Medical Care in the Last Twelve Months of Life: The Relation between Age, Functional Status, and Medical Care Expenditures

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тне PAST DECADE OR MORE SEVERAL VER studies have shown that persons who die appear to consume a disproportionate amount of medical resources (Timmer and Kovar 1971; Pira and Lutins 1973; Cancer Care and the National Cancer Foundation 1973; Fisher 1980; Ginzberg 1980). The best known and most recent of these studies, by Lubitz and Prihoda (1984), showed that the 5.9 percent of Medicare beneficiaries who died in 1978 accounted for 27.9 percent of Medicare reimbursements. In addition to these studies of medical expenditures at the end of life, several studies of high-cost hospital patients have shown that a considerable portion of these costs is incurred by patients who died either during their hospitalization or shortly after discharge from the hospital (Civetta 1973; Cullen et al. 1976; Turnbull et al. 1979; Thibault et al. 1980; Schroeder, Showstack, and Roberts 1979; Schroeder, Showstack, and Schwartz 1981; Detsky et al. 1981). This has led to a widespread belief that excessive amounts of high-cost technology care is expended on patients, mainly elderly ones, whose prognosis is poor and who will die despite the intensive care they get. There is concern not only that such care is wasteful use of scarce medical resources but that it may also be inappropriate care for the elderly patients. Although dealing with the problem of health care for the elderly in general and not focusing on their last year of life, it is this dual concern which

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has prompted Callahan (1987) in his recent book to propose that we should be prepared, over the next 20 to 30 years, to make a "societal decision deliberately to limit life-extending high-technology care for those who have lived out a natural life span," which he sets at the late 70s or early 80s.

Before we conclude that the high medical care expenditures of the elderly in their last year of life are wasteful and inappropriate, or agree with Callahan that eventually we may have to consider formal rationing (see appendix note) of life-extending high-technology care by not providing it to persons above a certain age, we have to know far more about expenditures and the pattern of expenditures in the last year of life and about the characteristics of persons in their last year of life than we know at this time. The studies conducted to date have two major shortcomings. First, most of them do not provide information on all medical expenses in the last months or year of life and are either limited, like the Lubitz and Prihoda study, to expenses of the elderly covered by Medicare, i.e., almost exclusively expenses for hospital and physician services, or refer to hospital expenses only or to the costs of a specific terminal illness like cancer. Thus, the studies do not show the amounts of total medical expenditures by type of service nor possible differences in the pattern of these expenses by different groups of decedents, such as the "older old" (those aged 80 and over) compared with the younger old (those aged 65 to 79). Second, few of them give any information about the characteristics of those who died beyond these ages, sex, and, in some instances, cause of death. Perhaps the most important data gap in this respect is the lack of any information about the functional status of the decedents because without at least some information about their condition in the months prior to their death it is impossible to evaluate whether their care was "wasteful" or "inappropriate."

In order to shed some light on these questions, we conducted a small, in-depth retrospective study of a group of decedents for whom we collected all information on use of and expenses for medical care in the 12 months preceding their death. In addition, we conducted interviews with the next of kin of a sample of the decedents in which we asked a number of questions about the decedents' characteristics, including their functional status in the last 12 months of their lives. In this article, we will focus on the relation between total expenditures and expenditures by type of service on the one hand and age and functional status on the other.

Methodology and Study Population

Methodology

Our study population consists of all patients who received their medical care from physicians at the Palo Alto Medical Clinic (PAMC) and who died in the period of January 1983 through August 1984. The PAMC is a multi-specialty predominantly fee-for-service group practice of about 135 physicians, with its own laboratories, x-ray and radiation therapy facilities, and other facilities providing outpatient ancillary services. It does not operate its own hospital but uses Stanford University Hospital for patients who need inpatient treatment, or a free-standing "surgi-center" for certain out-of-hospital surgical procedures.

