

Medicare Program Expenditures Associated with Hospice Use

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Background: Hospice providers contend that enrollment reduces the cost of the Medicare programs, but estimates of effects are dated, methodologically limited, and focused on persons with cancer.

Objective: To estimate the effects of hospice care on Medicare program payments during the last year of life from 1996 to 1999 within cohorts defined by age and diagnosis.

Design: Retrospective cohort.

Setting: Deceased Medicare enrollees.

Participants: Elderly Medicare fee-for-service beneficiaries who received 36 months of continuous Part A and B coverage before death during 1996 to 1999 ($n = 245\ 326$). Age- and condition-specific (cancer or noncancer and principal condition) cohorts were defined.

Measurements: Medicare expenditures in the last year of life, as a total figure and by service type. The cost effects of hospice were estimated by using linear regression within the cohorts for hospice enrollees compared with nonenrollees after adjustment for propensity to use hospice, gender, race, enrollment in Medicaid, urban setting, duration of illness, comorbid conditions, low use of Medicare, nursing home residence, and year of death.

Results: Adjusted mean expenditures were 4.0% higher overall among hospice enrollees than among nonenrollees. Adjusted mean expenditures were 1% lower for hospice enrollees with cancer than for patients with cancer who did not use hospice. Savings were highest (7% to 17%) among enrollees with lung cancer and other very aggressive types of cancer diagnosed in the last year of life. Expenditures for hospice enrollees without cancer were 11% higher than for nonenrollees, ranging from 20% to 44% for patients with dementia and 0% to 16% for those with chronic heart failure or failure of most other organ systems. Hospice-related savings decreased and relative costs increased with age.

Conclusion: Hospice enrollment correlates with reduced Medicare expenditures among younger decedents with cancer but increased expenditures among decedents without cancer and those older than 84 years of age. Future studies should assess the effects of hospice on quality and on expenditures from all payment sources.

Ann Intern Med. 2004;140:269-277.

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The hospice benefit in Medicare aimed to enhance beneficiaries' options for less aggressive end-of-life medical care and for death at home by providing comprehensive services that were not otherwise covered (for example, outpatient drugs, homemaker services, and bereavement counseling) to patients who agree to forgo "curative treatment for their terminal illness" and who have a physician-certified life expectancy of 6 months or less (1). Previous research on patients with cancer who died between 1981 and 1992 (2–8) indicated, and opinion leaders have often claimed, that hospice enrollment reduces Medicare program costs compared with conventional care during the last month but not the last year of life (2–4, 9, 10). Earlier evaluations cautioned that changes in pricing, benefit design, and case mix could affect their findings (3).

Those elements have certainly changed. Enrollment in the Medicare hospice benefit increased from 9% in 1992 to 23% in 2000 (11). Between those years, the percentage of hospice enrollees without cancer increased from 24% to 49%, the percentage of enrollees in nursing homes increased from 11% to 36%, and the percentage of those older than 79 years of age increased from 35% to 47% (11, 12). The Balanced Budget Act of 1997 made the Medicare hospice benefit more flexible and long lasting, instituted prospective payments for after-hospital home and skilled-

nursing facility care, and decreased hospital payments for unusually short stays before postacute care. These policies increase the desirability of hospice enrollment, especially for patients without cancer.

We estimated the effects of hospice enrollment on national Medicare expenditures during the last year of life among persons who died of conditions other than cancer and made more recent estimates of effects for persons who died of cancer. Examination of expenditures in the last year of life directly addresses the influence of hospice on Medicare program costs at the end of life and avoids serious limitations of previous studies that involved matching enrollees and nonenrollees by duration of hospice enrollment (8). Our design, analytical methods, and measures address selection bias, matching, and generalizability limitations of previous studies (2–4, 8, 13, 14).

