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## Association of physician specialty with hospice referral for hospitalized nursing home patients with advanced dementia

Claire K. Ankuda, MD, MPH<sup>1</sup>, Susan L. Mitchell, MD, MPH<sup>2</sup>, Pedro Gozalo, PhD<sup>3</sup>, Vince Mor, PhD<sup>3,4</sup>, David Meltzer, MD, PhD<sup>5</sup>, and Joan M. Teno, MD, MS<sup>6</sup>

<sup>1</sup>Robert Wood Johnson Clinical Scholars Program, University of Michigan, Ann Arbor, MI <sup>2</sup>Hebrew Senior Life, Institute for Aging Research, Boston MA <sup>3</sup>Health Services, Policy, and Practice, Center for Gerontology and Health Care Research, Brown University School of Public Health, Providence, Rhode Island <sup>4</sup>Veterans Administration Medical Center, Providence, RI <sup>5</sup>Section of Hospital Medicine, University of Chicago, IL, USA <sup>6</sup>Division of Gerontology and Geriatric Medicine, Department of Medicine, Cambia Palliative Care Center of Excellence, University of Washington, Seattle

### Abstract

**Background/Objectives**—Hospitalists hospice referral patterns have been unstudied. This study aims to examine hospice referral rates by attending type for hospitalized nursing home (NH) residents with advanced cognitive impairment (ACI) at the time of discharge between 2000 and 2010.

**Design**—Retrospective cohort study.

**Participants**—Hospitalized NH residents age ≥66 drawn from the 20% sample of Medicare beneficiaries with ACI, 4 or more Activities of Daily Living (ADL) impairments on last minimum data set (MDS) assessment completed within 120 day of admission (N=128,989).

**Measurements**—Hospice referral was defined as referral to hospice within 1 day after hospital discharge. Attending physician type was determined by Part B physician billing for 100% of the billings during that admission. Continuity of care was defined as the hospital physician also billing for an outpatient visit within 120 days of that hospital admission. Number of ADL impairments, cognitive measures, pre-admission illnesses and illness severity were derived from the MDS.

**Results**—Of the 105,329 hospitalized patients with ACI that survived to discharge (72.3% white, 30.6% male), the hospice referral rate at the time of hospital discharge increased from 2.8% in 2000 to 11.2% in 2010. Using a multivariate, hospital fixed effects model examining changes in the distribution of inpatient attending physicians, hospitalists compared to generalist physicians were more likely to refer these patients to hospice at discharge (AOR 1.17, 95% CI 1.09–1.26). Continuity of physician care from the outpatient setting to the hospital was associated with lower hospice referral (AOR 0.78, 95% CI 0.73–0.85).

**Corresponding Author:** Claire K. Ankuda, RWJF Clinical Scholars Program, University of Michigan, NCRC- 2800 Plymouth Road, Building 10, Room G016, Ann Arbor, MI 48109, [cankuda@umich.edu](mailto:cankuda@umich.edu), T (802) 299-8557, F (734) 647-3301.

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**Conclusions**—Hospice referrals for NH-dwelling persons with ACI admitted to the hospital increased between 2000 and 2011 and disproportionately so when the attending physician was a hospitalist.

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## Introduction

Hospice enrollment at the end of life is associated with a high quality of care, as reported by patients and their families.<sup>1–3</sup> Individuals dying from advanced dementia have been shown to benefit from hospice, with hospice enrollees having improved symptomatic treatment and fewer unmet needs,<sup>4</sup> fewer hospitalizations and burdensome transitions,<sup>5</sup> and better surrogate perceptions of quality of end of life care.<sup>6</sup>

