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## How U.S. Doctors Die: A Cohort Study of Health Care Utilization at End of Life

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### Abstract

**Objectives**—We aimed to compare health care utilization in the last months of life between physicians and non-physicians in the United States (US). Based on widely publicized testimonial and hypothetical evidence stating that physicians desire less aggressive care at the end of life, we hypothesized that physicians would spend fewer days in the hospital and more days in hospice at the end of life when compared to non-physicians.

**Design**—A retrospective observational cohort study.

**Methods**—Fee-for-service Medicare beneficiaries across the United States using Medicare Part A claims data from 2008–2010 for decedent physicians (N=9947) and a random sample of Medicare decedents (N=192,006). Utilization measured by days in the hospital and proportion utilizing hospice in the last six months of life as primary outcome measures adjusted for sociodemographic characteristics and regional variations in health care.

**Results**—Inpatient hospital utilization in the last 6 months of life was no different between physicians and non-physicians, although more physicians used hospice and for longer. Comparisons of physicians to others, adjusting for covariates, were: 1) utilizing the hospital (OR=0.98, 95% CI 0.93 to 1.04); 2) hospital days (mean difference 0.26, P=0.14); 3) dying in the

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hospital (OR=0.99, 95% CI 0.95 to 1.04) 4) ICU/CCU days (mean difference 0.35 more days for physicians,  $P<0.001$ ); 5) using hospice (OR=1.23, 95% CI 1.18 to 1.29); 6) number of days in hospice (mean difference 2.06  $P<0.001$ ).

**Conclusion**—This retrospective, observational study is subject to unmeasured confounders and variation in coding practices. However, this study provides preliminary evidence of actual utilization. US Physicians were more likely to use hospice and ICU/CCU level care. Hospitalization rates were similar.

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## INTRODUCTION

Patients, clinicians, and policymakers alike have become increasingly concerned about rising health care utilization at the end of life.<sup>1-4</sup> A quarter of all Medicare spending occurs in the last year of life, a finding consistent over decades. Among Medicare beneficiaries, this utilization varies over two-fold based only on where in the country one lives.<sup>5</sup> This has raised concerns that many of the interventions provided near the end of life may be of little value.<sup>6-10</sup> Worse, higher spending in the last week of life has been associated with a poorer quality of death<sup>11</sup> and many interventions may be discordant with patients' preferences.<sup>12</sup>

Recent publications have highlighted these persistent gaps in care for persons facing life limiting illness.<sup>13, 14</sup> These gaps include lack of prognostic understanding and a failure to address care goals and preferences. Many believe that when doctors are patients, they may die differently than the rest of society. In 2011, Dr. Ken Murray published an essay describing his physician colleague's decision to opt for comfort-based care over chemotherapy for his incurable cancer. The current medical literature supports the hypothesis that doctors may die differently than non-doctors. When physicians are surveyed, they overwhelmingly opt for a less aggressive, more comfort based approach to care in the face of life limiting illness.<sup>15</sup> Physicians are also more likely to have completed an advance directive documenting care preferences compared to the general population.<sup>16</sup> It is not known if actual health care utilization differs between physicians and non-physicians at the end of life.

As physicians are intimately familiar with the health care arena, they are uniquely aware of both potential benefits and limitations of modern medicine. Their medical knowledge allows for a better understanding of prognosis. As a consequence, we hypothesized that physicians would approach their own death and dying differently than someone without the same level of understanding and experience. The objective of this study was to compare the actual utilization patterns between physician and non-physician decedents at the end of life.

## METHODS

### Study Overview

We aimed to compare health care utilization in the last 6 months of life between physicians and non-physicians. This retrospective observational cohort study involved Medicare decedents with validated death dates between July 2008 and December 2010. We hypothesized that physicians would use fewer hospital and intensive care unit (ICU) services

and more hospice care in the last 6 months of life compared to non-physician decedents. This study was deemed exempt by the Colorado Multi-Institutional Review Board.

### Data Sources

**Identification of non-physician decedents:** The study sample of non-physician decedents was randomly drawn from the Medicare Enrollment Database (EDB). This database includes monthly indicators of whether beneficiaries are enrolled in fee-for-service versus Medicare advantage plans, as well as demographic information including dates of birth and death, sex, race/ethnicity, and residential zip codes. Medicare decedents under 65 years of age or with managed care coverage during the study period were excluded. There was no overlap between the sample of physician decedents and non-physician decedents.