During the 20-month period of January 1983 through August 1984, PAMC physicians informed us of every patient who died and supplied the name and address of the decedent's next of kin. After a suitable interval (generally a month, but longer in some cases if the physician thought more time was necessary after a death), we contacted all next of kin, described our study, and asked them to participate in it by signing a consent form on which they were asked to list all providers of medical care other than the PAMC from whom the decedent had received services during the 12 months preceding death. We then wrote all providers of care for copies of their bills on the basis of the consent forms. This method of data collection, which we have used successfully in previous studies, is least burdensome for the respondents and provides more accurate information than asking them directly for data on medical care expenses, especially when these data relate to a person other than the respondent. Data on the decedent's PAMC bills were obtained from the PAMC. We checked all billing information (both PAMC bills and bills for services from other providers such as non-PAMC physicians, hospitals; and nursing homes) against the decedent's PAMC medical records which always record hospitalizations and nursing home stays and often also indicate the use of non-PAMC physicians. In addition, we also probed for non-PAMC services in the household interviews described below with the next of kin. We are confident, therefore, that we missed no major medical care expenses.

To gain more detailed information about the sociodemographic and other characteristics of the decedents, we contacted the next of kin of a random sample of decedents for detailed household interviews conducted by our staff. The interview covered questions on marital and family status, occupation, education, income, living arrangements, sources of informal support and intensity of informal support, health insurance coverage, out-of-pocket medical expenses, and functional status in the 12 months preceding death. For data on functional status, we used the standard questions on activities of daily living (ADL), instrumental activities of daily living (IADL), and cognitive status. As an example of how we worded these questions, since they referred to functional status over the course of a 12-month period rather than at a given point in time, we asked the respondent how many days, weeks, or months before death the decedent was able to dress (a) without any help, (b) with some help, or (c) was completely unable to dress himself/herself. The answer might be that the patient was able to dress without any help the first four months, needed some help the next seven-and-a-half months, and was completely unable to dress the last two weeks before death. For each activity the answers were coded in terms of weeks before death.

When analyzing the data on functional status, we decided to use only the responses to the ADL questions regarding dressing, toileting, transferring, and continence, which have generally proved to be the most predictive of health care utilization, and to omit the responses to the questions regarding eating and bathing. For the analysis of the IADL data, we used only the responses to the questions regarding the ability to handle personal business affairs, transportation, and shopping, omitting the responses to the questions regarding preparing meals, doing housework, and doing laundry, which many respondents found difficult to answer for males. Finally, as an indicator of cognitive status we used only the responses to the questions regarding the decendents' degree of confusion and memory loss.

After experimenting with various, more sophisticated, methods of scaling degree of functioning in ADL, IADL, and cognitive status, we adopted a simple classification scheme because of the relatively small number of decedents for whom we had this detailed information.

Study	y Population, and	d United States 19	83*
All Ages	PAMC All Decedents 100.0% (N = 502)	PAMC Study Population 100.0% (N = 261)	United States 100.0% ($N = 1.6$ million)
Bv age			
<65	20.7%	17.2%	24.6%
65–79	36.7	39.5	40.0
80 and over	42.6	43.3	35.4
By sex: percentage of	males		
All ages	42.4	38.3	51.7
<65	48.1	48.9	61.9
65–79	49.5	45.6	56.9
80 and over	33.6	27.4	38.8
By cause of death			
Cancer	33.9	37.2	24.3
Heart disease	32.1	33.0	43.0
Cerebrovascular	-		
disease	13.7	11.0	11.6
Respiratory disease	8.2	9.6	7.3
All other	12.2	9.2	13.9
By place of death			
Home	25.3	27.2	NA
Hospital	51.6	47.5	NA
Nursing home,			
convalescent	22.1	25.2	NT 4
hospital, hospice	23.1	25.3	INA
65 Years and Over	100.0% (N = 398)	100.0% (N = 216)	100.0% (N = 1.2 million)
By cause of death			
Cancer	25.6%	27.8%	20.8%
Heart disease	36.2	38.0	45.9
Cerebrovascular	16.6	13 4	13.6
disease	10.0	17.7	19.0
Respiratory disease	9.8	11.6	7.9
All other	11.8	9.3	11.8

TABLE 1

Percentage of Distribution of Decedents by Age, Sex, Cause of Death, and Place of Death: All 1983–1984 PAMC Decedents, 1983–1984 Study Population, and United States 1983*

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65 Years and Over	100.0% (N = 398)	100.0% (N = 216)	100.0% (N = 1.2 million)
By place of death			
Home	22.4	21.8	NA
Hospital	49.5	48.6	NA
Nursing home, convalescent			
hospital, hospice	28.2	29.7	NA

TABLE 1—(Continued)

* Data are for whites and exclude perinatal deaths and deaths from accidents and poisonings.

