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Impact of Hospice Use on Costs of Care for Long Stay Nursing Home Decedents

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Abstract

Objectives—To examine impact of hospice use on costs, we analyzed costs for long-stay (> 90 days) nursing home decedents with and without hospice care.

Design—Retrospective cohort study using a 1999-2009 dataset of linked Medicare, Medicaid claims and Minimum Data Set Assessments.

Setting—Indiana nursing homes.

Participants—2,510 long stay nursing home decedents.

Measurements—Medicare costs were calculated for multiple time periods prior to death – 2, 7, 14, 30, 90, and 180 days; Medicaid costs were also calculated for dual eligible patients. Total costs and costs for hospice, nursing home and inpatient care are reported.

Results—Of 2,510 long stay nursing home decedents, 35% received hospice. Mean length of hospice was 103 days (median 34 days). Compared to non-hospice patients, hospice patients were more likely to have cancer (p<.0001), a DNR order in place (p<.0001), higher levels of cognitive impairment (p=.0002) and worse activities of daily living function (p<.0001). Hospice patients were less likely to have had a hospitalization in the year prior to death (p<.0001). In propensity score analyses, hospice users had lower total Medicare costs for all time periods up to and including 90 days prior to death. For dual eligibles, overall costs and Medicare costs were

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significantly lower for hospice patients up to 30 days prior to death. Medicaid costs were not different between the groups except for the 2 day time period.

Conclusion—In this analysis of costs to Medicare and Medicaid among long stay nursing home decedents, use of hospice did not increase costs in the last 6 months of life. Evidence supporting cost savings are sensitive to analyses that vary the time period before death.

Keywords

hospice; nursing home; costs

INTRODUCTION

Hospice use by nursing home patients has grown dramatically.[1] From 2005–2009, Medicare spending on hospice for this population increased 70%.[2] Many more people die in nursing homes without hospice services, however, and quality of care issues at the end of life, including unrelieved pain and family dissatisfaction with care and burdensome transitions, have been documented.[3–5] Targeting appropriate nursing home patients for hospice care is an area of active discussion by policymakers,[6,7] including the timing of hospice enrollment to optimize patient benefit from services and cost implications to government programs that finance care for this frail population.

Nursing home patients are more likely than patients in other settings to have longer lengths of stay on hospice, which is important because Medicare reimburses the majority of hospice days on a per diem basis. One study found that nursing home decedents enrolled in hospice had a mean length of stay that was 20 days longer than non-nursing home decedents enrolled in hospice.[8] Extended lengths of stay, and thus costs to the Medicare hospice program, are a primary reason that questions have been raised about the use of hospice in nursing homes. There are concerns that for-profit hospices[2,9] in particular are targeting “profitable” nursing home patients. These concerns have prompted calls for increased scrutiny of hospices with a predominance of nursing home patients.[10]

Detailed data about the costs of care and their relationship with hospice length of stay are an important component of these debates. However, the published literature on this issue presents a mixed picture[11–15]. In one study, researchers examined the combined Medicare and Medicaid costs for long-stay nursing home residents (greater than 90 days) and compared residents with and without hospice care. In the last six months of life, there were no differences in costs, irrespective of hospice enrollment.[12] However, this study relied on 1999 data and was restricted to dual eligible residents (with both Medicare and Medicaid coverage) with specific diagnoses, limiting its generalizability for the present debate. Another study found that hospice stays in the range of 53–105 days demonstrated Medicare cost savings, but Medicaid costs were not evaluated.[13] A more recent study examined a national sample of hospice patients in common enrollment periods (1–7, 8–14, 15–30 and 53–105 days before death) and found lower costs for hospice patients compared to matched controls for all time periods.[14] This study was not limited to nursing home decedents and did not include Medicaid claims. A recently published study of nursing home decedents found an overall increase in Medicare expenditures for hospice patients. The authors attribute this

finding to longer lengths of hospice stay and potentially less opportunity to avoid expensive acute care utilization in a population of patients already more likely to want less aggressive care – with or without hospice.[15]

