Influence of Hospice Among Nursing Home Residents with Advanced Dementia Who Received Medicare-Skilled Nursing Facility Care Near the End of Life

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Abstract

Background/Objectives—Current Medicare payment policy results in lower hospice use at the end of life for beneficiaries receiving skilled nursing facility (SNF) care. This study examined differences in outcomes by hospice status among SNF recipients.

Design—Retrospective cohort.

Setting—3,353 U.S. NHs.

Participants—We studied 4,344 persons with advanced dementia who died in NHs in 2006 *and* had SNF care within 90 days of death. Of these, 1086 also received hospice prior to death: 705 post SNF, and 381 concurrent with SNF.

Measurements—Treatments, persistent pain and dyspnea, and hospital death.

Results—Compared to decedents without hospice, decedents with any hospice received fewer medications, injections, feeding tubes, intravenous fluids, therapy services and more hypnotics (p values <.001). Decedents with hospice post SNF received fewer antipsychotics and those with hospice concurrent with SNF received more antipsychotics compared to nonhospice decedents (p values <.001). Multivariate logistic regressions showed decedents with hospice post SNF had lower likelihoods of persistent dyspnea (adjusted odds ratio [AOR] 0.63, 95% CI 0.45, 0.87) and hospital death (AOR 0.02, 95% CI 0.01, 0.07), compared to nonhospice decedents. Decedents with hospice concurrent with SNF had a higher likelihood of persistent pain (AOR 1.65, 95% CI 1.23, 2.19) and a lower likelihood of hospital death (AOR 0.13, 95% CI 0.07, 0.26) compared to nonhospice decedents.

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Conclusion—Residents dying with advanced dementia who received SNF care in the last 90 days of life have fewer aggressive treatments and lower odds of hospital death if they also receive hospice care at any point during that time. Associations between hospice and persistent pain or dyspnea differ by whether hospice care is concurrent with or post SNF care.

Keywords

advanced dementia; hospice; nursing homes; Medicare

INTRODUCTION

Two-thirds of older adults who die with advanced dementia do so in nursing homes (NHs).[1] High proportions of them have distressing symptoms and burdensome interventions[4–9] that could benefit from the palliative care practices of hospice care.[10–17] A current Medicare policy, however, creates a major barrier to hospice access for the 40% of this population who use Medicare skilled nursing facility (SNF) care in the last 90 days of life. [2–3] This policy dictates that a Medicare beneficiary cannot simultaneously access Medicare hospice and SNF care for the same terminal condition. As such, research has found lower rates of hospice use among NH decedents with advanced dementia who access SNF in the last 90 days of life compared to those who do not (30% vs. 46%).[2] This lower use of hospice by NH residents with Medicare SNF care near the end of life raises concerns about the quality of end-of-life care for this vulnerable population.

Residents with advanced dementia who are admitted/readmitted to NHs after hospitalizations qualify for Medicare SNF care when skilled observation and assessment are needed due to unstable conditions *or* when they are prescribed complex services (e.g., intravenous feedings or intramuscular injections) or therapies requiring skilled nursing or rehabilitation staff supervision.[18] However, since 12% of residents die within 90 days of a Medicare-SNF admission,[19] of concern is whether high-quality palliative care expertise is available to these dying residents. Also of concern is whether the SNF services/therapies received align with preferences for the goals of their medical care since there is a financial incentive to both NHs and residents' family members to choose SNF care over hospice care. Medicare SNF care offers a higher per diem to NHs (than the Medicaid per diem rate) and potentially less out-of-pocket expense to families since the SNF benefit covers NH room and board which the hospice benefit does not.

While we know the Medicare policy disallowing simultaneous payment for Medicare SNF and hospice care results in less hospice use near the end of life,[2] it does not preclude it altogether. Residents near the end of life often have several comorbidities and may qualify for both SNF and hospice simultaneously for *different* conditions. In addition, residents may disenroll in SNF and access hospice prior to death. Unknown is whether outcomes differ by hospice status for residents with advanced dementia who receive Medicare SNF near the end of life. Also unknown is whether the timing of that hospice use is important. This retrospective cohort study examined how hospice use and its timing was associated with treatments received and with several key markers of the quality of end-of-life care: persistent pain, persistent dyspnea and a hospital death.[4–7] Based on previous research,[10–16] we hypothesized that residents with advanced dementia who used Medicare SNF care near the end of life and received hospice concurrent with or post SNF would receive fewer aggressive treatments and have higher quality outcomes than comparable nonhospice residents.