**Identification of physician decedents:** The American Medical Association (AMA) maintains a Physician Masterfile on U.S. physicians dating back to the early 1900s. This data file includes physician name, death date, and last known mailing and/or office address. A Medicare-contracted third party (Buccaneer) matched physician decedents—identified with data from the AMA Physician Masterfile—to the Medicare inpatient, skilled nursing facility (SNF), and hospice claims data from 2008 to 2010 by developing a multi-step algorithm to maximize accuracy of matching. All subjects under 65 years of age or with health maintenance organization (HMO) enrollment within the study period were excluded.

For the subgroup analysis of physician decedents by specialty, we regrouped the 259 specialty designations into 18 general categories (see Supplementary Appendix).

### Utilization Outcomes

To determine utilization, we used the Medicare inpatient and hospice claims for the 6 months prior to the decedent's date of death.

**Inpatient care**—We operationalized this concept to include the rates of hospital and ICU utilization (the proportion of subjects hospitalized or cared for in the ICU in the last 6 months and 1 month of life) and mean total days in the hospital (primary outcome) and ICU in the last 6 months and 1 month of life. We also examined the proportion of physicians versus non-physicians dying in the hospital.

ICU utilization was defined using the inpatient base claims and revenue center files. Because admit and discharge ICU dates were unavailable in the Medicare dataset, ICU utilization was defined using a combination of 'hospital stays' from the inpatient base claims and 'revenue codes' from the revenue center files. Specifically, ICU length of stay was defined as the sum of the revenue center unit count for hospital stays with revenue code '020x', following the intensive care day count definition from the research data distribution center Medicare provider analysis and review record - data dictionary."

**Hospice care**—We examined hospice utilization in the last 6 months of life using several different methods: overall enrollment rates in hospice care (primary outcome), length of stay in hospice, and hospice utilization within 3 and 7 days of death. Hospice enrollment within 3

and 7 days of death have been identified as potential measures of poor quality end-of-life care.<sup>17</sup>

## Covariates

We selected all covariates for the adjusted analysis *a priori* to account for factors known to be associated with variations in care at the end of life. Sociodemographic information available from the Medicare claims includes birth date, sex, and race/ethnicity. We operationalized socioeconomic status as median annual household income calculated based on 2010 U.S. Census zip code data.<sup>18</sup> Additionally, we further adjusted for ‘dual-eligibility’ – beneficiaries who are eligible for both Medicare and Medicaid – as this is also associated with lower SES (mean household income was \$50528 for the dual eligible beneficiaries vs \$57441 for the non-dual eligible beneficiaries). We adjusted for the effect of comorbidities using the modified Charlson comorbidity index score based on diagnoses in the Medicare claims during the final 6 months of life.<sup>19</sup> To account for regional variations in health care at the end of life, we linked decedents to their hospital referral region (HRR) using zip code. HRRs are regions defined by the Dartmouth Atlas based on referral patterns for tertiary care.<sup>5</sup> For each HRR, we included a measure of supply: the number of acute care hospital beds per 1000 residents in 2006 and a measure of practice: the hospital care intensity (HCI) index in 2010.<sup>20</sup> The HCI is a standardized regional composite measure that incorporates the numbers of days patients spend in the hospital and the number of physician encounters during the hospitalization measured as a ratio compared to the national average.

## Analysis

Characteristics of the study sample were described using means and standard deviations for continuous variables, and numbers and percentages for categorical variables, then compared between physicians and non-physicians using t-tests or chi-square tests as appropriate. Differences in measures for hospital and hospice utilization between physicians and non-physicians were first tested using t-tests for continuous measure and chi-square tests for dichotomous measures. Differences between medical subspecialties for the two primary measures were also investigated by comparing one group with all other subspecialty fields. Differences between physicians and non-physicians were further tested using linear or logistic regression adjusting for other covariates. Differences between physicians and non-physicians stratified by age group (<75, 85+ vs. 75 to 84), and age group by cohort (physician vs. non-physician) interaction in the regression models were examined for the primary measures to determine if the differences were consistent across age groups. Significance was defined as  $P < 0.05$  (or 95% confidence). All analyses were performed using SAS software, version 9.2 (SAS Institute).