We grouped all decedents into one of three categories: (1) those unimpaired all 12 months (or, if they died in the hospital, until this final hospitalization), (2) those totally impaired all 12 months, and (3) those partially impaired all or part of the 12 months. For example, in the case of ADL those unimpaired the whole 12 months were persons who were able to perform all four functions without any help all 12 months (or if they died in the hospital, until their last hospitalization); those totally impaired were persons who needed help with or were unable to perform all four functions all of the 12 months; and those partially impaired were persons who needed help with or were unable to perform one or more of the four functions part or all of the 12 months. The same classification system was used for the responses to the questions regarding IADL and cognitive status. Because our findings are very much the same for the three sets of data, only the data relating to the findings for the ADL will be reported here. For the sake of brevity, the three categories will be referred to as the unimpaired, the partially impaired, and the totally impaired.

Study Population

Of the 513 deaths of patients of PAMC physicians which occurred over the 20 months, we eliminated 11 suicides and accidental deaths. We sent consent forms to the next of kin of the remaining 502 decedents of whom 365 (72.7 percent) agreed to participate, 110 (21.9 percent) refused, and 27 (5.4 percent) could not be located. The information for these 365 decedents other than that on their medical care use and expenditures is limited to age, sex, cause of death, and place of death. The next of kin of a random sample of 291 of these 365 decedents were contacted for the detailed household interviews. Of those contacted, 261 (89.7 percent) completed the interview, 24 (8.2 percent) refused the interview or did not complete it, and six (2.1 percent) died before the interview or could not be located. The 261 decedents for whom interviews of next of kin were completed are the subject of the analysis presented in this article.

Table 1 records that these 261 decedents who are our study population are quite similar to all 502 PAMC decedents with regard to age, sex, cause of death, and place of death, the characteristics for which data are available for all 1983-1984 PAMC decedents. They are somewhat older than all decedents, with those under the age of 65 years slightly underrepresented. Similarly, males are somewhat underrepresented, especially among those aged 80 years and over. A slightly higher percentage died of cancer and a lower percentage of cerebrovascular disease. This is, however, due largely to the high percentage of cancer deaths in the group under the age of 65 while (as table 1 also records) the distributions by cause of death for the group aged 65 and over are very similar. Finally, a somewhat higher percentage died at home rather than in the hospital. This too is explained by the high percentage of decedents in the group under the age of 65 who died of cancer and who tended to die at home, while the distributions by place of death for the groups aged 65 and older are very similar.

Compared with the United States population, the study population is older, with 83 percent in the group aged 65 and over compared with 75 percent for the United States. (Because the study population consists entirely of whites, the figures presented here are for whites [1983]. Excluded are perinatal deaths and deaths from accidents and poisonings.) The percentage of deaths from cancer is higher, 37 compared to 24 percent, and that from heart disease lower, 33 percent compared to 43 percent. While these differences are very pronounced in the under-65 year age group, however, they are less in the group aged 65 and over where cancer deaths are 28 percent compared to 21 percent and deaths from heart disease are 38 percent compared to 46 percent. The percentage of deaths from cerebrovascular disease is about the same, 11 percent compared to 12 percent for the United States, and deaths from respiratory disease are slightly higher, 10 percent compared to 7 percent.

Findings

Expenditures by Age

We found, as have some other researchers before us (e.g., Lubitz and Prihoda 1984), that in the case of decedents, medical care expenditures decline beyond a certain age. Figure 1 records total medical expenditures as well as expenditures for different types of services by age group. Medical services have been broken down into hospital services, which include all inpatient hospital services billed for by the hospital; physician services, which include inpatient and outpatient medical and surgical physician services and all outpatient ancillary services such as laboratory tests, x-rays, and scans; nursing home services, in which hospice services have been included because they were too few to justify a separate category; home health care services; and all other services, which include drugs and prescriptions, medical supplies, and a number of relatively rarely used miscellaneous services such as, for example, speech therapy and counselling.