METHODS

Data

With a signed data use agreement from the Centers for Medicare and Medicaid Services (CMS) in place, we used 2005–2006 NH resident assessment data (minimum data set; MDS) in the 50 U.S. states and the District of Columbia, matched to Medicare Part A claims and enrollment data (which include vital statistics data and information on health maintenance organization [HMO] enrollment). Residents enrolled in an HMO at any time in the last year of life were not included in this sample because of the absence of (nonhospice) Medicare claims for these residents. We submitted the study for Institutional Review Board review and it was determined to be exempt from review since the study's sample consisted only of decedents.

The above data were concatenated to create a Residential History File (RHF)[20] that was used to determine residents' healthcare use in the days and weeks prior to death. To this resident-level file we merged NH facility-level data obtained from the Online Survey, Certification, and Reporting (OSCAR) database and county-level data obtained from the Area Resource File (ARF).

Sample Identification

Our initial population consisted of all NH residents with advanced dementia who died in 2006 and received Medicare SNF within 90 days of death. The criteria for advanced dementia was developed in an earlier study[2] using both MDS and Part A claims. A diagnosis of "Alzheimer's" or "Dementia other than Alzheimer's" had to be documented on the MDS closest to death *or* on any Medicare Part A claim (i.e., home health, hospice, hospital, outpatient or Medicare-SNF claim) in the last 12 months of life. The ICD-9-CM diagnosis codes we used to capture dementia have been used by others[21, 22] (290.xx, 291.2, 292.82, 294.1x, 294.8, 331.0–331.2, and 332.83). The severity of dementia was determined by using the cognitive performance scale (CPS) derived from the MDS closest to death.[23, 24] Those with a diagnosis of dementia and a CPS score of 5 or 6 (severe impairment or very severe impairment with eating problems) were identified as having advanced dementia.

Since we were interested in the election of hospice during or after SNF in the last 90 days of life, we excluded decedents who accessed hospice prior to receiving SNF. In addition, because our outcomes included measures of the *persistence* of pain and dypsnea, our eligible sample had to have at least two MDS assessments after SNF admission in order to measure changes in pain and dypsnea in the last 90 days of life. For residents with hospice, one of the two MDS assessments had to have been completed after hospice admission. Finally, all decedents had to have a NH length of stay of at least eight days, and for hospice residents a hospice stay of at least eight days, because many of the outcomes were measured using a week-long look-back period.

We used the remaining group as a starting point to select the hospice/nonhospice study samples. For each decedent with advanced dementia who accessed hospice concurrent with or post SNF we chose three nonhospice decedents with similar NH lengths of stay (i.e., 8–14 days, 15–21 days, 22–30 days, 31–60 days, 61–90 days, 91–180 days, or more than 180 days) and the same number of days between their last MDS assessment and death. Of the 1,144 hospice decedents identified, 23 (2%) were dropped due to missing data on the MDS, and an additional 35 (3.1%) were dropped because three nonhospice decedents with the exact number of days between last MDS and death could not be identified to serve as controls. This resulted in a final sample of 4,344 decedents–1,086 with hospice and 3,258 without. The mean days between decedents' last MDS and death was 17 (standard deviation 15.6), and the median was 12 days.

Variables of Interest

Independent Variable – Medicare hospice and its timing—As indicated previously, hospice can be concurrent with SNF when SNF care is not related to the terminal condition. Of the 1,086 hospice decedents identified above, 705 (65%) enrolled in hospice after their Medicare SNF stay ("hospice post SNF") and 381 (35%) enrolled during their SNF stay ("hospice concurrent with SNF"). We examined the effects for these two hospice groups separately since we thought decedents in the two groups may differ (perhaps in unmeasured ways). Given the disparate goals of Medicare SNF and hospice care, of particular interest was how outcomes may differ when hospice care is concurrent with SNF.