Despite the benefits of hospice care, there is significant variation in who is enrolled in hospice that is not driven by patient preferences for care.<sup>7</sup> Patient sex,<sup>8</sup> race,<sup>8,9</sup> age,<sup>8</sup> illness,<sup>8,10</sup> and socioeconomic status<sup>11</sup> contribute to hospice enrollment, as do health care system characteristics such as nonprofit status,<sup>12</sup> health maintenance organization (HMO) membership,<sup>8</sup> and region.<sup>11,13,14</sup> Physician characteristics are a major predictor of hospice enrollment, with physician race and age associated with hospice referral.<sup>14,15</sup> In a recent study in oncology patients with a poor prognosis, past oncologist hospice referral rates was demonstrated to be the strongest determinant of hospice referral among many patient and physician characteristics.<sup>12</sup>

Given the increasing role of hospitalists in the acute care setting,<sup>16</sup> we focus our analysis on comparing rates of hospice referral by hospitalists, generalist, and specialists caring for hospitalized nursing homes residents with advanced dementia. Hospitalist care is associated with lower length of stay and other quality outcomes<sup>17</sup> and has been proposed as a target for improving hospice referral rates.<sup>18</sup> We specifically focus on a hospitalized advanced dementia population given both the high mortality rate and degree of burdensome care in the last months of life in this population.<sup>19,20</sup>

One controversial aspect of the hospitalist role is their absence of continuity with the outpatient setting. Continuity in the form of duration of patient-physician relationship has been found to decrease physicians' prognostic accuracy<sup>21</sup> but increase trust in the physician<sup>22</sup> and decrease end of life ICU utilization.<sup>23</sup> Therefore, not only the relationship between hospitalist care and hospice referral is unknown but also the role of continuity.

## Methods

This is a retrospective cohort study based upon a 20% sample of Medicare fee-for-service enrollees admitted to a hospital from a nursing home between 2000 and 2010. Along with Medicare claims data, the study utilized the Minimum Data Set (MDS) 2.0. The MDS is a comprehensive assessment required by all Medicaid and Medicare certified nursing homes upon nursing home admission, with any changes in status like acute illness, quarterly, and annually. This comprehensive assessment contains information on cognition, function, medical diagnoses, and other domains.<sup>24</sup>

Cases were included if they had a MDS assessment completed within 120 days prior to admission to the hospital; if they had advanced cognitive impairment, defined as a Cognitive Performance Score of 5 (“Severe”) or 6 (“Very Severe”), which is the equivalent of a Mini Mental Status Exam of 5.1 or 0.4 respectively<sup>24</sup>); if they had 4 or more activity of daily living impairments; and if they 66 years and older. Cases were excluded if the length of stay was  $\leq 3$  days, if they did not survive the hospitalization, or if the hospital they were admitted to had  $<5$  cases per hospital year. Hospitalizations with short lengths of stay were excluded given the potential that a specific attending type might be assigned to individuals when a short stay was anticipated.

### Hospice referral

Hospice referral was defined as hospice enrollment within one calendar day after discharge from the hospital. This allowed for the possibility that a referral might be initiated by a physician in the hospital but not placed until after discharge home.

### Physician characteristics

The attending physician type for a hospitalization was determined by classifying Medicare evaluation and management (E&M) codes. We used the E&M codes to determine whether either of the three types of physicians billed for 100% of the days billed with the exception of the admission day. Physician claims logged on the admission day were excluded as some hospitals have on-call medical providers (e.g., moonlighter) admitting patients but not otherwise managing their care. Physicians were classified as general practitioners (i.e., general practitioner, family practitioner, geriatric physician or internal medicine physician that did not meet the proposed criteria of hospitalist), specialists, and hospitalists. Hospitalist were classified as non-specialist billing greater than 90% of their evaluation and management codes in an acute care hospital.<sup>16</sup> These methods have previously been used to classify attending specialty.<sup>25</sup>

Physician continuity was defined as physicians who submitted the hospital bill had also submitted a bill for a given patient in the 120 days prior to the hospital admission. This approach to measuring continuity has been used before in understanding hospitalization in older adults.<sup>26</sup> Physician continuity was further classified as generalist continuity vs. specialist continuity based on the physician type billing in the outpatient and inpatient settings. Continuity could exist for either the hospital attending or consultants who had previously seen the patient.