The goal of this study is to contribute to the ongoing discussions about hospice payment reform, through providing additional data about costs of care for both hospice and non-hospice decedents – using both Medicare and Medicaid claims to be fully representative of costs to government payors. We describe analyses regarding the costs of care for long-stay nursing home residents (greater than 90 days in the facility) who did and did not use hospice, over multiple periods of time. This study uses a unique dataset of linked Medicare and Medicaid claims, as well as Minimum Data Set (MDS) assessments, which include key patient demographic information on functional status and degree of cognitive impairment. We predicted that hospice users would incur lower costs near the end of life than non-hospice users, due to the avoidance of expensive inpatient hospital care.

METHODS

Overview

This study was approved by the Indiana University Purdue University-Indianapolis Institutional Review Board and the Centers for Medicare and Medicaid Services Privacy Board. The dataset was created by merging electronic medical record data from a single health care system with Medicare claims, Indiana Medicaid claims and Minimum Data Set (MDS) reports, version 2.0. Patients included in this study had at least one clinical encounter within Wishard Health Services, an urban public safety net health system in Indianapolis. Although patients were identified initially through contact with Wishard Health Services, the Medicare, Indiana Medicaid and MDS data capture utilization and medical records for all providers and hospitals utilized. Data were collected over an 11 year period (1999 – 2009) on 33,387 patients aged 65 and older. Individuals who had a clinical encounter with the health care system were included in the database if they turned 65 years old at any time between 1999 and 2008. These individuals were matched to Medicare claims using name, social security number and birthdate.[16,17]

Sample

Of the 33,387 patients in the entire sample, 32% (10,556 patients) lived in a nursing home for some period of time between 1999 and 2008. Using Medicare claims and MDS assessments, we identified 2,976 long-stay nursing home patients. Long stays were defined as 90 or more days in a nursing home[18] to differentiate between nursing home patients with short-term rehabilitation goals who are more likely to transition back to the community and a more chronic, institutionalized population. The majority of long stay nursing home residents are, or become, eligible for Medicaid during their nursing home stay and costs of dual eligible patients are included in these analyses. We further narrowed the sample to focus on decedents who died during a nursing home stay or within 30 days of nursing home discharge. All decedents who used hospice for any period of time for the 180 days prior to death were included in the hospice group – including those who disenrolled prior to death.

This resulted in a sample of 2,510 long stay decedents comprising the sample for analysis (888 hospice and 1,622 non-hospice decedents).

Data Collection

Variables extracted from the dataset included demographic characteristics, comorbidities and health care utilization. Demographic characteristics consisted of age at hospice enrollment, gender, race/ethnicity (white vs. non-white) and Medicare and Medicaid eligibility based on claims enrollment data. Dual eligibility was based upon having non-zero Medicaid costs in the given time frame. Medicare and Medicaid International Classification of Disease (ICD 9) codes present in claims files at the time of hospice enrollment were used to define comorbidity with indicators of coronary artery disease, congestive heart failure, hypertension, arthritis, diabetes, chronic obstructive pulmonary disease and stroke. Primary diagnosis of the hospice stay was recorded, including diagnosis categories of dementia, failure to thrive, heart disease, lung disease, cancer or “other.” Utilization, including hospital, hospice and nursing home use, was derived from Medicare and Medicaid claims. ADL impairments, calculated cognitive performance scale, and presence of a DNR order was captured from the most recent full MDS assessment.

Analysis

Costs were compared for: (1) all patients as total costs to Medicare and costs for major categories of service and (2) those who were dual eligible as costs to both Medicare and Medicaid. Costs are defined as the payment amounts obtained from Medicare and Medicaid claims data. These claims data include payments for all services including inpatient care, outpatient physician visits, hospice care, nursing home care, and durable medical equipment. The medical care component of the Consumer Price Index[19] was used to account for inflation over the observation period; all costs were converted to December 2009 value dollar amounts. Means, standard deviations and medians were calculated for multiple time periods: 2 days, 7 days, 14 days, 30 days, 90 days, and 180 days prior to death. To be included in a hospice group time period, decedents had to be receiving hospice services for the entire time period (e.g., all 7 days for the 7 day group) and could be counted in multiple time periods (e.g., in the 7 day group and 2 day group) depending on their length of stay. Further analyses were done to look at costs based on hospice length of stay. Total Medicare costs were calculated for mutually exclusive categories of patients with hospice stays of 7 days or less, 8–14 days, and 15–30 days – means, standard deviations, and medians are presented. Total Medicare and Medicaid costs were calculated in the same manner for dual eligible patients.