METHODS

Design

In this retrospective cohort study, we used linear regression models to estimate adjusted mean Medicare payments in the last year of life that were associated with hospice enrollment. Hospice enrollees were matched to nonenrollees by using poststratification (15) with strata

Table 1. Sample Characteristics by Condition Cohort and Age Stratum

Characteristic	Total Sample	Noncancer Decedents				Cancer Decedents			
		All	68–79 Years	80–84 Years	≥85 Years	All	68–79 Years	80–84 Years	≥85 Years
Decedents, n (%)	245 365 (100)	180 190 (73)	59 761 (24)	39 509 (16)	80 920 (33)	65 175 (27)	34 067 (14)	14 115 (6)	16 993 (7)
Hospice use, %	18	10	9	11	11	38	42	38	32
Descriptors									
Mean age at death, y	83	84	75	83	91	80	74	82	90
Women, %	57	61	48	57	72	48	45	48	55
Nonwhite, %	10	10	12	9	9	10	11	9	10
Medicaid use, %	24	27	23	24	32	16	14	15	21
Duration of illness, %									
Diagnosed last mo before death	11	11	12	11	10	11	10	12	12
Diagnosed 2nd mo before death	4	3	3	3	4	6	7	7	6
Diagnosed 3–6 mo before death	11	10	9	9	10	16	17	15	13
Diagnosed 7–12 mo before death	14	14	14	14	14	15	17	14	14
Comorbid conditions, %									
0 or 1	20	20	21	18	21	18	20	17	15
≥5	18	19	22	22	16	15	13	16	16
Nursing home residence, %	45	50	34	49	63	32	23	34	48
Area of residence, %									
Metropolitan	72	72	71	72	72	73	72	73	73
Urbanized	13	13	14	13	13	13	13	13	13
Rural	15	15	15	15	15	14	14	14	14
Low Medicare use, %	8	9	10	8	9	4	3	3	5

formed by age and diagnosis group (cancer or noncancer, or principal condition). Within strata, we adjusted for propensity to use hospice, gender, race, enrollment in Medicaid, urban setting, illness duration, comorbid conditions, consistently low use of Medicare, nursing home residence, and year of death. Data sources include denominator and claims files from Medicare.

Setting and Participants

The sample (n = 245 326) comprises all decedents from the Medicare standard national 5% sample who had fee-for-service coverage, were older than 67 years of age, died between 1 January 1996 and 31 December 1999, and

had at least 36 months of continuous Part A and B Medicare coverage before death. We excluded decedents who were eligible for Medicare on the basis of end-stage renal disease or disability and those who resided outside the United States.

Outcome Measures

Our primary outcome measure was Medicare payments to providers, adjusted for inflation to 1999 and summed overall and by type of service (hospital inpatient, skilled-nursing facility, home health, hospice, outpatient facility, and physician or supplier). We exclude co-insurance, copayments, and deductibles because our focus was

Table 2. Unadjusted Mean Medicare Program Expenditures in the Last Year of Life by Hospice Enrollment, with Ratios of Hospice to Non-Hospice Expenditures within Condition Cohort and Age Stratum*

Condition Cohort	Expenditures by Age Stratum			
	All Ages	68–79 Years	80–84 Years	≥85 Years
All enrollees	24 830	30 015	25 498	19 495
Hospice enrollees	27 426	30 910	26 794	23 094
Non-hospice enrollees	24 273	29 781	25 214	18 882
Ratio	1.13	1.04	1.06	1.22
Noncancer cohort				
All	23 271	28 429	24 634	18 797
Hospice enrollees	26 751	31 856	27 461	23 328
Non-hospice enrollees	22 879	28 096	24 296	18 247
Ratio	1.17	1.13	1.13	1.28
Cancer cohort				
All	29 140	32 799	27 917	22 820
Hospice enrollees	27 917	30 558	26 274	22 721
Non-hospice enrollees	29 905	34 396	28 937	22 868
Ratio	0.93	0.89	0.91	0.99

* A ratio less than 1.0 indicates that use of hospice is associated with savings to the Medicare program, whereas a ratio greater than 1.0 indicates increased costs.

Medicare program expenditures. Measures of volume and intensity of service use in the last year of life were mean days in hospital, mean days in the intensive care unit, and mean hospice payments per diem. Timing of hospice entry was defined by days in hospice.