Outcome Variables—We used data from a decedent's last MDS assessment before death to identify treatments received in the seven days prior to that assessment. For medications, we included the mean number of medications being received, whether any medications were by intramuscular injection (yes/no), and the receipt of antipsychotics (yes/no) and hypnotics or antianxiety medications (yes/no). Of note, receipt of analgesics could not be examined since these drugs are not documented on the MDS. We also examined MDS variables indicating whether decedents had feeding tubes (yes/no) or received intravenous fluids (yes/no). Last, we included variables indicating whether the decedent had received any occupational, physical, respiratory or speech therapy (yes/no for each).

Persistent pain and dyspnea variables were defined as having dyspnea or pain on the first assessment (MDS) after the first SNF stay in the last 90 days of life *and* at the time of the last assessment (MDS) before death. Further, for pain to be "yes" it had to be recorded more specifically as daily, *or* as moderate, severe or excruciating less than daily. To examine the association between hospice enrollment and dying in a hospital we used the RHF to identify NH residents who died within seven days of transfer from a NH to a hospital.

Control Variables—In multivariate analyses we controlled for decedent demographic and social characteristics including age, gender, marital status and race. Age was categorized as <85 and 85+, race/ethnicity as non-Hispanic White, non-Hispanic Black, Hispanic and other, and marital status as married versus other. We also captured whether the decedent was bedfast prior to death and had weight loss (10% of body weight), congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), cancer, stroke, arteriosclerotic heart disease, renal failure, other cardiovascular disease, fracture or osteoporesis (yes/no for each). To characterize functional impairment we used an activities of daily living (ADL) scale, derived from the MDS and ranging from 0 to 28 (higher values indicating greater impairment).[26] Also, using the MDS we identified whether decedents had a do not resuscitate (DNR) order, a do not hospitalize (DNH) order or perceived end-stage disease (defined as having six or fewer months to live). Finally, we controlled for short (90 days) versus long (>90 days) NH stays.

Nursing Home- and County-Level Variables—For analyses of hospital deaths, we also controlled for numerous NH-level variables taken from the OSCAR including whether a NH is chain-affiliated, for-profit, and has any special care unit or physician extenders. Continuous variables included a NH's number of beds, its occupancy rate, and its percentage of Medicaid and Medicare residents. Using the ARF, we additionally controlled for county-level variables including the number of hospital beds, the number physicians per 100 individuals aged over 65, and NH competition within a county (using the Herfindahl index). Last, we controlled for the number of hospices providing care in NHs in a county (per claims data).

Statistical Analyses

Proportions and means were used to descriptively compare decedent characteristics, treatments and outcomes and Chi-square statistics, t-tests and ANOVAs tested the statistical significance of observed differences. For the multivariate analysis, we used logistic regressions with generalized estimating equations to estimate the independent effects of hospice enrollment on the outcomes studied, using Version 11 of Stata software.[27] The generalized estimating equation adjusted for the correlation occurring between decedents from the same NH.

RESULTS

Descriptive Comparisons

Descriptive comparisons of the study sample by hospice status are found in Table 1. Neither race, age, nor marital status differed significantly across groups though a significantly higher proportion of nonhospice decedents were male compared to either hospice group (36% versus 32% respectively [p = .039]). Compared to nonhospice decedents, a significantly higher proportion of decedents with any hospice were bedfast, had end-stage disease documented, and had a DNR order and a lower proportion had arteriosclerotic heart disease. Significantly higher proportions of decedents with hospice post SNF had DNH orders, arthritis, cancer, renal failure, other cardiovascular disease and osteoporosis compared to both nonhospice decedents and those with hospice concurrent with SNF; lower proportions had CHF, COPD and fractures. All decedents were similar with regard to ADL impairment and CPS scores. Also, all had extensive functional impairment (a mean score of 26 on a scale of 0 to 28 [greatest impairment]) and approximately 72% had very severe cognitive impairment with eating problems (i.e., a CPS of 6). Higher proportions of hospice versus nonhospice decedents had persistent pain, but the occurrence of persistent pain was much greater for decedents with hospice concurrent with SNF versus hospice post SNF. Rates of hospital deaths were significantly lower for decedents with any hospice compared to nonhospice decedents.