## RESULTS

### Sample

The AMA Physician Masterfile contained 15,635 deceased physicians – 65 between the years 2008 and 2010; we were able to uniquely match 14,334 beneficiaries yielding a 92% match rate. The final cohort comprised 9947 physician decedents and a random sample of 192,006 non-physician decedents with a verified death date between July 1, 2008 and

December 31, 2010 and without HMO (Figure 1 for the physician cohort). Characteristics of the sample cohort are found in Table 1.

### Hospital Utilization

After excluding 613 subjects whose death dates preceded their inpatient discharge dates, our cohort consisted of 9914 physicians and 191,426 non-physicians. In the last 6 months and 1 month of life, a lower proportion of physicians had at least one hospitalization compared to non-physicians (66.6% vs. 69.5%,  $P<0.001$ ; 50.1% vs. 52.5%,  $P<0.001$ , respectively). After adjusting for covariates, the difference did not reach statistical significance for the last 6 months (adjusted odds ratio [AOR], 0.96; 95% confidence interval [CI], 0.91 to 1.01) and was marginally significant for the last 1 month of life (AOR, 0.91; 95% CI, 0.87 to 0.96). The mean number of days spent in the hospital in the last 6 months and 1 month of life was nearly identical for physician and non-physician decedents (12.2 vs. 12.4,  $P=0.28$ ; 5.3 vs. 5.3,  $P=0.87$ , respectively), also with no significant differences after adjustment. There were no significant differences between the proportions of physicians and non-physicians who died in the hospital (25.3% vs. 25.9%,  $P=0.18$ ), including after adjustment (Table 2).

In the last 6 months and 1 month of life, the proportion of physicians and non-physicians having at least one ICU stay were essentially equivalent (34.6% vs. 34.3%,  $P<0.45$ ; 25.6% vs. 25.0%,  $P<0.18$ , respectively). The differences remained non-significant with adjustment. The mean number of days spent in the ICU in the last 6 months and 1 month of life was slightly greater for physicians compared to non-physician decedents (3.1 vs. 2.8,  $P<0.001$ ; 1.7 vs. 1.5,  $P<0.001$  respectively). These clinically modest differences remained after adjustment (Table 2).

### Hospice Utilization

Nineteen subjects whose death dates either preceded their hospice start or discharge dates were removed from the cohort described in Table 1, resulting in 9,947 physicians and 191,987 non-physicians. For the outcome of any hospice utilization, 46.4% of physicians versus 43.2% of non-physicians had enrolled in hospice care for some amount of time during the last 6 months of life ( $P<0.001$ ). These differences remained significant after adjusting for covariates (AOR, 1.21; 95% CI, 1.16 to 1.27). Unadjusted, the mean number of days in hospice care was approximately the same for physicians and non-physicians (19.4 vs. 19.3,  $P=0.88$ ). However, in the adjusted analysis, physicians used hospice on average 2.44 days more than non-physicians ( $P<0.001$ ). Finally, the proportion of physicians using hospice 3 days before death was significantly different compared to non-physicians (8.1% vs. 7.5%,  $P=0.03$ ), which did not reach statistical significance after adjustment. The proportion of physicians using hospice within 7 days of death was slightly greater than non-physicians (16.8% vs. 15.0%,  $P<0.001$ ). The differences remained significant after adjustment (AOR, 1.08; 95% CI, 1.02 to 1.14) (Table 2).

### Age Stratification

In the age-stratified analyses for the two primary outcomes, the small differences between physician and non-physician decedents were only seen in the older age groups (Table 3).

Adjusting for covariates, the difference between physicians and non-physicians was not significantly different in 65–74 or 85+ age categories, compared to 75–84 category.

### By Specialty

Utilization between medical subspecialties for the primary measures was very similar. Compared to all other specialty fields, psychiatry appeared to have the lowest hospice use (39% vs. 47%,  $P<0.001$ ) and adult medical subspecialty appeared to have higher hospital use (13.9 vs. 12.3 mean number of days,  $P=0.04$ ) (Table 4).