### Other variables

Information on pre-hospitalization illnesses and illness severity were collected from the MDS: CHES score for predicted mortality in older adults,<sup>27</sup> Cognitive Performance Score, number of ADL impairments, pre-admission presence of do not resuscitate (DNR) and do not hospitalize (DNH) orders, diagnosis including bipolar disorder, schizophrenia, COPD, hip fracture, renal disease, heart failure, diabetes, stroke, Alzheimer’s dementia, aphasia, hemiparesis, paraplegia, pneumonia, disordered chewing and disordered swallowing. For any missing MDS assessments, imputation was used to replace the missing data with the most common value.

## Statistical analysis

Descriptive statistics were used to compare the characteristics of patients hospitalized by each of the three proposed physician groups based on evaluation and management codes. The rates of hospice enrollment were then described for each group and over time.

We then used a multivariate logistic regression model with hospital-level fixed effects to determine the association of physician type and hospice enrollment at the time of hospital discharge, described as our bivariate model. Given the potential confounding from both regional variation in hospice referral<sup>14</sup> and hospital-level differences in patient population, a within-hospital fixed effects as opposed to random or mixed-effects model was used. This fixed effects model allowed us to examine the association of attending physician type with hospice referrals for advanced dementia patients within each hospital controlling for hospital-level confounders that could be correlated with the choice of attending physician. Model 1 additionally adjusts for patient age, race, sex, pre-hospitalization measures of illnesses and illness severity, hospital length of stay and time between the MDS assessment and hospital admission. Model 2 includes the same covariates as Model 1 and additionally adjusts for pre-admission continuity.

As the literature points to temporal increases in hospitalist care in the United States over the study time period, we added an additional model that includes a covariate capturing the hospital-level physician mix. This was defined as the proportion of admissions where the attending was a hospitalist for that calendar year. To specifically assess those hospitals with large shifts in physician types over time, we compare the odds of hospice referral within hospitals that shifted between the lowest vs. highest decile of hospitalist use over the study period.

All analyses were performed in Stata Version 14 software.<sup>28</sup>

## Results

Between 2000 and 2010, there were 128,989 hospitalizations of seriously demented individuals with significant functional impairment from nursing homes in the cohort. Overall mortality in the year post-hospitalization was 66.6% with 10.6% dying during the index hospital admission. Characteristics of the cohort are described in Table 1. The characteristics of patients with generalist, hospitalist and specialist attending physicians were similar with several exceptions. Generalists were the attending for fewer black patients compared to hospitalists and specialists (17.4% vs. 24.4% and 24.9%). Specialists cared for a higher proportion of patients with stroke than generalists and hospitalists (35.8% vs. 33.0% and 33.2%) as well as renal disease (9.0% vs. 6.1% and 6.9%). Generalists had the highest rates of admissions with pre-admission DNR orders, followed by hospitalists, and then specialists (53.9% vs. 49.6% vs. 41.2%). Over time, all physician groups had increasing hospice referral rates from 2.7%, 3.6% and 2.6% in 2000 for generalists, hospitalists, and specialists respectively; to 9.9%, 13.8% and 10.2% in 2010.

Table 2 presents the unadjusted and adjusted results using the multivariate hospital fixed effect model. Our bivariate hospital fixed effect model with only the physician group in

model found that hospitalist had 1.27 times the odds of hospice referral (95% CI 1.19–1.36) compared to non-hospitalists generalists for this cohort of nursing home residents with ACI. There was no significant difference between generalists and specialists in hospice referrals.

In our first model, patient and hospitalization characteristics are adjusted for, as the difference in hospice referral between physician groups that we observe is potentially confounded by sicker patients being triaged to one physician type within the hospital. Despite adjusting for a wide range of pre-admission diagnoses, severity measures, presence of pre-admission orders to limit life sustaining treatment, and admission length of stay the association between hospitalist vs. generalist attending and hospice referral remained statistically significant (OR 1.29, 95% CI 1.20–1.40). There was still no significant difference between specialist and generalist attending physicians.