As figure 1 records, mean total medical expenditures were \$22,610



FIG. 1. Mean medical expenses of decedents by age and type of service, PAMC 1983-1984.

for all decedents. While they were about the same for the group under the age of 65 and those aged 65 to 79 years, \$24,793 and \$24,888, respectively, they declined to \$19,663 for those aged 80 years and over. In other words, the total expenses of the oldest age group were about 80 percent of those of the younger age groups.

Figure 1 also records that the differences in expenditures for hospital and physician services of the group aged 80 and over compared with those of the two younger age groups are considerably larger than the differences in total expenditures. For example, expenses for hospital services for the group aged 80 and over were about 50 percent and for physician services about 46 percent of the expenses of those aged 65 to 79 years, and 54 percent and 30 percent, respectively, of the expenses of those under 65 years of age. In other words, the oldest group received very much less of the relatively intensive type of care exemplified by hospital services and to a lesser extent by physician services, but obtained largely supportive care in the form of nursing home and home health care services.

Table 2 presents these findings in a different way and contrasts the percentage of decedents in each age group with the percentage of expenditures for different types of services by each age group. It shows that the distributions of decedents and of *total expenses* by age group are not too dissimilar. The group under the age of 65 accounted for 17 percent of all decedents and 19 percent of total expenses; the corresponding figures for decedents aged 65 to 79 years are 40 percent

	$\begin{array}{l} \text{All} \\ (N = 261) \end{array}$	Under 65 $(N = 45)$	65-79 (N = 103)	80 and over $(N = 113)$
Decedents	100%	17%	40%	43%
Total expenditures	100	19	43	38
Hospital expenditures	100	21	51	28
Physician expenditures	100	31	46	23
Nursing home and home health				
expenditures	100	3	23	74

TABLE 2

Percentage of Distribution of Decedents, Total Medical Expenditures, and
Expenditures for Hospital, Physician, and Nursing Home and Home
Health Care Services by Age, PAMC 1983-1984

and 43 percent, and for those aged 80 years and over, 43 percent and 38 percent.

The distributions of decedents and of *expenses for specific services* by age group show marked differences, however. Decedents under the age of 65, though accounting for only 17 percent of all decedents, accounted for 21 percent of all expenses for hospital services and 31 percent of all expenses for physician services. Similarly, those aged 65 to 79 years, representing 40 percent of all decedents, accounted for 51 percent of hospital expenses and 46 percent of physician expenses. By contrast, those aged 80 years and over, constituting 43 percent of all decedents, accounted for only 28 percent of all hospital expenses and 23 percent of all physician expenses; they were responsible, however, for almost three-quarters of total nursing home and home health care expenditures.

Expenditures by Functional Status

Perhaps the most important finding of the study is that of the relation between functional status and medical care expenses in the last year of life. Because there were only two decedents in the group under the age of 65 who were totally impaired, this age group is omitted from the analysis. Of the 216 decedents aged 65 years and over, 29 percent were unimpaired, 49 percent were partially impaired, and 22 percent were totally impaired.

Figure 2 records the data on medical care expenditures for all 216 decedents according to functional status. It is interesting to note that mean *total* expenses did not differ substantially according to functional status, averaging \$23,000 for the unimpaired, \$22,000 for the partially impaired, and \$21,400 for the totally impaired. The pattern of expenses by type of service showed striking differences, however.