We performed propensity score analyses to assess the differences in care costs between patients with and without hospice services. Propensity score analysis is typically used in analysis of non-randomized observational data to alleviate biases caused by systematic differences between treatment groups for causal inference.[20,21] Specifically, we used a logistic regression model to estimate the probability of hospice enrollment in individual patients; baseline characteristics listed in Table 1 were used as independent variables in the logistic regression model. The inverse of the estimated probability of hospice enrollment (i.e., the propensity score) was then used as a weight variable in regression analysis to

compare costs.[22] Comparisons between hospice and non-hospice patients were made using a generalized linear regression model with a log-link function and a gamma distribution to account for the skewed distribution in cost outcomes. Adjusted p-values were obtained using false discovery rate method.[23] All analyses were carried out using SAS System for Windows 9.3. As a sensitivity analysis, the analyses were repeated after removing anyone hospitalized in both the 48 hours prior to death and then also the 72 hours prior to death (in order to address the issue of informative censoring).

RESULTS

Among nursing home decedents who used hospice, the mean length of hospice stay was 103 days (±SD=175) and median length was 34 days (range 1–1621 days). Characteristics of long stay nursing home decedents who did and did not receive hospice are shown in Table 1. Compared to non-hospice patients, hospice patients were more likely to have cancer (42% vs. 32%; p<.0001), a DNR in place (69% vs. 54%; p<.0001), higher levels of cognitive impairment (mean CPS score 3.2 vs. 2.9; p=.0002) and worse ADL function (mean ADL score 17.9 vs. 16.6; p<.0001). No significant differences were observed for age, race, gender, or dual eligible status. Using a propensity score weighting approach, patients on hospice had significantly lower total Medicare costs for all time periods up to and including 90 days prior to death (see Table 2). For example, in the 7 days prior to death, nursing home decedents who used hospice for that entire time period had total mean Medicare costs of $2,132 (±SD $6,337) and those who were not receiving hospice care had mean Medicare costs of $5,034 (±SD $9,367) (p<.0001). There were not significant differences between the groups at 180 days prior to death. For hospice decedents, the largest contributor to overall costs to Medicare was hospice care; for non-hospice patients, the largest contributor to overall costs was inpatient care.

The same approach was used to examine both Medicare and Medicaid costs for dual eligibles. Patients with hospice had lower Medicaid costs for the 2 days preceding death (p=.0099); there were minimal differences in Medicaid costs at other time periods up to 180 days prior to death. In this sub-population of duals, total Medicare costs were lower for time periods 90 days or less, but not the 180 day time period (see table 3).

Among these dual eligible decedents, inpatient costs were the largest cost driver for non-hospice patients for all time periods 90 days or less; nursing home costs were higher at the 180 day time period. Hospice was the largest cost category for all time periods for the hospice group.

Two sensitivity analyses were performed, removing 1) anyone hospitalized in the 48 hours prior to death, and 2) those hospitalized in the 72 hours prior to death (in order to address the issue of informative censoring – i.e., a non-hospice eligible resident having an unexpected catastrophic event and terminal hospitalization that might weight the costs of the non-hospice group). Removing these patients did not impact the differences seen in patient characteristics between hospice and non-hospice patients. In this analysis, Medicare total costs were still significantly lower at the 2, 7, 14 and 30 day time periods (p<.0001 for each), however, in the analysis that removed patients hospitalized 72 hours prior to death,

results at 90 days became non-significant. Significant differences were still seen (p=.0354) at the 90 day time period for the analysis without patients hospitalized 48 hours prior to death. For the duals, the removal of these patients did not change the finding that Medicare and overall costs remained significantly lower at 2, 7, 14, and 30 day time periods. Removing terminal hospitalizations made differences at 2 days prior to death for Medicaid costs non-significant in both sensitivity analyses – patterns were otherwise similar to the full sample analyses.