Decedents with hospice post SNF had the lowest use of the treatments/therapies studied, and nonhospice decedents had the highest (Table 2). Compared to their nonhospice counterparts, hospice decedents received significantly fewer medications and less often had intravenous fluids, feeding tubes or received medication via IM injection. A significantly lower proportion of decedents with hospice post SNF received antipsychotics compared to other groups; however, a higher proportion of decedents with hospice concurrent with SNF received antipsychotics. Also, significantly lower proportions of hospice decedents compared to nonhospice decedents received therapy services (Table 2). A quarter of nonhospice decedents compared to approximately 20% of decedents with hospice concurrent with SNF received occupational and physical therapy near death, and only 2% of decedents with hospice post SNF received these therapies.

Multivariate Analyses

Controlling for potential confounders (see Table 3), decedents with hospice post SNF had a 37% lower likelihood of persistent dyspnea compared to nonhospice decedents (adjusted odds ratio [AOR] 0.63; 95% confidence interval (CI): 0.45, 0.87). There was no significant difference in the likelihood of persistent pain across these two groups. Decedents with hospice concurrent with SNF had a 65% greater likelihood of having persistent pain (AOR 1.65; 95% CI: 1.23, 2.19) but no significant difference in the likelihood of persistent dyspnea compared to nonhospice decedents. Both groups of hospice decedents had a significantly lower likelihood of dying in a hospital compared to nonhospice decedents. Residents with hospice post SNF had a 98% lower likelihood of a hospital death (AOR 0.02;

95% CI: 0.01, 0.07) and those with hospice concurrent with SNF had an 87% lower
likelihood (AOR 0.13; 95% CI: 0.07, 0.26; Table 3).

DISCUSSION

NH residents who died in 2006 with advanced dementia and enrolled in hospice concurrent
with or post Medicare SNF care received fewer invasive treatments and had a significantly
lower likelihood of a hospital death than did comparable residents without hospice care.
Additionally, compared to nonhospice decedents, those with hospice post SNF had a
significantly lower likelihood of having persistent dyspnea while decedents with hospice
concurrent with SNF had a significantly *higher* likelihood of having persistent pain. This
study is the first to our knowledge to attempt to understand how treatments and outcomes
vary for NH residents with advanced dementia who use Medicare SNF care near the end of
life, and who do or do not enroll in Medicare hospice. This understanding is particularly
important given that nearly half of all NH residents dying with advanced dementia receive
Medicare SNF care in the last 90 days of life, and those with Medicare SNF care are less
likely to enroll in hospice.[2] As in numerous other studies[11, 12, 16] we found hospice
enrollment was associated with a lower likelihood of dying in a hospital. Unique to this
study we found that this association holds even for decedents who received hospice
concurrent with SNF. While causality cannot be established from this cross-sectional study,
the finding that hospice decedents had an 87% lower likelihood of a hospital death
compared to nonhospice decedents lends plausible support to the notion that dual access to
Medicare SNF and hospice care may reduce the rates of end-of-life hospitalizations.

For some treatments and for persistent pain and dyspnea, the effect of hospice care differed
by the timing of hospice. Decedents with hospice post SNF (but not hospice concurrent with
SNF) had a lower likelihood than nonhospice decedents of having persistent dyspnea. This
finding is consistent with research by Kiely and colleagues[16] showing hospice versus
nonhospice residents with advanced dementia and dyspnea had a three times greater
likelihood of receiving dyspnea treatment, and with family reports of fewer unmet dyspnea
needs with hospice.[28] Also, the use of therapy services for residents with hospice concurrent
with SNF was more similar to nonhospice decedents than to decedents with hospice post
SNF. On one hand, it is possible that the greater use of certain therapy services (i.e., physical
and occupational therapy) by decedents with hospice concurrent with SNF reflects a
preference for more aggressive care. On the other hand, these therapy services while
consistent with the restorative goals of Medicare SNF may not align with the palliative care
goals of hospice. More in depth research on the use of therapy services by NH residents with
advanced dementia is needed to more fully understand the factors driving this use.