Hospital expenses declined sharply with declining functional status, averaging \$18,000 for the unimpaired, \$11,600 for the partially impaired, and \$3,700 for the totally impaired. The pattern of physician expenses is slightly different, with the partially impaired having the highest expenses of \$4,500, compared with \$4,000 for the unimpaired and \$1,600 for the totally impaired. By contrast, as would be expected, nursing home and home health care expenses rose sharply with declining functional status. While the unimpaired averaged less 650



Functional Impairment

FIG. 2. Mean medical expenses of decendents aged 65 and over by functional status and type of service, PAMC 1983–1984.

than \$100 for nursing home care, the partially impaired averaged \$1,800 and the totally impaired almost \$11,000. The corresponding figures for home health care expenses are less than \$100 for the unimpaired, \$3,100 for the partially impaired, and \$3,900 for the totally impaired. Put differently, 96 percent of the medical expenses of the unimpaired were for hospital and physician services, compared with 73 percent for the partially impaired and a mere 25 percent for the totally impaired.

It might be thought that the decline in hospital and physician services with declining functional status is due to age differences rather than differences in functional status, because both our study and the Medicare study by Lubitz and Prihoda show that in the case of decedents these expenses decline with age. Moreover, data from the National Center for Health Statistics Health Interview Survey show that functional status as measured by limitation in activity and need for assistance in ADL and IADL also declines with age (LaPlante 1988). Figures 3 and 4, presenting the same data separately for those aged 65 to 79 years and for those aged 80 and over, respectively,



FIG. 3. Mean medical expenses of decedents aged 65 to 79 by functional status and type of service, PAMC 1983-1984.



Functional Impairment

FIG. 4. Mean medical expenses of decedents aged 80 and over by functional status and type of service, PAMC 1983–1984.

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show, however, that this is not the case and that the pattern of hospital and physician expenses is the same for both age groups. In other words, holding age constant, expenses for hospital and physician services decline sharply with declining functional status. What stands out is the striking difference between the expenses for these services by the unimpaired compared with the totally impaired. (Figures 3 and 4 also record that, holding functional status constant, expenses for hospital and physician services decline with age.)

Figures 3 and 4 also shed some interesting light on *total* medical expenditures in the last year of life by functional status and age. In the case of decedents aged 65 to 79 years, the unimpaired and partially impaired had about the same total expenses, \$26,200 and \$26,600, respectively, while the totally impaired had very much lower expenses, averaging \$15,700. By contrast, for decedents in the group aged 80 and over, total expenses rose with decreasing functional status. They were lowest for the unimpaired, averaging \$16,100, somewhat higher for the partially impaired, \$18,400, and highest for the totally impaired, \$24,000. These differences are due solely to expenses for nursing home and home health care services, which rose sharply with declining functional status and more than offset the decline in expenses for hospital and physician services as functional status declined.

Use and Intensity of Hospital and Physician Services by Functional Status

The same differences by functional status of the decedents, especially between the unimpaired and the totally impaired, are found when we look at the use and intensity of hospital and physician services instead of expenses for these services. Table 3 presents data on hospital inpatient use and shows that fewer than one-half of the totally impaired aged 65 years and over had a hospital admission, compared with 71 percent of the unimpaired and 85 percent of the partially impaired. Similarly, their average number of admissions was 0.7, compared with 1.3 for the unimpaired and 1.4 for the partially impaired; and their average number of hospital days was 5.1, compared with 11.5 and 15.1 for the unimpaired and the partially impaired. The same pattern is shown when the data are broken down into the two age groups, 65 to 79 years and 80 years and over.

Table 3 also records that the intensity of hospital care appears to

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Use of Hospital Services in the Last	TABL Twelve Months of Life, ar Age, PAMC 1983–1984,	LE 3 nd Mean Charge per Hos Age 65 Years and Over	pital Day, by Functions	al Status and
			Functional status	
Age	ИК	Unimpaired	Partially Impaired	Totally Impaired
65 and over $(N = 216)$				
Percentage with admissions	72.2%	71.0%	84.9%	45.9%
Mean number of admissions	1.2	1.3	1.4	0.7
Mean number of hospital days	11.9	11.5	15.1	5.1
Mean charge per hospital day	\$984	\$1,573	\$768	\$727
65-79 (N = 103)				
Percentage with admissions	71.8%	66.7%	84.8%	46.7%
Mean number of admissions	1.4	1.3	1.7	0.6
Mean number of hospital days	14.8	12.0	21.0	3.7
Mean charge per hospital day	\$1,069	\$1,724	\$738	\$858
80 and over $(N = 113)$				
Percentage with admissions	72.6%	80.0%	85.0%	45.5%
Mean number of admissions	1.1	1.2	1.2	0.7
Mean number of hospital days	9.2	10.6	10.6	5.7
Mean charge per hospital day	\$865	\$1,193	\$812	\$693