We also examined costs based on length of hospice stay to look more closely at the group with hospice stays less than a month (Table 4). Unlike the prior analyses (in Tables 2 and 3), these groups are mutually exclusive, i.e.-if a patient had a hospice length of stay of 12 days, then his costs would be included only in the 8–14 day group. Total mean Medicare costs for long stay nursing home decedents with hospice stays of 7 days or less were significantly lower than the costs in the last week of life for non-hospice decedents - $3,727 (±SD $8,687) vs. $5,231 (±SD $9,445) (p=.009). Lower Medicare costs were also found for decedents who used hospice for 8–14 days prior to death and those who used hospice for 15–30 days prior to death, compared to non-hospice decedents. For dually eligible nursing home patients, total combined Medicare and Medicaid costs were lower for hospice patients with hospice stays less than 7 days, 8–14 days and 15–30 days compared to non-hospice patients. In the sensitivity analyses which removed all patients hospitalized in the 48 and 72 hours prior to death, Medicare costs were no longer significant for the 1–7 day time period. For the duals sub-group, there were no longer significant differences seen at the 1–7 day time period; significant differences were still observed in the 8–14 and 15–30 day time periods.

DISCUSSION

The intent in establishing the Medicare hospice program was to provide appropriate, goal-directed, supportive care to patients at the end of life, as well as promote cost savings, or at least cost neutrality. Nursing home patients on hospice are under scrutiny, due to concerns that there may be inappropriate hospice use in this population, driven by some hospices' desire to enroll these potentially lower need, longer stay, more profitable patients. Thus, it is important to carefully examine the cost implications for this vulnerable group of patients, who largely rely on government funding for their care through Medicare and Medicaid. In this cohort of long stay nursing home decedents, those who used hospice incurred lower costs to Medicare in the last 90 days of life compared with decedents who did not use hospice. Dually eligible long stay nursing home residents who used hospice incurred lower combined Medicare and Medicaid costs in the last 90 days of life. We also examined costs based on hospice length of stay for common hospice enrollment periods of less than 30 days, and again found lower costs for the hospice patients for Medicare and combined Medicare and Medicaid costs.

These findings of cost savings are tempered by the sensitivity analyses that do not demonstrate cost savings when we remove all decedents with a hospitalization in the last 48 or 72 hours of life (this includes both hospice and non-hospice users). This sensitivity analysis is offered as potential alternative explanation for apparent cost savings under the hypothesis that some non-hospice users suffered a catastrophic illness and died within 2–3

days and thus never had the opportunity or clinical indication for hospice despite accruing the costs of a terminal hospitalization. It is not surprising that removal of all terminal hospitalizations would impact the degree of cost savings that could be demonstrated, especially for patients with very short hospice stays. Acute care utilization is the largest cost driver in the non-hospice group. While the impact of potential informative censoring (a catastrophic event requiring acute care in a patient not previously hospice eligible) is an important consideration, we also acknowledge that terminal hospitalizations are avoided by support of hospice providers and thus cost savings could be appropriately attributed to hospice in some cases. Of note, none of our analyses demonstrated an increase in costs to Medicare by hospice patients.

Patient characteristics among long stay nursing home decedents who do and do not use hospice, the methodologic challenges in hospice cost studies, and potential cost implications of hospice on government financing programs are points which merit discussion based on our findings. Overall there were few significant differences in clinical and demographic characteristics between long stay nursing home decedents who did and did not receive hospice near the end of life. The exception to this was that decedents with a cancer diagnosis were more likely to receive hospice than decedents with other diagnoses. It was not surprising that advanced dementia was associated with increased hospice use, as it is a terminal diagnosis and research suggests that family members of persons with the disease overwhelmingly preferred medical care focused on comfort.[5] Other factors important in end of life decision making, such as religious or cultural values, or disease severity, were not available in this data set.