Covariate Measures

Hospice enrollees comprised decedents with any hospice claim, including the 10% of those discharged before death or who had gaps in hospice enrollment. Information on age at death, gender, race, and Medicaid enrollment was obtained from the denominator file. Race was categorized as white or nonwhite. Any state buy-in during the last year of life indicated Medicaid enrollment. Urban setting was categorized as metropolitan, urbanized, or rural (16). Categories for unusually many (≥ 5) or few (1 or none) comorbid conditions (based on the number of Charlson comorbid conditions) (17, 18) were used to control for the variation in illness burden among decedents.

Low use of Medicare (within the 25th percentile of total expenditures consistently for 24 months before death) was used to control for selection and data sampling biases. Consistently low use may indicate selection bias related to patient preference for less aggressive care. If hospice enrollees generally wanted less aggressive care, the associated costs would be less even without hospice. Consequently, hospice savings would be overstated without controls for consistently low use (3). Consistently low use of Medicare may also reflect data sampling bias for patients with coverage from other insurance programs (for example, veterans) or care from non-Medicare providers and may imply a lower chance of referral to hospice under Medicare.

Categories of illness duration (Table 1) were used to control for variations in opportunity to enroll in hospice, because some time is needed to arrive at a prognosis and enroll in hospice. Duration of illness was calculated as number of days between the date of death and earliest diagnosis of a principal condition.

Principal conditions in the last year of life were derived from expenditures and principal diagnoses recorded on claims. We adapted a plurality of physician expenditures method that places patients in leading cause-of-death categories as defined by the National Center for Health Statistics (19). Adaptation was necessary for 3 reasons. First, among causes of death derived by using the expenditure plurality method, 3 (pneumonia or influenza, accidents or adverse effects, and septicemia) are often secondary to underlying serious and chronic illnesses, and 6% of cases could not be classified. Second, we aimed for consistency with previous research that selected patients with cancer on the basis of having any cancer diagnosis in claims (3, 4). Finally, for decedents with cancer, we identified subgroups that were homogeneous in terms of survival and disease course to control for confounders associated with those factors and to allow comparison of estimated cost effects of hospice in the cancer cohort.

Consequently, after we classified decedents into condition groups by using the expenditure plurality method, we reclassified those who died of pneumonia or influenza, accidents or adverse effects, septicemia, or unclassified causes by using the plurality of principal diagnoses among all last-year-of-life claims. We then assigned decedents with a cancer classification from the expenditure plurality or the diagnosis plurality method to the cancer cohort. Finally, we divided decedents with cancer into 7 subgroups by plurality of cancer diagnosis (lung, other aggressive types of cancer with median survival < 1 year [20], all other types of cancer with metastases, and all other types of cancer without metastases) and timing of diagnoses (incident [first diagnosed in the last year] or prevalent [first diagnosed before the last year]). Because nonaggressive, nonmetastatic types of cancer are fairly indolent, making incident cases uncommon, we combined patients with incident and prevalent cancer. The validity of this method is supported by consistency between the distribution of decedents among principal conditions and distributions by cause of death reported by the National Center for Health Statistics and National Mortality Follow Back Survey (19, 21).

We derived and validated an indicator of nursing home residence from physician claims in which place-of-service or evaluation and management codes indicated encounters that took place at a nursing home or skilled nursing facility. Application of these classification rules to Medicare Current Beneficiary Survey claims resulted in a κ value of 0.78 (95% CI, 0.76 to 0.80) between our measure and Medicare Current Beneficiary Survey facility residence status (22).

To mitigate potential selection bias, we calculated hospice use propensity scores within each cohort by using logistic regression (23, 24). The propensity score for a decedent is the predicted likelihood of hospice use conditioned on factors that are known to correlate with hospice use (3, 4, 11, 25, 26) (gender, race, Medicaid enrollment, primary condition, comorbid conditions, and urban setting) and an indicator for residence in states with high or low rates of hospice use (20% to 29% and $\geq 30\%$ greater or less than the norm among the sample) to account for combined influences of health service supply, provider practice patterns, selection bias, and geopolitical variations that affect service supply or health coverage (for example, Medicaid hospice and home health payments, charismatic leaders, and innovative non-hospice-based end-of-life care programs).