## DISCUSSION

We hypothesized that doctors would have lower utilization of hospital and ICU services and higher utilization of hospice services. Our findings, in contrast, were mixed. On the one hand, we observed an increase in hospice utilization among physicians. When the mean number of hospice days is 20, an increased length of stay in hospice of 2.4 days could be considered a moderately important clinical difference. On the other hand, we also observed a small increase in ICU utilization. Taken together, these results suggest that physician decedents use slightly more resources in general.

Based on prior survey research of physician attitudes toward end-of-life care, we expected physicians to have lower use of high-intensity hospital-based care at the end of life.<sup>15, 16, 21, 22</sup> First, we expected their knowledge of medicine and its limitations to be evident in their avoidance of high intensity end-of-life care. Patients tend to overestimate the benefits of treatments, believing, for example, that chemotherapy for stage IV cancer is curative<sup>23</sup> and cardiopulmonary resuscitation has a high success rate.<sup>24</sup> These are the kinds of misperceptions that can lead to increased utilization of hospital and ICU services. Second, we hypothesized that physicians would ensure the care they received was congruent with their preferences. A power differential exists in the traditional physician–patient relationship, often causing patients to defer to their physicians for fear of being labeled “difficult.”<sup>25</sup> We thought this power differential would not exist among physician-patients, allowing them to more comfortably exert their preferences. Finally, the practice of medicine often exists at the interface between life and death. As such, we thought physicians might have a higher level of death acceptance (and thus lower utilization of hospitalization and ICU services) than a population of people who did not have the same familiarity with death and dying.

Why might our findings conflict with the prior evidence that demonstrates physicians’ preferences for less aggressive care? It could be generational; the average age of physician decedents in our sample was 83. Many of these physicians trained and practiced medicine at a time prior to hospice or palliative care and prior to many of the technologic advances in intensive care. Thus, the burdens of highly aggressive care at the end of life may be more apparent to younger generations of physicians. The fact that the modest differences we saw between physicians and non-physicians were concentrated in the oldest old cohort argues against a generational argument. Decedents 65–74 years had no difference in utilization across all care settings. Ultimately, testing a generational theory would require a repeat of the present study 30 years from now. Secondly, fear and avoidance of dying are strong



motivators of much of our behavior,<sup>26</sup> and perhaps we as physicians are not immune to these fears of dying.

The most concerning potential explanation for our findings is that higher level health care system factors drive end-of-life care independent of patient or clinician factors. Future qualitative research using an organizational perspective should explore the details of the experiences of physicians and their families as they encounter the health care system near the time of their death. This presumably empowered and informed population may be able to provide unique insights into the degree and mechanisms by which the culture and the system influence care at the end of life. The recent IOM report highlights the limitations of the fee-for-service Medicare reimbursement structure that incentivizes procedures while providing little to no coverage for the supportive services patients and families commonly need to provide high quality care outside of the hospital.<sup>14</sup> Thus, our system has evolved to favor hospital-based interventions that may offer less value during a patient's final months.

Our study has several limitations. First, as a retrospective, observational study, there may be unmeasured confounders. Notably, we were unable to adjust for individual education and income. To address this concern, we adjusted for both median income within a zip code and dual eligibility, which captures some aspects of socioeconomic status and is a proxy for education and income. Second, this analysis is based on administrative data, and we know that coding of claims varies geographically.<sup>27</sup> However, the lack of regional differences after adjusting for hospital care intensity suggests that diagnostic coding variation was not an important limitation. Third, Medicare Advantage is excluded from this analysis; it could be that the physicians likely to choose less aggressive care are also more likely to enroll in a Medicare Advantage program and by limiting to fee-for-service enrollees, we may have selected for the more aggressively minded physicians. Fourth, the sample of physician decedents is largely Caucasian males representing the unfortunate reality that previous generations of physicians in the United States were mostly Caucasian males. Finally, utilization is only a proxy for what we truly care about—whether patients actually received medical services that were concordant with their well-informed goals and values.