There are challenges in the methodologic approaches used to determine whether or not hospice use causes decreased overall health care spending. It is unlikely that a randomized controlled clinical trial of hospice use in nursing homes would be conducted and such a trial would also have important biases. This is true because participants likely to enroll in such a trial are unlikely to be representative of the larger group of patients eligible for hospice. Similar to Gozalo[11] and colleagues, we used propensity score weighting to correct for confounding and sample selection bias. In their analyses examining both short and long stay nursing home decedents in Florida in 1998-99, they found Medicare cost savings for shorter stay nursing home patients but, depending on the patient's primary diagnosis, modest cost savings to cost increases for longer stay patients. A more recent paper[15] using national Medicare data uses a novel approach – a differences in differences cross temporal matching design – that uses a hospice cohort in 2004 to predict hospice users and non-users in their 2009 cohort. This approach was chosen due to the pervasive issue of selection bias – the theory that people who would choose hospice are fundamentally different from those who would not in terms of their desire for aggressive and expensive care near the end of life. They found that there was a net increase in spending in the last year of life – that the increased costs of hospice care were not off-set by decreases in hospitalizations. In addition to differences in methodologies, their findings may differ from ours in that they included both short and long stay nursing home patients in their analyses

In our analyses, high costs of non-hospice decedents are driven by inpatient hospital costs. For long stay nursing home residents who are likely to return for post-acute care back to a

facility following a hospitalization, the post-acute skilled nursing facility costs associated with hospitalizations are also a significant cost category. The avoidance of costly inpatient and post-acute care appears to offset hospice payments, even when made over a prolonged period of time. We performed sensitivity analyses, removing patients with a hospitalization in the last 48 and last 72 hours of life, which did attenuate some of the findings of cost savings and highlights the difficulty of accounting for informative censoring in these types of studies.

Despite concerns, centered primarily on for-profit hospices, regarding inappropriate hospice practices (e.g., "gaming" the system and enrolling high numbers of lower need patients in nursing homes), we found that hospice appears to be a "good deal" or at least cost neutral for Medicare. The 2009 MedPAC report and subsequent OIG findings highlight concerns about ferreting out inappropriate relationships between hospice and nursing homes that may represent conflicts of interest and more careful scrutiny of hospices with greatly disproportionate numbers of very long stay patients in nursing homes .[10] Some policy recommendations, however, have outlined sweeping changes to the hospice benefit for people living in nursing homes and increased scrutiny all of nursing home hospice enrollees[2] – this conversation may have a chilling effect on hospices' willingness to serve nursing home patients. Hospices already face obstacles in working with nursing home patients, including the added challenge of coordination of care plans and some nursing home owners' and administrators' reluctance to support the use of hospice in the facility.[22,24] Financial and regulatory policies that inhibit access to or discourage use of the Medicare hospice benefit run the risk of further reducing access to palliative and end of life care for a very vulnerable population – as well as an unintended potential consequence of overall increased costs to Medicare near the end of life.

Our study is limited to a cohort of patients drawn from a safety net health system which serves a population that is disproportionately poor, non-white, and characterized by high health care costs which may limit generalizability. Further, our sample has high rates of cancer diagnoses. While our sample is limited to a single state, the use of Medicaid claims allows for a fuller picture of government costs. We did not, however, have data on other cost sources including private insurance and out-of-pocket costs. Also our data were collected over a period of 11 years, during which time use of hospice by nursing home patients changed including overall growth and increase of non-cancer hospice diagnoses. Our prior work with this dataset, however, showed that trends over time in our sample largely mirrored those of national nursing home samples.[8,25,26] Finally, without the ability to incorporate measures of care quality for people with and without hospice services in this dataset, we cannot comment directly on the value of such care.