Statistical Analysis

Interaction effects observed among age, principal condition, race, and gender prompted us to perform stratified analyses to avoid masking true effects. Within each stratum of age and cancer or noncancer status, or age and principal condition, linear regression was used to further control for propensity to use hospice, gender, race, Medicaid enrollment, urban setting, comorbid conditions, low use of

Table 3. Ratios (Hospice/Non-Hospice Enrollees) of Adjusted Mean Medicare Expenditures in the Last Year of Life by Condition Cohort and Age Stratum*

Condition Cohort	Total Sample, <i>n</i>	Age Stratum			
		All Ages	68–79 Years	80–84 Years	≥85 Years
All conditions	245 365	1.04	0.98	1.04	1.16
Noncancer conditions	180 190	1.11	1.05	1.09	1.22
Kidney disease	10 748	0.93	0.86	0.90	1.02
Diabetes	9535	1.09	1.12	1.04	1.10
Cerebrovascular disease	31 344	1.11	1.02	1.11	1.14
Chronic obstructive pulmonary disease	22 636	1.04	0.99	1.07	1.15
Chronic heart failure	40 258	1.08	1.00	1.05	1.16
Other heart disease	23 081	1.24	1.16	1.18	1.41
Dementia	18 633	1.34	1.30	1.20	1.44
All other disease	23 955	1.53	1.50	1.40	1.59
Cancer conditionst	65 175	0.99	0.95	0.99	1.06
Incident aggressive cancer	5293	0.83	0.83	0.87	0.86
Incident lung cancer	7135	0.85	0.84	0.87	0.93
Incident other metastatic cancer	5104	0.91	0.89	0.93	0.84
Prevalent aggressive cancer	4998	0.93	0.91	0.94	1.04
Prevalent lung cancer	6629	0.96	0.96	0.95	1.03
Prevalent other metastatic cancer	10 617	0.98	0.96	1.00	1.05
All other cancer with no metastases	25 399	1.08	1.06	1.08	1.13

* A ratio less than 1.0 indicates that use of hospice is associated with savings to the Medicare program, whereas a ratio greater than 1.0 indicates increased costs.

† “Incident” means that the cancer was diagnosed in the last year of life. “Prevalent” means that the cancer was diagnosed before the last year of life. Aggressive types of cancer are those other than lung cancer with a median survival of 1 year or less.

Medicare, duration of illness, nursing home residence, and year of death.

We estimated the effects of hospice enrollment on Medicare program expenditures in the last year of life, overall and by service type (hospital inpatient, skilled-nursing facility, home health, outpatient facility, and physician or supplier). We modeled untransformed expenditures, expenditures truncated at the 5th and 95th percentile of the strata-specific distributions (that is, more extreme values set to those percentiles), and log-transformed expenditures and present effects from the truncated models because they moderate the disproportionate influence of very high and low use decedents while estimating mean effects in the original dollar scale. Adjusted mean ratios for Medicare program expenditures in the last year of life (hospice enrollees or nonenrollees) less than 1.0 indicated savings, and those greater than 1.0 indicated added costs for hospice enrollees compared with nonenrollees. Adjusted differences between mean expenditures incurred by hospice enrollees and nonenrollees, by service type within age and cancer or noncancer stratum, show the relation of hospice enrollment to patterns of service use and expenditures. Variations in service use and timing of entry to hospice between condition cohort and age strata inform interpretation of results.