In Model 2, generalist and specialist pre-admission continuity was added to the model in order to see if the difference between physician groups in hospice referral was explained by the high rates of continuity in the generalist and specialist groups. Both generalist and specialist continuity were still independently associated with lower hospice referrals (OR 0.78, 95% CI 0.73–0.85 and OR 0.83, 95% CI 0.70–0.97). Higher rates of generalist continuity associated with lower hospice referrals partially but did not completely remove the association of hospitalist vs. generalist physicians and hospice referral (OR 1.17, 95% CI 1.09–1.26).

Given the increasing use of hospitalists over time simultaneous to the increasing overall rates of hospice enrollment over time, Model 3 estimates the degree that these time shifts explain the observed differences between physician groups in hospice referral. When hospitals increased their utilization of hospitalists to the highest vs. lowest category of hospitalist prevalence they had significantly greater odds of hospice referrals (OR 1.75, 95% CI 1.50–1.86). For these hospitals with large shifts in physician type, this explained all previously observed differences between hospitalists and generalists in hospice referral but not the observed association of higher continuity with lower hospice referral.

## Discussion

Prior research has demonstrated that physician characteristics are a strongly associated with hospice referral for poor-prognosis cancer patients.<sup>12</sup> Our results add to this literature by demonstrating that while hospice referral for admitted patients with advanced dementia have increased from 2000 to 2010, patients cared for by hospitalists as compared to non-hospitalist generalists are more likely to be referred to hospice. We additionally find that for hospitals that made large shifts in their physician attending types over time, a higher density of hospitalists and lower density of generalists and specialists is associated with higher odds of hospice referral.

The increased likelihood of hospice referral for admissions where hospitalists are the attending physician is encouraging given the growing role of hospitalists in the care of hospitalized older adults. There are several possible hypotheses for this association. First, hospitalists are a new specialty with large numbers of recent residency graduates, and so

efforts to expand palliative education in medical training may be impacting their practice patterns.<sup>29</sup> Second, hospitalists may see an increasingly greater volume of inpatients than generalists and specialists, making them more comfortable with hospital system quality improvement efforts in advance care planning and hospice referral, as demonstrated by the shorter hospital length of stay seen with hospitalist care.<sup>30</sup> Third, the lack of continuity that hospitalists have with patients may increase hospice referral from the hospital, either through improved prognostication,<sup>21</sup> or reduced fears of patient-perceived abandonment.<sup>31</sup> Finally, hospitalists may be utilized in health systems emphasizing hospice as a route to reduce readmissions or inpatient deaths, given growing financial incentives to do so.

We attempted to disentangle these hypotheses in our analysis. We added pre-admission continuity to our model and did show that continuity was associated with lower hospice referrals, which partially explained the difference in hospice referrals between hospitalists and generalists. It is not clear whether this is because of differences in prognostication or whether hospice referral was seen as a disruption in an existing care pattern for physicians with continuity.

In addition, we wished to separate the “herd effects” of specialty at the hospital level. To do this, we compared the hospice referral patterns within hospitals reporting both high and low hospitalist use during different years in the study. We found that for hospitals exhibiting large shifts in physician type, higher reliance on hospitalists (and inversely, lower reliance on generalists and specialists) was associated with greater odds of hospice referral. This indicates that the effects of specialty are from the hospital-level changes in practice and culture as well as individual physician behavior.

It is critical to contextualize the statistically significant differences in hospice referrals by specialty in the overall low hospice referral rates for this ill population. While our cohort had a nearly 70% one-year mortality rate following the admission, the peak hospice referral rate for hospitalists was only 14%. In addition, the differences in hospice referral rates between specialties were dwarfed by the overall increases in hospice referral for all physician types over time.