Our findings in this sample of long stay nursing home decedents are in line with a recent national study of hospice patients in multiple settings which found savings to Medicare for shorter lengths of hospice stay.[14] They contrast, however, with a recent study[15] of nursing home decedent costs which found an increase in Medicare spending attributed to the growth of hospice over time. Our study includes both Medicare and Medicaid data, presenting a fuller picture of government costs, and demonstrates cost neutrality of hospice to the Medicaid program. It is possible that selection bias or other confounders not able to be

measured may inflate the perceived cost benefits of hospice. Coupled with a body of research that describes improved quality of care for nursing home hospice patients, findings of reduced or even neutral costs appear to bolster the case for the value of hospice for nursing home patients. As nursing homes plan an increasing role in caring for people near the end of their lives, their ability to provide high quality end of life care becomes even more critical. Reduction of Medicare hospice costs are a goal of hospice payment reform, but policies that decrease incentives to provide hospice care in nursing homes might have the unintended consequences of increased overall Medicare spending, as well as reduce access to high quality end of life care for this vulnerable population.

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Table 1

Characteristics of the study population – long stay nursing home decedents[a], N=2510

Characteristic	No Hospice (N=1622)	Hospice (N=888)	P value[b]
Age at death, mean (±SD)	82.5 (8.1)	82.6 (8.2)	.6374
Age at entry to NH, mean (±SD)	80.3 (8.0)	80.4 (8.0)	.9170
Male sex, %	37.1	35.6	.4654
White race, %	62.6	62.8	.9214
DNR[c], %	53.6	69.0	<.0001
>=1 hospitalization in year prior to death, %	80.3	69.0	<.0001
ADL impairments[c], mean (±SD)	16.6 (6.0)	17.9 (5.6)	<.0001
Cognitive performance scale[c], mean (±SD)	2.9 (1.7)	3.2 (1.7)	.0002
Dual eligible Medicaid/Medicare, %	60.2	61.6	.5032
Co-morbidities, %			
Cancer	31.6	42.0	<.0001
CAD	51.9	52.0	.9557
CHF	49.1	46.4	.1990
HTN	86.1	86.3	.9264
Arthritis	57.9	60.7	.1813
Diabetes	49.0	42.6	.0020
COPD	42.8	46.2	.1024
Stroke	22.9	19.5	.0448
Renal disease	5.2	2.9	.0084
Liver disease	9.6	11.2	.2059

[a] A propensity score weighting approach was used to adjust for differences in these characteristics between hospice and no hospice subjects. Weights were calculated as 1/p for hospice subjects and 1/(1-p) for non-hospice subjects where p=predicted probability of hospice enrollment.

[b] Chi-square and t-test were used to make comparisons on categorical variables and continuous variables, respectively.

[c] Measured at the last full MDS assessment prior to death NH= nursing home; DNR = do not resuscitate order in place; ADL = activities of daily living; CAD = coronary artery disease; CHF = congestive heart failure; HTN = hypertension; COPD = chronic obstructive pulmonary disease

Table 2

Medicare costs for subjects residing in the nursing home – hospice vs. no hospice[a]

	No hospice		Hospice		
Cost Categories	**N**	**Mean (±SD)**	**N**	**Mean (±SD)**	**Adjusted p-value[b]**
2 days prior to death					
Total Medicare	1622	2785 (6018)	874	791 (2399)	<.0001
Hospice	1622	0 (0)	874	506 (669)	----
Inpatient	1622	2438 (5808)	874	231 (2265)	<.0001
SNF	1622	108 (317)	874	12 (130)	<.0001
Other	1622	241 (509)	874	44 (224)	<.0001
7 days prior to death					
Total Medicare	1622	5231 (9445)	706	2060 (6120)	<.0001
Hospice	1622	0 (0)	706	1275 (1426)	----
Inpatient	1622	4296 (9057)	706	635 (5859)	<.0001
SNF	1622	390 (1041)	706	26 (371)	<.0001
Other	1622	547 (814)	706	127 (479)	<.0001
14 days prior to death					
Total Medicare	1622	7349 (12108)	582	3436 (10614)	<.0001
Hospice	1622	0 (0)	582	2229 (1817)	----
Inpatient	1622	5683 (11424)	582	931 (10433)	<.0001
SNF	1622	771 (1957)	582	63 (799)	<.0001
Other	1622	897 (1191)	582	216 (697)	<.0001
30 days prior to death					
Total Medicare	1622	10677 (15688)	468	6361 (13804)	<.0001
Hospice	1622	0 (0)	468	4490 (3238)	----
Inpatient	1622	7551 (13969)	468	1361 (13460)	<.0001
SNF	1622	1568 (3674)	468	123 (1410)	<.0001
Other	1622	1560 (2033)	468	390 (1269)	<.0001
90 days prior to death					