Many believe that doctors in the U.S. die differently than the rest of society. Since the 2011 publication of Dr. Murray's essay,<sup>28</sup> the media has focused on this idea that doctors forgo aggressive care in favor of care that focuses on quality of life and comfort. Notable examples include a Radiolab story on National Public Radio<sup>29</sup> and a New York Times article<sup>30</sup> both reporting that physicians die differently. Even the Institute of Medicine (IOM) referred to the idea that doctors die differently in its report *Dying in America*.<sup>14</sup> Our findings suggest a more mixed and nuanced picture. Doctors may be more likely to die using hospice, however, they are no less likely to use high-intensity hospital care. If anything, they have higher rates of intensive care unit use in the last six months of life. Society as a whole and policymakers focused on containing health care costs, in particular, may be surprised to learn that even physicians, with knowledge of and experience with death and dying, have nearly identical utilization of hospitals as non-physicians.



## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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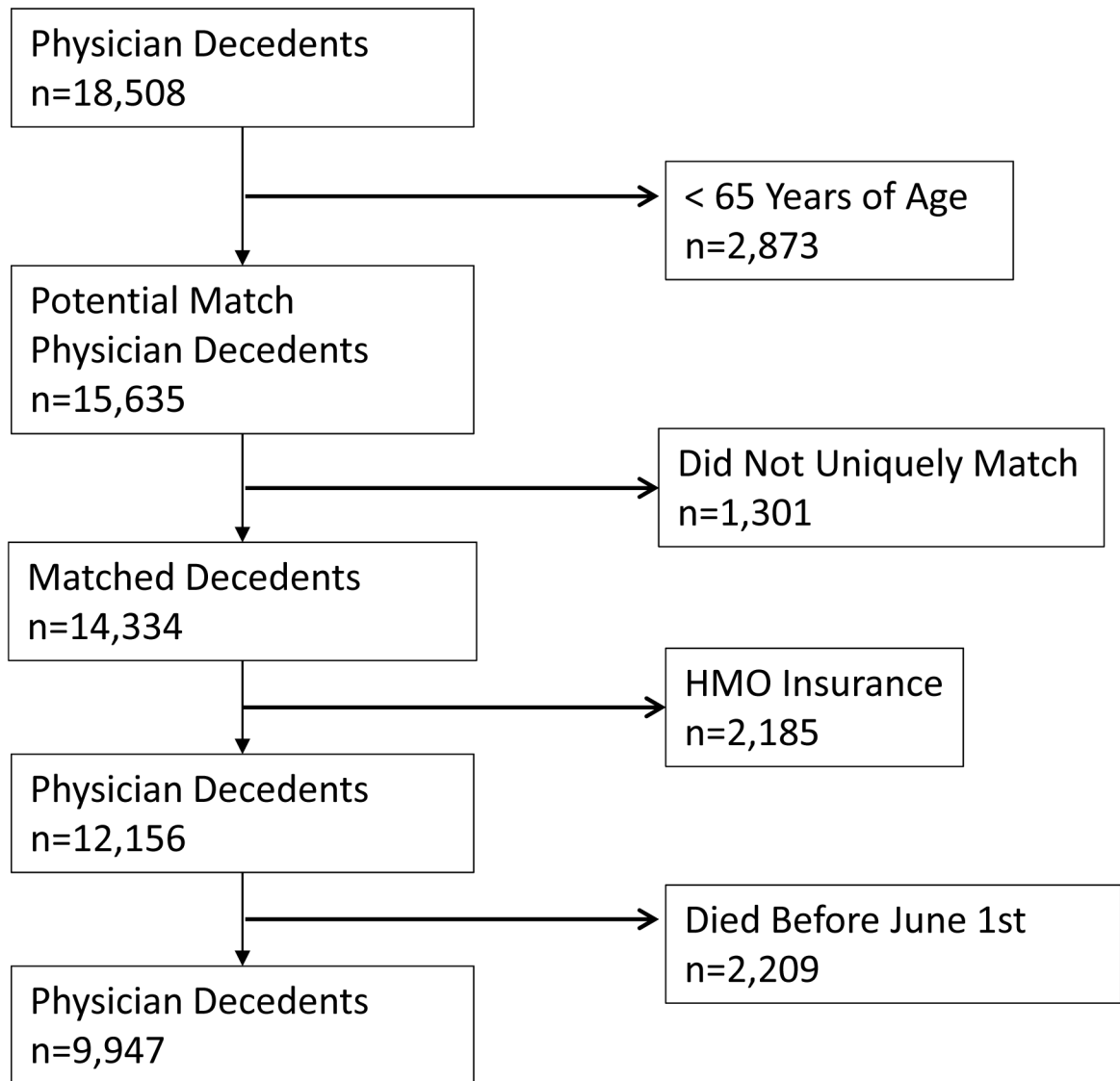
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**Figure 1.**  
Physician Decedent Physician Decedents Accrual