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decline with declining functional status. The mean charge per hospital day (i.e., each category of decedents' total hospital inpatient charges divided by their total number of hospital days) for all decedents aged 65 years and over averaged \$1,573 for the unimpaired, \$768 for the partially impaired, and \$727 for the totally impaired. The data for those aged 65 to 79 years and those aged 80 years and over show similar differences. What is of special interest to note is that, while the partially impaired spent somewhat more time in the hospital than the unimpaired, once hospitalized they were treated less intensively as is indicated by their mean charge per hospital day (\$768), which is closer to that of the totally impaired (\$727) than to that of the unimpaired (\$1,573).

Table 4 presents similar data for physician services. The number of physician services shown in the table is the sum of all physician medical and surgical office visits, hospital medical visits, and hospital surgical procedures. Total physician charges are the total charges for these services plus charges for all outpatient ancillary services (for laboratory tests, x-rays, etc.) on the theory that these ancillary services are an integral part of the physician outpatient service. In contrast to our findings with regard to hospital services, the data on physician services show that the mean number of physician services was about the same for the unimpaired and the totally impaired, averaging 15.6 and 15.4 services for all aged 65 years and over, with the partially impaired (as in the case of hospital services) having the highest rate of use, 22.6 services. As in the case of hospital services, however, the mean charge per physician service was substantially lower for the totally impaired compared with the unimpaired, averaging less than one-half that of the unimpaired (\$104 compared with \$255). While the charge per physician service of the partially impaired was somewhat lower than that of the unimpaired, it did not show the large difference we found for mean charges per hospital day.

When the data are examined by type of physician service, it is found that the largest difference in the use of physician services between the unimpaired, the partially impaired, and the totally impaired is in the use of hospital surgical procedures. While the unimpaired averaged 0.8 such procedures per patient, the partially impaired averaged 0.4, and the totally impaired a mere 0.1. Our data also show that none of the totally impaired had any major hospital surgery, "major" being defined liberally as any surgical procedure

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		Fu	nctional Status	
Age	IIV	Unimpaired	Partially Impaired	Totally Impaired
All, 65 and over $(N = 216)$ Mean number of physician services	19.2	15.6	22.6	15.4
Mean charge per physician service	\$204	\$255	\$219	\$102
(55-79) (N = 103) Mean number of physician services	21.5	16.9	28.6	13.2
Mean charge per physician service	\$262	\$279	\$271	\$134
80 and over $(N = 113)$				
Mean number of physician services	16.9	15.1	18.)	10.2
Mean charge per physician service	\$139	\$186	\$152	\$90

with a fee of over \$500. The relatively high use and cost of physician services by the partially impaired is accounted for largely by their high use of office medical visits and the outpatient ancillary charges associated with these visits, rather than by high-technology procedures.

Discussion

The study is a small one; the study population is predominantly white and middle class and thus not representative of the total population or the elderly population of the United States; the group of providers, the PAMC, may not be representative of physicians across the country; and we had no control group of survivors with which to compare the data for the decedents. Nevertheless, some tentative conclusions may be drawn from our findings.

First, our study suggests that despite the generally recognized difficulties of predicting when death will occur, and in the absence of a formal rationing program such as the one suggested by Callahan or institutional constraints on the use of medical resources, high-cost medical services may already be allocated to the elderly in their last year of life in a more rational manner than is generally assumed, with their age and functional status being taken into account. (The PAMC, as stated earlier, is a predominantly fee-for-service group practice, with only 15 to 20 percent of its revenue derived from prepaid plans. The patients in this study were fee-for-service patients covered by Medicare, with a few having supplementary medigap policies of various kinds.) The study shows that the elderly who got expensive, high-technology care in their last year of life were those with good functional status, especially the "younger old" (65 to 79 years), the kind of patients a physician would not feel justified in not treating aggressively, even if they had reached a "natural life span." A similar finding was made in an earlier study of patients treated in an intensive care unit, which showed that "among nonsurvivors, the highest charges were due to caring for patients who were perceived at the time of admission as having the greatest chance of recovery" (Detsky et al. 1981). By contrast to these patients with a good prognosis, our study found that patients with poor functional status in their last year of life received largely supportive care.