	No hospice		Hospice		
Cost Categories	**N**	**Mean (±SD)**	**N**	**Mean (±SD)**	**Adjusted p-value[b]**
Total Medicare	1622	19794 (27750)	268	16156 (18659)	.0016
Hospice	1622	0 (0)	268	12423 (5592)	----
Inpatient	1622	11938 (21804)	268	2524 (17998)	<.0001
SNF	1622	4247 (8664)	268	287 (3315)	<.0001
Other	1622	3611 (5336)	268	924 (2684)	<.0001
180 days prior to death					
Total Medicare	1622	32501 (43882)	159	30239 (23234)	.3506
Hospice	1622	0 (0)	159	25142 (9483)	----
Inpatient	1622	18189 (32004)	159	2981 (21713)	<.0001
SNF	1622	7858 (12838)	159	828 (7011)	<.0001
Other	1622	6456 (9850)	159	1291 (2361)	<.0001

[a]A propensity score weighting approach was used to adjust for differences in baseline characteristics between hospice and no hospice subjects. Weights were calculated as 1/p for hospice subjects and 1/(1-p) for non-hospice subjects where p=predicted probability of hospice enrollment; “other” category includes DME, ER, home health, outpatient, other, waiver; sample means and standard deviations are shown.

[b]P-values were obtained after adjustment using propensity score weights; false discovery rate method was used to account for multiple testing.

SNF = skilled nursing facility

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Table 3

Medicare and Medicaid costs for dual eligible patients residing in the nursing home – hospice vs. no hospice[a]

	No hospice		Hospice		
Cost Categories	**N**	**Mean (±SD)**	**N**	**Mean (±SD)**	**Adjusted p-value[b]**
2 days prior to death					
Total Medicare	900	3417 (6915)	520	813 (2757)	<.0001
Total Medicaid	900	281 (521)	520	246 (299)	.0099
Total Costs	900	3697 (6961)	520	1058 (2760)	<.0001
Hospice	900	0 (0)	520	677 (587)	----
Inpatient	900	3155 (6715)	520	301 (2648)	<.0001
SNF/Nursing Home	900	223 (241)	520	26 (129)	<.0001
Other	900	321 (587)	520	57 (266)	<.0001
7 days prior to death					
Total Medicare	1085	5731 (10100)	501	2081 (6817)	<.0001
Total Medicaid	1085	734 (919)	501	754 (649)	.6202
Total Costs	1085	6464 (10095)	501	2834 (6780)	<.0001
Hospice	1085	0 (0)	501	1857 (1140)	----
Inpatient	1085	4990 (9701)	501	771 (6707)	<.0001
SNF/Nursing Home	1085	811 (785)	501	57 (361)	<.0001
Other	1085	664 (877)	501	151 (492)	<.0001
14 days prior to death					
Total Medicare	1185	7683 (11888)	446	3441 (11751)	<.0001
Total Medicaid	1185	1339 (1369)	446	1481 (1201)	.0463
Total Costs	1185	9020 (11792)	446	4921 (11723)	<.0001
Hospice	1185	0 (0)	446	3486 (1964)	----
Inpatient	1185	6241 (11205)	446	1068 (11751)	<.0001
SNF/Nursing Home	1185	1742 (1585)	446	108 (744)	<.0001
Other	1185	1040 (1284)	446	262 (770)	<.0001
30 days prior to death					