**Table 1**

Characteristics of Physicians Versus Non-Physicians who Died between July 1, 2008 and Dec 31, 2010.\*

	Physicians (N = 9,947)	Non-Physicians (N = 192,006)	P Value
Age at time of death — yr <sup>†</sup>	82.7±8.0	82.2±8.8	<0.001
Female — %	5.9	54.9	<0.001
Race/ethnicity — %			
Caucasian	91.9	87.7	<0.001
Average regional median annual household income — \$	69,412±30,338	54,832±22,096	<0.001
Mean regional hospital care intensity index <sup>‡</sup>	54.3±24.4	51.4±23.4	<0.001
Acute care hospital beds per 1,000 residents	2.4±0.5	2.5±0.5	<0.001
Charlson comorbidity index score <sup>§</sup>	2.7±3.0	2.8±3.0	<0.001
Specialty groups — no. (%)			
Adult primary care	3,027 (30.4)		
Adult medical subspecialty	606 (6.1)		
Anesthesiology	149 (1.5)		
Dermatology/HEENT	513 (5.2)	NA	NA
Neurology	97 (1.0)		
Obstetrics and gynecology	641 (6.4)		
Orthopedics	326 (3.3)		
Other	463 (4.7)		
PMR/Sports medicine	207 (2.1)		
Pathology	674 (6.8)		
Pediatrics	506 (5.1)		
Psychiatry	924 (9.3)		
Radiology	395 (4.0)		
Surgery	1,412 (14.2)		

\* Less than 5% of data were missing for sex, race/ethnicity, and regional characteristics; data were complete for the remaining characteristics. HEENT denotes Head, Eyes, Ears, Nose and Throat, PMR Physical Medicine and Rehabilitation, and NA not applicable.

<sup>†</sup> Plus-minus values are mean ±SD.

<sup>‡</sup> Hospital Care Intensity (HCI) index in 2010.<sup>20</sup> The HCI is a standardized regional composite measure that incorporates the numbers of days patients spend in the hospital and the number of physician encounters during the hospitalization measured as a ratio compared to the national average.

<sup>§</sup> Charlson index scores reflect comorbidities from diagnoses during last 6 months of life. If there were no diagnoses within the last 6 months of life, then the Charlson index and individual comorbidities were set to 0.<sup>19</sup>

To compare physicians and non-physicians, t-tests for continuous variables and chi-square tests for categorical variables were used.