Even Callahan (1987) exempts what he calls "the physically vigorous elderly person" from his recommendation that in the future Medicare not provide high-technology care to persons who have lived a full life span: "All levels of care are appropriate, at least through the first round of illness and disease, and even for those who have lived a natural life span if there is a solid prospect of a few (say, four or five) more years of good life. It is the one category in which an exception to the cessation of Medicare-supported life-extending treatment to those who have lived a full life span would be justified" [italics supplied].

Second, if the very old with a good prognosis (and this includes persons who die despite such care, such as the patients we have called the unimpaired) are to be exempt from the formal rationing of hightechnology care, what is the scope for formal rationing of such care for the rest of the elderly? Unfortunately, we have data only for persons who died. But the data for these decedents suggest that the scope may be limited. Only the unimpaired received intensive hospital and physician services. While the partially impaired, whose prognosis probably was uncertain, had a relatively high rate of use of hospital and physician services, they did not receive the intensive care of the unimpaired, and the data suggest little use of high-technology care. Finally, the totally impaired, and especially the very old patients among them, had little hospital and physician care, much less hightechnology care. Thus, limiting the use of high-cost technology by a formal program of rationing may not be required.

Finally, our study shows that when all types of medical services are included (rather than only services covered by Medicare, as in the study by Lubitz and Prihoda), the frail and debilitated "older old" (80 years and over) are likely to have especially high expenses. The totally impaired in this age group had expenses only slightly below those of the most expensive decedents (the 65 to 79 year old unimpaired), \$24,000 compared with \$26,200, despite the fact that they had no high-technology care. It is true that our study population was middle class and hence able to spend more on nursing home and home health care than the average elderly person can. But our data can be regarded as indicating the medical care needs of this group which, if not supplied by paid personnel, will fall on the family of the patients and should not be regarded as without cost.

In view of the fact that the group aged 80 and over is expected to grow most rapidly in the next decade or more, the problem in the future may not be so much the problem of excessive high-cost technology in the care of elderly patients in general and especially of those in their last year of life as the long-term care needs of the very old and frail elderly. While it may be justifiable on both economic and humanitarian grounds to limit the use of high-technology medical care to elderly persons who have lived a full life span and whose prognosis is poor (as our study suggests may already be done in the case of elderly persons in their last year of life), limiting the use of supportive care for the frail very old is an entirely different matter and raises ethical problems which our society has not even begun to face. Two years ago we already raised this problem (Scitovsky and Capron 1986), but we are nowhere nearer to dealing with it today. While our scruples to tackle it are understandable, we cannot ignore it indefinitely for both economic and humanitarian reasons.

To sum up, the conclusions that can be drawn from our study are highly tentative but strongly suggest the need for further, more comprehensive and representative studies of the relation between age, functional status, and the use and costs of medical care of the elderly, in general, and in the last year or years of life, in particular. Without additional data, proposals for formal rationing of high-technology care—quite apart from the ethical aspects of such rationing—are at best premature.

Appendix Note

In recent years, the term "rationing" has been used rather loosely when applied to health care services, as in "rationing by price" and "rationing by queue." In this article, to "ration" is used in one of the more narrow senses given in *Webster's Third International Dictionary* to mean "to distribute or divide (as commodities in short supply) in an equitable manner," and "formal rationing" to mean an explicit government policy to achieve this aim. The question whether Callahan's proposal achieves an equitable distribution of scarce medical resources is beyond the scope of this article. But it should be noted that limiting Medicare payments in the way he proposes while presumably permitting those who can pay for high-technology care to obtain it in the open market raises serious ethical problems.

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