	No hospice		Hospice		
Cost Categories	**N**	**Mean (±SD)**	**N**	**Mean (±SD)**	**Adjusted p-value[b]**
Total Medicare	1235	10984 (15536)	371	6246 (14607)	<.0001
Total Medicaid	1235	2864 (2264)	371	3183 (2288)	.0269
Total Costs	1235	13847 (15098)	371	9428 (14443)	<.0001
Hospice	1235	0 (0)	371	7298 (3993)	----
Inpatient	1235	8155 (13798)	371	1412 (14657)	<.0001
SNF/Nursing Home	1235	3904 (2958)	371	260 (1757)	<.0001
Other	1235	1790 (2257)	371	461 (1254)	<.0001
90 days prior to death					
Total Medicare	1277	19851 (28131)	221	16466 (19980)	.0102
Total Medicaid	1277	8813 (5832)	221	9820 (6606)	.0237
Total Costs	1277	28663 (26610)	221	26284 (20202)	.0276
Hospice	1277	0 (0)	221	21435 (10002)	----
Inpatient	1277	12545 (22404)	221	2830 (19512)	<.0001
SNF/Nursing Home	1277	11942 (7195)	221	973 (5397)	<.0001
Other	1277	4178 (6129)	221	1049 (2612)	<.0001
180 days prior to death					
Total Medicare	1290	31692 (44086)	132	30744 (25211)	.7204
Total Medicaid	1290	17475 (10723)	132	19554 (9053)	.0385
Total Costs	1290	49167 (41489)	132	50298 (26535)	.6202
Hospice	1290	0 (0)	132	42859 (16746)	----
Inpatient	1290	18459 (33078)	132	3441 (23740)	<.0001
SNF/Nursing Home	1290	23291 (11052)	132	2380 (10775)	<.0001
Other	1290	7418 (11376)	132	1621 (2879)	<.0001

[a] A propensity score weighting approach was used to adjust for differences in baseline characteristics between hospice and no hospice subjects. Weights were calculated as 1/p for hospice subjects and 1/(1-p) for non-hospice subjects where p=predicted probability of hospice enrollment; “other” category includes DME, ER, home health, outpatient, other, waiver; sample means and standard deviations are shown.

[b] P-values were obtained after adjustment using propensity score weights; false discovery rate method was used to account for multiple testing.

SNF = skilled nursing facility

Table 4

Medicare and Medicaid costs for subjects residing in the nursing home – hospice vs. no hospice

	No hospice		Hospice		
Cost Categories	**N**	**Mean (±SD)**	**N**	**Mean (±SD)**	**Adjusted p-value[a]**
Total Medicare					
7 days prior to death[b]	1622	5231 (9445)	202	3727 (8687)	.0009
14 days prior to death[c]	1622	7349 (12108)	119	4615 (8160)	<.0001
30 days prior to death[d]	1622	10677 (15688)	107	6814 (7874)	<.0001
Total Medicare+Medicaid[e]					
7 days prior to death					
Total Medicare	1085	5731 (10100)	140	4055 (9450)	.0057
Total Medicaid	1085	734 (919)	140	659 (772)	.2198
Total Costs	1085	6464 (10095)	140	4713 (9268)	<.0001
14 days prior to death					
Total Medicare	1185	7683 (11888)	90	4137 (7084)	<.0001
Total Medicaid	1185	1339 (1369)	90	1313 (1975)	.8373
Total Costs	1185	9020 (11792)	90	5449 (7371)	<.0001
30 days prior to death					
Total Medicare	1235	10984 (15536)	88	6466 (7013)	<.0001
Total Medicaid	1235	2864 (2264)	88	3144 (2892)	.2629
Total Costs	1235	13847 (15098)	88	9609 (7849)	<.0001

[a] P-values were obtained after adjustment using propensity score weights; false discovery rate method was used to account for multiple testing.

[b] comparisons made between 1622 subjects not admitted to hospice and 202 subjects with hospice length of stay of 1–7 days

[c] comparisons made between 1622 subjects not admitted to hospice and 119 subjects with hospice length of stay 8–14 days

[d] comparisons made between 1622 subjects not admitted to hospice and 107 subjects with hospice length of stay 15–30 days

[e] comparisons made among dual eligible patients