**Table 2**  
Hospital and Hospice Services Utilization in the Last 6 Months and 1 Month of Life.

	Physicians (N = 9,914)	Non-Physicians (N = 191,426)	Unadjusted P Value	Adjusted Beta or Odds Ratio [AOR]*	Adjusted P Value or 95% Confidence Interval [CI]
<b>Hospitalization</b>					
Hospitalization in last 6 months of life — no. (%)	6,606 (66.6)	133,062 (69.5)	<0.001	AOR = 0.96	CI 0.91–1.01
Hospitalization in last month of life — no. (%)	4,966 (50.1)	100,539 (52.5)	<0.001	AOR = 0.91	CI 0.87–0.96
Days in hospital in last 6 months of life <sup>‡</sup>	12.2±18.7	12.4±17.8	0.28	0.34	0.05
Days in hospital in last month of life	5.3±7.8	5.3±7.5	0.90	-0.01	0.90
Death in hospital — no. (%)	2,509 (25.3)	49,604 (25.9)	0.18	AOR = 0.99	CI 0.95–1.04
<b>Intensive Care Unit (ICU) Stay</b>					
ICU stay within last 6 months of life — no. (%)	3,432 (34.6)	65,559 (34.3)	0.45	AOR = 1.01	CI 0.96–1.05
ICU stay within last month of life — no. (%)	2,537 (25.6)	47,850 (25.0)	0.18	AOR = 1.00	CI 0.95–1.05
Days in ICU in last 6 months of life	3.1±8.1	2.8±7.3	<0.001	0.35	<0.001
Days in ICU in last month of life	1.7±4.3	1.5±3.9	<0.001	0.15	<0.001
<b>Hospice Care</b>					
Death with hospice care — no. (%)	4,360 (43.8)	77,753 (40.5)	<0.001	AOR = 1.20	CI 1.15–1.26
Hospice care in last 6 months of life — no. (%)	4,614 (46.4)	82,964 (43.2)	<0.001	AOR = 1.21	CI 1.16–1.27
Death within 3 days of enrolling in hospice care — no. (%)	802 (8.1)	14,365 (7.5)	0.03	AOR = 0.95	CI 0.93–1.08
Death within 7 days of enrolling in hospice care — no. (%)	1,670 (16.8)	28,833 (15.0)	<0.001	AOR = 1.08	CI 1.02–1.14
Days in hospice care in last 6 months of life	19.4±43.5	19.3±44.0	0.88	2.44	<0.001

\* Adjusting the comparison of physicians to non-physicians by t-tests and chi-square tests for age, gender, race/ethnicity, median income by zip code, hospital care intensity average by region, number of acute beds/resident by region, and comorbidity in linear and logistic regression for continuous and dichotomous outcomes, respectively

<sup>‡</sup> Plus-minus values are mean ±SD.

**Table 3**

Hospital and Hospice Services Utilization in the Last 6 Months of Life, Stratified by Age.

Number of days in hospital during last 6 months of life <sup>†</sup>			
Age at Death Category	Physicians (N = 9,914)	Non-Physicians (N = 191,419*)	P Value
65–74	14.8±23.4	15.4±21.6	0.31
75–84	13.5±19.6	14.0±19.0	0.16
85+	10.0±15.2	9.5±13.8	0.04
Percentage utilizing hospice during last 6 months of life			
Age at Death Category	Physicians (N = 9,947)	Non-Physicians (N = 191,980*)	P Value
65–74	34.6	35.8	0.30
75–84	44.6	42.4	0.01
85+	52.5	47.6	<0.001

<sup>†</sup>Plus-minus values are mean ±SD.

To compare physicians and non-physicians, t-tests for number of days in hospital and chi-square tests for hospice utilization were used.

\* Seven people who were 64 years old at death were excluded.

**Table 4**

Hospital and Hospice Services Utilization in the Last 6 Months of Life by Physician Specialty Groups. \*

Specialty Group	Number of days in hospital during last 6 months of life <sup>†</sup>	P Value <sup>‡</sup>	Hospice utilized during last 6 months of life — %	P Value <sup>‡</sup>
Adult primary care	12.1±18.2	0.84	45.6	0.29
Adult medical subspecialty	13.9±21.2	0.04	46.5	0.94
Anesthesiology	11.9±16.7	0.74	49.0	0.29
Dermatology/HEENT	11.9±18.4	0.67	47.4	0.60
Emergency Medicine	14.9±21.1	0.17	47.0	0.89
Neurology	12.7±20.6	0.76	40.0	0.20
Obstetrics and gynecology	11.9±17.2	0.64	49.5	0.11
Orthopedics	11.6±16.0	0.49	45.1	0.64
Other	10.5±17.5	0.052	46.9	0.83
PMR/sports medicine	11.4±16.7	0.51	49.3	0.40
Pathology	12.9±21.2	0.54	50.5	0.13
Pediatrics	12.9±20.5	0.42	44.5	0.37
Psychiatry	12.7±19.0	0.37	39.1	<0.001
Radiology	11.1±16.7	0.13	49.0	0.22
Surgery	12.1±19.7	0.85	49.2	0.03

\* HEENT denotes Head, Eyes, Ears, Nose and Throat, and PMR Physical Medicine and Rehabilitation.

<sup>†</sup> Plus-minus values are mean±SD.

<sup>‡</sup> Compared to other physicians not in the category, t-tests were used for number of days in the hospital; chi-square tests were used hospice utilization.