The divergent hospice effects relating to persistent pain are puzzling. Decedents with
hospice concurrent with SNF had a *greater* likelihood of persistent pain than did nonhospice
decedents while no significant difference was found between decedents with hospice post
SNF and nonhospice decedents. Previous research has suggested that there is differential
pain assessment performed for hospice versus nonhospice residents, resulting in hospice
residents having greater pain severity assessed and documented.[17, 25] We addressed this
assessment bias by only considering the presence of daily pain rather than its severity when
constructing our pain measure. [25] However, as a result it is likely that our outcome measure
lacked the sensitivity to adequately capture changes that may occur with hospice enrollment.
Rather than measuring persistent pain we would have preferred to examine pain
management since its measurement is more objective and has been shown to be superior for
hospice versus nonhospice NH residents.[10] However, we were unable to do so since
analgesic drug data were unavailable. These measurement issues provide likely explanations
for our inability to find a significant difference in the persistence of pain between decedents

with hospice post SNF compared to nonhospice decedents, but they do not adequately address the greater likelihood of persistent pain found among decedents with hospice concurrent with SNF compared to their nonhospice counterparts. As speculated a priori and shown in our descriptive comparisons, decedents with hospice concurrent with SNF are different from those with hospice post SNF. For example, they may have more severe and intractable pain. While we controlled for comorbidities commonly associated with pain (arthritis, fractures, other) it is likely there were unmeasured confounding factors for which we could not control. In relation to this, since Medicare payment policy requires SNF care concurrent with hospice to be unrelated to the terminal condition, it may be that Medicare SNF residents had a qualifying event which triggered referral. One such event may have been a fracture, and we did find that 14% of residents with hospice concurrent with SNF had a principal diagnosis of fracture on their final Medicare SNF claim; this compares with a prevalence of 3% generally on the Medicare SNF claims studied. Finally, it may also be that hospices are less able to affect outcomes when care is concurrent with SNF, given the divergent goals of hospice and Medicare SNF care. To test whether this is the case, a prospective study with primary data collection is needed. Also, such a study would need to control for selection bias (i.e., for differences in hospice/nonhospice residents and between residents receiving hospice concurrent with or post SNF).

This study has other limitations that deserve comment. First, the diagnosis of advanced dementia was determined indirectly using secondary data contained in MDS and Medicare claims. However, using our methodology, our NH dementia prevalence estimates were very similar to those from a Maryland study which used an expert panel and DMS-III-R criteria.[2, 22] Also, other resident-level demographic and clinical data were obtained from the MDS, and the possibility of inaccuracies must be considered. Additionally, we are unable to comment on the decision-making around Medicare-SNF and hospice use and on factors associated with referral other than those represented in our secondary data sources. Last, this research had a retrospective cohort design since we examined the care received by persons with advanced dementia who had died in NHs. Important concerns about bias with the use of a retrospective study design have been noted.[30] However, by limiting our cohort to NH decedents identified as having advanced dementia (using diagnosis *and* CPS score) and by examining care only in the last 90 days of life we have attempted to minimize this bias.

In conclusion, regardless of whether hospice enrollment was concurrent with or post Medicare SNF care, NH decedents with advanced dementia and SNF care in the last 90 days of life received fewer aggressive treatments and had substantially lower odds of a hospital death when they received hospice care compared to when they did not. Also, while we found associations between hospice use and persistent pain and dyspnea differed by the timing of hospice enrollment, our understanding of the hospice effect when hospice was concurrent with SNF care is limited by our study design and data sources. Through the Affordable Care Act's required Medicare Hospice Concurrent Care demonstration project (which will allow concurrent hospice and other Medicare Part-A care)[31] the benefits and costs of Medicare-SNF/hospice concurrent care will be studied. To assure valid comparisons it is essential this research relies on primary data collection for the measurement of pain and other outcomes and controls for potential differences between nonhospice residents and those who receive hospice concurrent with SNF care versus hospice post SNF.