Role of the Funding Sources

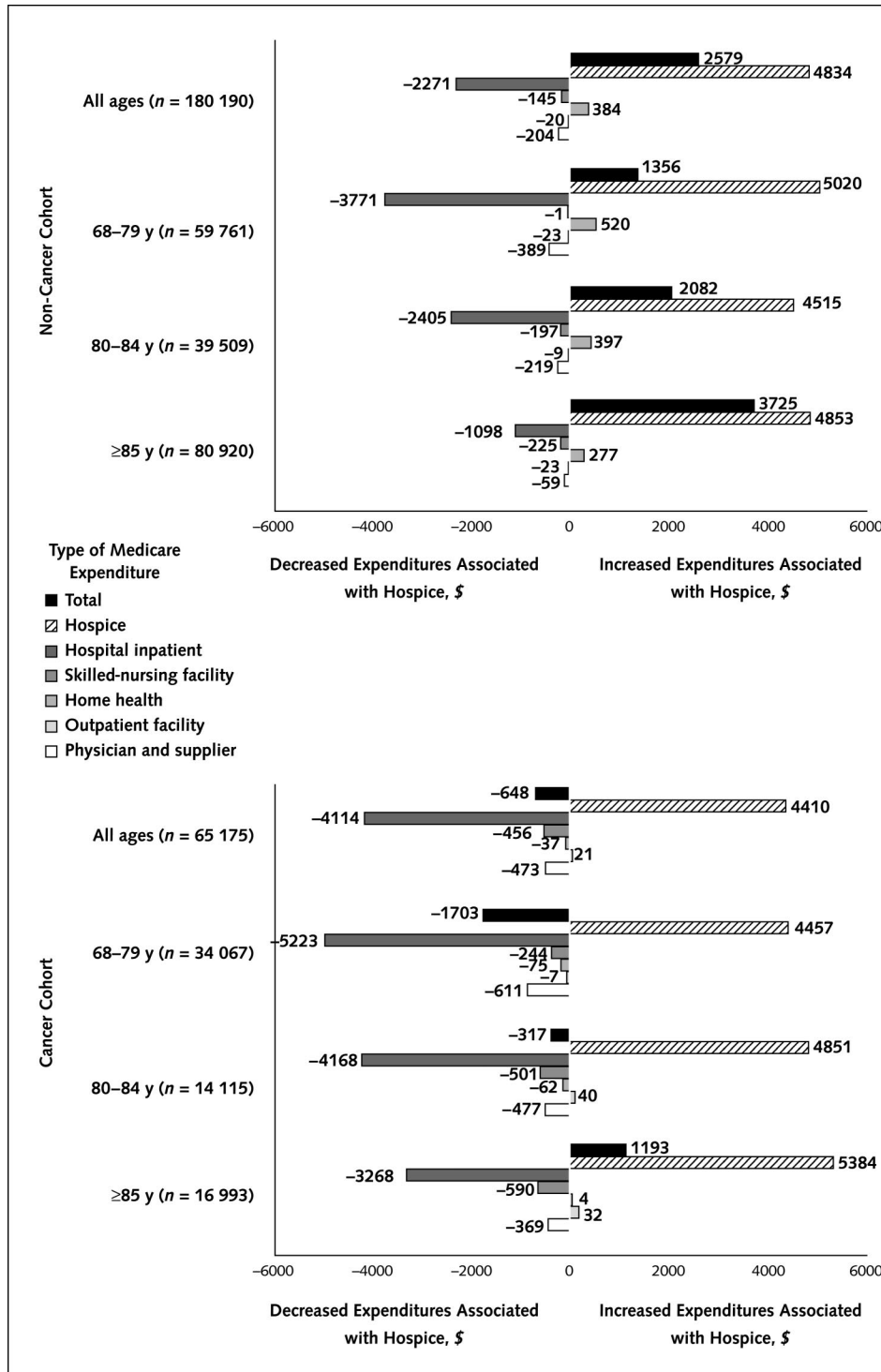
The funding sources had no role in the analyses or interpretation of the study findings. The manuscript was reviewed by the Centers for Medicare & Medicaid Services (formerly Health Care Financing Administration) to ensure the confidentiality of patients and providers.