Through examining specialty as well as continuity, this study has implications for how hospice referrals for high-risk patients might be increased. It is interesting that generalists with continuity were less likely to refer persons to hospice, indicating that the presence of fresh eyes might be important to reevaluate a patients’ clinical course. However, interventions such as electronic medical record triggers or triggered palliative care consults could provide this benefit regardless of attending type. In addition, due to their proximity to medical training as well as their inpatient role, hospitalists may be more aware of efforts to reduce readmissions<sup>32</sup> and have greater exposure to inpatient palliative care teams.<sup>18</sup> Efforts to increase generalist and specialist education around palliative care and collaboration with palliative specialists could mimic some of this exposure and training that hospitalists have.

There are several limitations to this study. Given that our data source is claims data and the MDS assessment, there may be unmeasured differences in the characteristics of patients triaged to a hospitalist vs. generalist vs. specialist services that interviews or chart

abstraction could better assess. While we can measure the association between hospitalists and hospice referral, we cannot assess the underlying mechanism. It will be important to pursue qualitative research that captures the mechanism for this finding if we are to capitalize on the higher referral rates of hospitalists through education, payment or practice structure interventions. Our fixed effects hospital-level analysis reduces confounding by regional hospice or hospital-level characteristics but limits our ability to comment on between-hospital effects, which may alter the association of specialty and referral.

This work contributes an additional example of the role of the physician and health system in determining the care that patients receive at the end of life. Understanding the increasingly common hospitalist role as well as hospital-level factors associated with hospitalist utilization is necessary to understand how we might ensure that the hospice benefit is available for all patients and families who might benefit.

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Conception and design: JT, VM, PG, CA; acquisition of data: VM, JT; analysis and interpretation of data: SM, CA, JT, DM; drafting of the manuscript: CA, JT; critical revision of the manuscript: SM, VM, PG, DM; statistical analysis JM, CA, PG, SM, DM; obtaining funding: JT, PG, VM.

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## References

1. Wright, Aa, Zhang, B., Ray, A., et al. Associations between end-of-life discussions, patient mental health, medical care near death, and caregiver bereavement adjustment. *JAMA*. 2008; 300(14): 1665–1673. DOI: 10.1001/jama.300.14.1665. Associations [PubMed: 18840840]
2. Finlay IG, Higginson IJ, Goodwin DM, et al. Palliative care in hospital, hospice, at home: results from a systematic review. *Ann Oncol*. 2002 Feb; 13(Suppl 4):257–264. DOI: 10.1093/annonc/mdf668 [PubMed: 12401699]
3. Teno JM, Clarridge BR, Casey V, et al. Family perspectives on end-of-life care at the last place of care. *Jama*. 2004; 291(1):88–93. DOI: 10.1001/jama.291.1.88 [PubMed: 14709580]
4. Kiely DK, Givens JL, Shaffer ML, Teno JM, Mitchell SL. Hospice use and outcomes in nursing home residents with advanced dementia. *J Am Geriatr Soc*. 2010; 58(12):2284–2291. DOI: 10.1111/j.1532-5415.2010.03185.x [PubMed: 21143437]
5. Gozalo PL, Teno JM, Mitchell SL, et al. End-of-Life Transitions among Nursing Home Residents with Cognitive Issues. *N Engl J Med*. 2011; 365(13):1212–1221. [PubMed: 21991894]
6. Teno JM, Gozalo PL, Lee IC, et al. Does hospice improve quality of care for persons dying from dementia? *J Am Geriatr Soc*. 2011; 59(8):1531–1536. DOI: 10.1111/j.1532-5415.2011.03505.x [PubMed: 21797834]
7. Casarett D, Van Ness PH, O’Leary JR, Fried TR. Are patient preferences for life-sustaining treatment really a barrier to hospice enrollment for older adults with serious illness? *J Am Geriatr Soc*. 2006; 54(3):472–478. DOI: 10.1111/j.1532-5415.2005.00628.x [PubMed: 16551315]
8. duPreez AE, Smith Ma, Liou J-I, et al. Predictors of hospice utilization among acute stroke patients who died within thirty days. *J Palliat Med*. 2008; 11(9):1249–1257. DOI: 10.1089/jpm.2008.0124 [PubMed: 19021489]