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Sponsor's Role:

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Table 1

Nursing Home Decedents with Advanced Dementia in 2006 and with Medicare Skilled Nursing Facility Care in Last 90 Days of Life: Characteristics and Outcomes by Hospice Status (N=4,344)

Variable	Nonhospice (N=3,258)	Hospice Concurrent with SNF (N=381)	Hospice Post SNF (N=705)	P-Value
Race				0.457
Non-Hispanic White (reference)	80.7%	83.2%	81.1%	
Non-Hispanic Black	13.9%	12.3%	14.8%	
Other	5.4%	4.5%	4.1%	
Age 85+	54.2%	52.5%	52.8%	0.677
Male	36.3%	31.5%	32.3%	0.039
Married	27.0%	27.6%	26.5%	0.932
Bedfast	30.1%	34.9%	37.5%	<0.001
Cognitive Performance Scale of 6	71.9%	69.8%	73.1%	0.527
Mean ADL Severity Score ± SD (Range 0–28)	26.0(3.2)	26.2(2.9)	26.2(3.0)	0.063
End-Stage Disease Documented (on MDS)	8.7%	45.7%	43.1%	<.001
Advance Directives				
Do Not Resuscitate Order	72.1%	82.7%	78.3%	<0.001
Do Not Hospitalize Order	9.6%	7.4%	12.2%	0.025
Diagnoses				
Congestive Heart Failure	28.3%	29.4%	22.3%	0.003
Chronic Obstructive Pulmonary Disease	19.3%	17.9%	12.3%	<0.001
Arthritis	6.6%	3.1%	13.6%	<0.001
Cancer (any)	4.1%	4.2%	9.4%	<0.001
Weight Loss	34.3%	34.7%	38.0%	0.169
Stroke	28.1%	27.6%	28.7%	0.925
Arteriosclerotic Heart Disease	14.6%	8.7%	8.5%	<0.001
Renal Failure	3.4%	1.6%	9.4%	<0.001
Other Cardiovascular Disease	6.1%	3.2%	13.1%	<0.001
Fracture	8.3%	16.8%	8.5%	<.001
Osteoporosis	4.0%	3.2%	9.4%	<.001
Nursing Home Stay <90 Days	15.3%	19.2%	13.2%	0.033
Outcomes				
Persistent Pain	15.6%	26.8%	16.5%	<0.001
Persistent Dyspnea	11.1%	15.0%	7.7%	<0.001
Hospital Death	21.3%	2.4%	0.4%	<0.001

Table 2

Nursing Home Decedents with Advanced Dementia in 2006: Care Documented on the Last Assessment (MDS) Prior to Death for Hospice and Non-Hospice Decedents[a] (N=4,344)

	Non-Hospice (N=3,258)	Hospice Concurrent with SNF (N=381)	Hospice Post SNF (N=705)	P-Value
Medications				
Mean Number	10.0 (4.8)	9.6(4.9)	8.5(4.6)	<0.001
Medications (±SD)				
--by Intramuscular Injection (any)	36.6%	29.0%	25.4%	<0.001
Antipsychotics (any)	27.0%	32.9%	23.7%	0.004
Hypnotics or Antianxiety	18.1%	30.5%	28.9%	<0.001
Treatments				
Feeding Tube	31.6%	24.7%	23.7%	<0.001
Intravenous Fluids	13.5%	8.1%	3.7%	<0.001
Therapies (any)				
Occupational	24.6%	19.2%	2.8%	<0.001
Physical	27.7%	21.8%	2.1%	<0.001
Respiratory	7.6%	5.6%	3.6%	0.001
Speech	18.9%	14.1%	1.4%	<0.001

[a] All decedents included had Medicare skilled nursing home care in the last 90 days and hospice decedents had hospice after SNF admission. Each hospice decedent was matched to three non-hospice decedents by nursing home length of stay categories (8 to14 days, 15–21 days, 22–30 days, 61–90 days, 91–180 days, and >180 days) and by the number of days between the last MDS and death (an exact match).

Table 3

Multivariate Logistic Regressions—Persistent Pain and Dyspnea, and Hospital Death among Nursing Home Decedents with Advanced Dementia in 2006[a] and With or Without Hospice (N=4,344)