RESULTS

The sample was 57% female, 10% nonwhite, 72% metropolitan, 13% urbanized, and 15% rural; 24% were Medicaid enrollees (Table 1). Characteristics varied by condition cohort and age. The noncancer cohort comprised 73% of all decedents and had an overall rate of hospice use of 10%, compared with 38% for cancer decedents. Hospice use increased with age in the noncancer cohort and decreased with age in the cancer cohort. Compared with the cancer cohort, the noncancer cohort was older and more likely to be female, use Medicaid, have a longer duration of illness, have more coexisting conditions, live in a nursing home, and have consistently low use of Medicare services in the 24 months before death. In both cohorts, the percentage of women, those using Medicaid, nursing home residents, and those with consistently low use of Medicare increased with age.

Unadjusted Medicare program expenditures and associated expenditure ratios (hospice enrollees to nonenrollees) also varied by age and condition cohort (Table 2). Expenditures decreased with age in every category. Total expenditures were higher at every age for the cancer cohort than the noncancer cohort. Ratios increased with age from 1.04 to 1.22; the average was 1.13 for all ages and all conditions. These unadjusted ratios suggest that use of hospice is associated with additional costs to the Medicare program and that added costs increase with age. Comparison of ratios between the noncancer cohort (1.13 to 1.28) and cancer cohort (0.89 to 0.99) suggests that additional Medicare program costs associated with hospice are a function of hospice use in the noncancer cohort.

Figure. Estimated effect of hospice on adjusted mean Medicare program expenditures in the last year of life by type of Medicare expenditure within condition cohort and age stratum.



Similar findings were derived from estimated Medicare program expenditures that were adjusted for propensity to use hospice, gender, race, use of Medicaid, urban setting, duration of illness, comorbid conditions, consistently low use of Medicare, nursing home residence, and year of death

(Table 3). Overall adjusted ratios increased with age from 0.98 to 1.16 and averaged 1.04 for all ages and conditions, suggesting that hospice incurs additional costs to the Medicare program. Comparison of ratios in the noncancer cohort (1.05 to 1.22 [average, 1.11 for all ages]) with those in

Table 4. Differences between Adjusted Mean Medicare Program Expenditures in the Last Year of Life for Hospice Enrollees Compared with Non-Hospice Enrollees by Type of Expenditure within Condition Cohort and Age Stratum

Type of Expenditure	Difference in Noncancer Cohort (95% CI)			
	All (n = 180 190)*	68–79 Years (n = 59 761)	80–84 Years (n = 39 509)	≥85 Years (n = 80 920)
Total differences in means	2579 (1934 to 3224)	1356 (509 to 2203)	2082 (1300 to 2864)	3725 (3296 to 4153)
Hospital inpatient	–2271 (–2723 to –1819)	–3771 (–4425 to –3116)	–2405 (–2944 to –1866)	–1098 (–1358 to –839)
Skilled-nursing facility	–145 (–280 to –8)	–1 (–123 to 122)	–197 (–372 to –21)	–225 (–352 to –97)
Home health care	384 (271 to 497)	520 (398 to 642)	397 (253 to 541)	277 (187 to 368)
Outpatient facility	–20 (–52 to 12)†	–23 (–58 to 13)†	–9 (–48 to 29)†	–23 (–49 to 4)†
Physician or supplier	–204 (–275 to –132)	–389 (–484 to –293)	–219 (–308 to –130)	–59 (–104 to –14)
Hospice‡	4834 (4673 to 4992)	5020 (4835 to 5201)	4515 (4311 to 4719)	4853 (4731 to 4972)

* Values for all ages are the weighted average of stratum-specific estimates.

† Not significant ($P < 0.05$).

‡ Hospice values are calculated as [total – (hospital inpatient + skilled-nursing facility + home health care + outpatient facility + physician or supplier)].

the cancer cohort (0.95 to 1.06 [average, 0.99 for all ages]) suggests that additional costs are a function of hospice use by the noncancer cohort and the oldest old within the cancer cohort.

Adjusted expenditure ratios by principal condition imply that conditions indicative of multiple organ system failure (kidney disease, diabetes, cerebrovascular disease, chronic obstructive pulmonary disease, and heart disease) have less effect on added costs associated with hospice than do conditions indicative of dementia or frailty (dementia and all other noncancer diseases). In the cancer cohort, savings associated with hospice were higher for incident and more aggressive cancers. Ratios increased with age for all conditions, indicating that hospice savings decrease and added costs increase with age.

