appropriate longitudinal data, one could then begin to trace out lifetime costs. This could be particularly useful in instances where changes in expenditures lead to changes in survival that, in turn, induce future expenditures. Some of the work I have done on future costs in medical cost-effectiveness analysis suggests that these costs may be nontrivial (Meltzer 1997). Future costs such as these might imply that the costs associated with an intervention performed in a particular age group could appear in other age groups. This could provide some insight into why costs have increased so greatly among the very sick by separating changes in survival from technical change, changes in prices, and other causes of increased health care costs.

The second part of the paper examines particular diagnoses for these high-cost users: heart disease and cancer for the old and premature birth for the young. There are no surprises here; these diagnoses are well recognized to be the most common causes of serious illness in these age groups. Of course, it is worth remembering that these conditions may be to some extent acute manifestations of chronic conditions. For example, heart disease may result from diabetes, or premature birth may result from maternal substance abuse. This fact is important because it is a reminder that the most effective and efficient way to decrease the costs of caring for the extremely ill may, in some cases, be prevention.

The third part of paper shows that mortality has tended to decrease in those areas where costs have increased. The authors are careful not to say that this relationship is causal, but the motivation is clearly to suggest that medical expenditures in these areas may be of value. I suspect that this is correct but agree with the authors that other interpretations are possible. Expenditures may have increased because mortality has decreased. For example, imagine that we observe decreased cardiovascular mortality at the same time that costs increase. It could be that high spending to save patients from heart attacks leads to decreased mortality. On the other hand, it could also be that the accidental discovery of an inexpensive intervention that saves lives (e.g., administration of an aspirin in the emergency room to a patient with chest pain) also leads to prolongation of life and years of interventions with questionable value at the margin (e.g., cardiac catheterizations and treatment for congestive heart failure). To take another example, cancer can sometimes cause elevations in the amount of calcium in the blood (hypercalcemia) and can sometimes present itself first with the symptoms of hypercalcemia. Hypercalcemia can be fatal in the absence of good treatments, but effective and fairly inexpensive treatments are now available. The consequence, however, could be that people with cancer survive long enough to receive chemotherapy and incur the high costs associated with it. Even if chemotherapy had no effect on survival, we could observe that chemotherapy expenditures increase at the same time that cancer mortality decreases, but there would be no causal connection between the two, and most of the expenditures would be wasted.

Still, it seems likely that health care expenditures on the seriously ill have often had substantial payoffs. The vast body of literature from randomized clinical trials suggests that there is value in a wide range of medical interventions. The question is ultimately not whether medical interventions have had any value in improving health, but the magnitude of their contributions compared to other causes of improving health, such as expenditures on public health and increases in income and education. With respect to tuberculosis, there is evidence that the largest decreases in the burden of disease resulted from improvements in nutrition and public health that occurred before the development of effective treatments (McKeown 1988). With respect to cardiovascular mortality, older work suggested that treatment might not have been as important as prevention in reducing mortality, but some of the newest work suggests that more recent trends have been more heavily influenced by high-tech interventions. For example, a recent study suggests that more than three-fourths of the increase in survival after heart attacks in Minneapolis in the 1980s was due to acute interventions (McGovern et al. 1996). Of course, this is survival after a heart attack, and prevention may have a much bigger overall effect on cardiovascular mortality than does treatment. With cancer death rates not declining for the most part, it is hard to argue that huge strides have been made in that area (Bailar 1997). Certainly, it is possible that we would have done better with an emphasis on prevention and screening rather than an emphasis on acute treatment.

As a brief aside about the relatively slow decline in death rates for very low birth weight babies, it is worth noting that, while this could reflect changes in definitions of live versus still births, as suggested by the authors, it could also reflect the fact that existing technology is often simply not able help these infants.

I would like to make two last points about the implications of this research. First, the fact that health care costs are highly concentrated among high-cost users and are remaining so over time suggests that cost containment will have to come by controlling costs among this group. To the extent that this is accomplished through changes in the financing and organization of health care as opposed to cost-reducing medical technologies, it is likely to be difficult without managed care or prospective payment for inpatient care because most deductibles in traditional insurance are too small to be relevant for these sorts of large expenditures. One possible exception is medical savings accounts with very high deductibles. These arrangements might be effective, but there are still many questions concerning their intertemporal aspects as well as their effects on adverse selection. This may be somewhat less true to the extent that decreases in outpatient coverage can decrease inpatient utilization as suggested by the RAND Health Insurance Experiment (Manning et al. 1987). However, the RAND experiment lasted only a relatively short time, and it is quite possible that policies that try to lower expenditures by limiting outpatient expenditures would backfire by increasing preventable illness and hospitalization over the long run.

The second point is that patterns and trends in health care expenditures over the past 40 years may or may not be a good guide to the future. The increasingly popular view of health care as part of wellness—ranging from prevention to sports medicine—could cause much more growth in costs to occur among the well than among the severely ill. That seems unlikely, however.

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