Variable	Persistent Pain Odds Ratio (95% CI)	Persistent Dyspnea Odds Ratio (95% CI)	Hospital Death[b] Odds Ratio (95% CI)
Hospice Concurrent with SNF	**1.65 (1.23, 2.19)** ***	**1.31 (0.93, 1.83)**	**0.13 (0.07, 0.26)** ***
Hospice Post SNF	**0.94 (0.73, 1.21)**	**0.63 (0.45, 0.87)** **	**0.02 (0.01, 0.07)** ***
Race			
Non-Hispanic White (reference)			
Non-Hispanic Black	1.01 (0.78, 1.3)	0.83 (0.6, 1.14)	1.52 (1.18, 1.95) ***
Other	0.9 (0.59, 1.36)	0.94 (0.6, 1.49)	2.2 (1.56, 3.11) ***
Age 85+	0.8 (0.67, 0.95) **	0.91 (0.74, 1.12)	0.97 (0.8, 1.17)
Male	0.68 (0.56, 0.82) ***	1.22 (0.98, 1.53)	1.02 (0.84, 1.24)
Married	1.1 (0.9, 1.35)	0.84 (0.65, 1.07)	1.11 (0.9, 1.38)
Bedfast	1.49 (1.24, 1.79) ***	1.39 (1.11, 1.72) **	0.74 (0.6, 0.92) **
Cognitive Performance Scale of 6	0.78 (0.61, 1)	1.12 (0.81, 1.56)	1.35 (1, 1.82) *
ADL Severity Scale (Range 0–28)	1.02 (0.99, 1.06)	1.01 (0.97, 1.07)	0.97 (0.93, 1.01)
End-Stage Disease Documented (on MDS)	1.06 (0.84, 1.35)	1.31 (0.99, 1.72)	0.33 (0.2, 0.53) ***
Advance Directives			
Do Not Resuscitate Order	1.27 (1.04, 1.56) *	1.25 (0.97, 1.6)	0.36 (0.3, 0.44) ***
Do Not Hospitalize Order	1.1 (0.84, 1.43)	0.8 (0.56, 1.14)	0.15 (0.08, 0.3) ***
Diagnoses			
Congestive Heart Failure	1.02 (0.84, 1.23)	1.99 (1.62, 2.45) ***	0.99 (0.81, 1.22)
Chronic Obstructive Pulmonary	0.9 (0.71, 1.13)	2.94 (2.37, 3.64) ***	1.02 (0.8, 1.29)
Arthritis	0.93 (0.66, 1.3)	1.16 (0.79, 1.69)	0.71 (0.44, 1.14)
Cancer (any)	1.14 (0.79, 1.66)	1.05 (0.68, 1.64)	0.77 (0.47, 1.26)
Weight Loss	1.18 (1, 1.4)	0.87 (0.7, 1.07)	0.84 (0.69, 1.01)
Stroke	0.7 (0.58, 0.86) ***	0.94 (0.75, 1.17)	1.26 (1.03, 1.53) *
Arteriosclerotic Heart Disease	1.06 (0.82, 1.35)	1.06 (0.81, 1.4)	1.17 (0.91, 1.51)
Renal Failure	1.17 (0.76, 1.78)	1.25 (0.8, 1.97)	0.67 (0.37, 1.22)
Other Cardiovascular Disease	1.25 (0.89, 1.76)	1.12 (0.77, 1.63)	0.76 (0.5, 1.16)
Fracture	3.31 (2.6, 4.22) ***	0.92 (0.64, 1.32)	0.82 (0.57, 1.17)
Osteoporosis	1.07 (0.73, 1.57)	1.38 (0.89, 2.14)	0.85 (0.48, 1.51)
Nursing Home Stay <90 Days)	1.38 (1.11, 1.71) **	0.88 (0.66, 1.19)	0.91 (0.71, 1.18)

[a] All decedents included had Medicare skilled nursing home care in the last 90 days and hospice decedents had hospice after SNF admission. Each hospice decedent was matched to three non-hospice decedents by nursing home length of stay categories (8 to 14 days, 15 to 21 days, 31 to 60 days, 61 to 90 days, and >180) and by the number of days between the last MDS and death (an exact match).

[b]The model predicting hospital death controls for NH characteristics including: for profit status, chain status, percent residents with Medicaid as payer, percent residents with Medicare as payer, special care units (excluding Alzheimer's), any physician extenders (FTEs), total beds, occupancy rate; and county characteristics including: number of hospices serving NHs, Herfindahl Index for NH Beds, number of hospital beds per 1000 pop 65+, and number of doctors per 10000 pop 65+.

*
p<.05,

**
p<.01,

***
p<0.001