To illustrate pattern variations in use of services by condition cohort and age stratum (Figure), we examined differences between estimates for adjusted mean expenditures among hospice enrollees and nonenrollees by type of expenditure (total, hospital inpatient, skilled-nursing facility, home health, outpatient facility, or physician or supplier). The 95% CIs imply that estimated differences are relatively precise, and most are statistically significant (Table 4). The average hospice enrollee without cancer

incurs Medicare costs that are about \$2579 more in the last year than those of the average nonenrollee, and their additional costs increase with age from \$1356 at 68 to 79 years of age to \$3725 at 85 years of age or older. The average hospice enrollee with cancer appears to save Medicare \$648 in the last year of life compared with the average nonenrollee. The estimated savings of \$1703 among enrollees with cancer who are 68 to 79 years of age more than offset the additional cost of \$1193 among those 85 years of age or older. For decedents in the cancer cohort who were younger than 85 years of age, the cost of hospice is offset by savings in all other expenditures except outpatient facility use. In contrast, the estimated savings among the noncancer cohort for hospital inpatient, skilled-nursing facility, outpatient facility, and physician or supplier services do not offset the costs of hospice and increased spending for home health care among hospice enrollees.

Examination of volume, intensity, and timing of service use indicates that the noncancer cohort tended to use fewer but more intensive hospital and hospice services in the last year of life. On average, patients in the noncancer cohort spent 4 fewer days as a hospital inpatient than did those in the cancer cohort (16 vs. 20 days), yet patients in both cohorts spent an average of 3 days in a hospital intensive care unit. Hospice enrollment accounted for an average decrease of 6 days in hospital and 2 days in the intensive care unit among the cancer cohort but had little effect among the noncancer cohort. Mean per diem hospice expenditures were higher among enrollees without cancer (\$155) than those with cancer (\$136). Finally, entry to hospice in the last week of life was more prevalent among enrollees without cancer than those with cancer (36% vs. 23%). Because of higher hospice costs and lower expenditures for other services among the noncancer cohort (Table 2), hospice has reduced opportunities to show savings.

The results reported above persisted even after we varied our methods, although these alternative strategies affected the exact estimates. Specifically, population charac-

Table 5. Key Conclusions and Implications for Policy and Future Research

Hospice use appears to reduce Medicare expenditures for patients with cancer who are younger than 85 years of age, but to increase costs for patients without cancer and all patients older than 85 years of age. Hospice use in the Medicare program probably conserves more than 10% of the costs for patients with aggressive cancer and probably adds more than 30% to the costs for patients with dementia. Costs for other conditions fall in between these extremes. The variation in the effects of use of hospice on costs probably arises from different trajectories of service needs and prognostic certainty that are associated with patients' diagnoses and ages. From 1996 to 1999, use of hospice probably added about 4% to Medicare payments for the last year of life in the typical patient. This study does not estimate effects on other payment sources. Policy judgments on the merits of hospice use and expansion require understanding of the benefits, as well as the costs of hospice care.

Table 4—Continued

Difference in Cancer Cohort (95% CI)			
All (n = 65 175)*	68–79 Years (n = 34 067)	80–84 Years (n = 14 115)	≥85 Years (n = 16 993)
←————— \$ —————→			
–648 (–1425 to 11)†	–1703 (–2293 to –1113)	–317 (–1117 to 483)	1193 (515 to 1870)
–4485 (–5398 to –4385)	–5223 (–5665 to –4781)	–4168 (–4727 to –3609)	–3268 (–3699 to –2838)
–390 (–549 to –301)	–244 (–310 to –177)	–501 (–651 to –352)	–590 (–768 to –411)
–52 (–163 to 51)†	–75 (–138 to –11)	–62 (–189 to 64)†	4 (–139 to 148)
13 (–55 to 85)†	–7 (–73 to 60)†	40 (–34 to 115)†	32 (–20 to 84)
–519 (–709 to –423)	–611 (–745 to –476)	–477 (–631 to –324)	–369 (–474 to –264)
4784 (4984 to 5449)	4457 (4272 to 4638)	4851 (4589 to 5115)	5384 (5151 to 5615)

teristics would not change substantially if the continuous enrollment requirement were 12 rather than 36 months. The model presented has the same overall implications as do models with untransformed or log-transformed expenditures. Overall implications are also consistent with those of models that exclude hospice enrollees with discontinuous stays and models that do not correct for consistently low Medicare use.