9. Unroe KT, Greiner Ma, Johnson KS, Curtis LH, Setoguchi S. Racial differences in hospice use and patterns of care after enrollment in hospice among Medicare beneficiaries with heart failure. *Am Heart J*. 2012; 163(6):987–993.e3. DOI: 10.1016/j.ahj.2012.03.006 [PubMed: 22709751]
10. Waldrop DP, Meeker MA. Hospice decision making: Diagnosis makes a difference. *Gerontologist*. 2012; 52(5):686–697. DOI: 10.1093/geront/gnr160 [PubMed: 22387234]
11. Keating NL, Herrinton LJ, Zaslavsky AM, Liu L, Ayanian JZ. Variations in hospice use among cancer patients. *J Natl Cancer Inst*. 2006; 98(15):1053–1059. DOI: 10.1093/jnci/djj298 [PubMed: 16882942]
12. Obermeyer Z, Powers BW, Makar M, Keating NL, Cutler DM. Physician Characteristics Strongly Predict Patient Enrollment In Hospice. *Health Aff (Millwood)*. 2015; 34(6):993–1000. DOI: 10.1377/hlthaff.2014.1055 [PubMed: 26056205]
13. Holden TR, Smith Ma, Bartels CM, Campbell TC, Yu M, Kind AJH. Hospice Enrollment, Local Hospice Utilization Patterns, and Rehospitalization in Medicare Patients. *J Palliat Med*. 2015; 18(7):150416140354007.doi: 10.1089/jpm.2014.0395
14. Wang S-Y, Aldridge MD, Gross CP, et al. Geographic Variation of Hospice Use Patterns at the End of Life. *J Palliat Med*. 2015; 18(X):150714123616006.doi: 10.1089/jpm.2014.0425
15. Lamont EB, Christakis Na. Physician factors in the timing of cancer patient referral to hospice palliative care. *Cancer*. 2002; 94(10):2733–2737. DOI: 10.1002/cncr.10530 [PubMed: 12173344]
16. Kuo Y-F, Sharma G, Freeman JL, Goodwin JS. Growth in the care of older patients by hospitalists in the United States. *N Engl J Med*. 2009; 360(11):1102–1112. DOI: 10.1056/NEJMsa0802381 [PubMed: 19279342]
17. White HL, Glazier RH. Do hospitalist physicians improve the quality of inpatient care delivery? A systematic review of process, efficiency and outcome measures. *BMC Med*. 2011; 9(1):58.doi: 10.1186/1741-7015-9-58 [PubMed: 21592322]
18. Muir JC, Arnold RM. Palliative care and the hospitalist: An opportunity for cross-fertilization. *Dm Dis*. 2002; 48(4):207–216. DOI: 10.1016/S0002-9343(01)00963-9
19. Mitchell SL, Teno JM, Kiely DK, et al. The Clinical Course of Advanced Dementia. *N Engl J Med*. 2009; 361(16):1045–1057. DOI: 10.1056/NEJMoa0810625 [PubMed: 19717846]
20. Mitchell SL, Kiely DK, Hamel MB. Dying with advanced dementia in the nursing home. *Arch Intern Med*. 2004; 164(3):321–326. DOI: 10.1001/archinte.164.3.321 [PubMed: 14769629]
21. Christakis NA, Lamont EB. Extent and determinants of error in physicians' prognoses in terminally ill patients: prospective cohort study. *West J Med*. 2000; 172(5):310–313. DOI: 10.1136/ewj.172.5.310 [PubMed: 18751282]
22. Mainous AG III, Baker R, Love MM, Gray DP, Gill JM. Continuity of care and trust in one's physician: evidence from primary care in the United States and the United Kingdom. *Fam Med*. 2001; 33(January):22–27. [PubMed: 11199905]
23. Sharma G, Freeman J, Zhang D, Goodwin JS. Continuity of care and ICU utilization during end of life. *Arch Intern Med*. 2009; 169(1):81–86. DOI: 10.1001/archinternmed.2008.514.Continuity [PubMed: 19139328]
24. Morris JN, Fries BE, Mehr DR, et al. MDS Cognitive Performance Scale. *J Gerontol*. 1994; 49(4):M174–M182. DOI: 10.1093/geronj/49.4.M174 [PubMed: 8014392]
25. Teno J, Meltzer DO, Mitchell SL, Fulton AT, Gozalo P, Mor V. Type of attending physician influenced feeding tube insertions for hospitalized elderly people with severe dementia. *Health Aff*. 2014; 33(4):675–682. DOI: 10.1377/hlthaff.2013.1248
26. Sharma G, Fletcher KE, Zhang D, Freeman JL, Goodwin JS. Continuity of outpatient and inpatient care for hospitalized older adults. *JAMA*. 2009; 301(16):1671–1680. DOI: 10.1001/jama.2009.517.Continuity [PubMed: 19383958]
27. Hirdes JP, Frijters DH, Teare GF. The MDS-CHESS Scale: A New Measure to Predict Mortality in Institutionalized Older People. 2003:96–100.
28. StataCorp. *Stata Statistical Software: Release 14*. 2015
29. Harbuck, Stacie, Follmer, Amy, Dill, Michael, Erikson, C. Estimating the number and characteristics of hospitalist physicians in the US and their possible workforce implications. *Aamc*. 2012; 48(12):668.doi: 10.1049/el.2012.1827