DISCUSSION

Hospice is cost-neutral to cost-saving for persons who die of cancer and generally yields added costs for those who do not die of cancer. The latter is the fastest growing group of hospice enrollees (11). Overall, hospice users incur an estimated 4% greater costs than do similar patients who do not use hospice. Savings decrease and relative costs increase with age at death. Medicare expenditures near death decrease with age (27–30), whereas hospice expenditures remain relatively constant. Medicare expenditures were lower at every age and mean per diem hospice costs were higher in the noncancer cohort than the cancer cohort. Consequently, the potential for hospice savings was lower for the noncancer cohort.

Our findings confirm and update those of other studies. Studies in patients with cancer in the late 1980s to early 1990s indicate that hospice may have only small effects in the last year of life (2–4). More recent descriptive studies suggest that hospice may increase costs in the last year of life for persons who do not die of cancer (14, 31).

The relative costs of hospice are highest among patients with dementia and relatively nonspecific diagnoses and intermediate among patients with organ system failures. Hospice-related savings are often realized among patients with cancer. This pattern probably reflects differences in service needs (31–37) and certainty of prognosis (38–42) that are associated with 3 major trajectories to death: a short period of obvious decline at the end of life, which is typical of cancer; long-term disability with exacerbations and unpredictable timing of death, which is typical of chronic organ system failure; or persistent decline and deficits in self-care associated with frailty or dementia

(37, 43, 44). Effective and reliable care for persons approaching death may require organization and financing of care that match these trajectories (4, 37, 43, 45–60).

Earlier entry to hospice in the noncancer cohort may appear to be a way to reduce added costs associated with hospice care. However, earlier entry may not reduce costs or be achievable. The costs of hospice may exceed the costs of services avoided by earlier entry. Because prognoses in the noncancer cohort are typically uncertain (38–42), patients and their physicians may be unable or unwilling to determine or accept a 6-month prognosis or to forgo “curative treatment for their terminal illness,” as required for hospice eligibility.

Our study has some limitations. First, although our methods offer improved control for selection bias and other confounders that limited previous research, some selection bias and confounding inevitably remain. Second, findings pertain to the Medicare program only and do not consider the effect of Medicare’s hospice benefit on expenditures in the last year of life by patients and their families, Medicare for caregivers (61, 62), Medicaid, or other public or private payers. Finally, judging the merits of the hospice benefit requires understanding of the effect of hospice on quality of life, the impact of the Medicare hospice benefit on expenditures from all sources, and alternatives for organization and financing of end-of-life care. Table 5 shows key conclusions and implications for policy and future research.

Most Americans are seriously and chronically ill in the years before death. Sustainable comprehensive services are required that ensure comfort, advance planning, closure, and family support, in addition to treatment for medical conditions. Even if hospice care costs somewhat more than conventional care, its comprehensiveness and continuity may merit those costs.

From Medical Outcomes Research and Evaluation Services, Thetford, Vermont; RAND, Santa Monica, California; The Washington Home Center for Palliative Care Studies, Washington, DC; and Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland.

Disclaimer: The findings, statements, and views expressed are those of the authors and do not necessarily reflect the opinions and policies of the sponsors.

Grant Support: By the Agency for Healthcare Research and Quality, The National Institute on Aging, The Fan Fox-Leslie Samuels Foundation, and The Washington Home Center for Palliative Care Studies. The work was performed under a cooperative agreement with MedPAC, the Medicare Payment Advisory Commission.

Potential Financial Conflicts of Interest: None disclosed.

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