30. Rifkin WD, Holmboe E, Scherer H, Sierra H. Comparison of hospitalists and nonhospitalists in inpatient length of stay adjusting for patient and physician characteristics. *J Gen Intern Med.* 2004; 19(11):1127–1132. DOI: 10.1111/j.1525-1497.2004.1930415.x [PubMed: 15566442]
31. Back AL, Young JP, Mccown E, et al. Abandonment at the end of life from a patient and clinician perspective. *Arch Intern Med.* 2010; 169(5):474–479. DOI: 10.1001/archinternmed.2008.583.Abandonment
32. Koekkoek D, Bayley KB, Brown A, Rustvold DL. Hospitalists assess the causes of early hospital readmissions. *J Hosp Med.* 2011; 6(7):383–388. DOI: 10.1002/jhm.909 [PubMed: 21915999]
33. Morrison RS, Maroney-Galin C, Kralovec PD, Meier DE. The growth of palliative care programs in United States hospitals. *J Palliat Med.* 2005; 8(6):1127–1134. DOI: 10.1089/jpm.2005.8.1127 [PubMed: 16351525]

**Table 1**

Characteristics of Hospitalized Nursing Home Residents with Advanced Dementia, 2000–2010

	Attending physician type:		
	Generalist n=78,422	Hospitalist n=38,731	Specialist n=11,836
<i>Patient characteristics:</i>			
Male, %	29.14	27.88	31.51
Age, mean $\pm$ SD	83.78 $\pm$ 7.52	83.56 $\pm$ 7.63	82.97 $\pm$ 7.83
Race, %			
White	78.68	69.94	68.13
Black	17.39	24.37	24.90
Other	3.93	5.69	6.97
<i>Illness Characteristics:</i>			
Functional impairment, mean $\pm$ SD	25.00 $\pm$ 3.55	24.87 $\pm$ 3.59	25.10 $\pm$ 3.58
Pre-admission CHESS, mean $\pm$ SD	.80 $\pm$ 1.01	0.75 $\pm$ 0.97	0.82 $\pm$ 1.03
CPS Score = 6, %	58.9	30.1	11.0
Pre-admission diagnoses, %			
Cancer	5.84	5.59	6.64
CHF	23.41	22.78	23.83
Diabetes	30.68	33.46	33.71
Pneumonia	10.79	11.14	13.31
Hip fracture	5.38	5.26	4.37
CVA/stroke	32.96	33.19	35.76
Schizophrenia	2.71	3.25	2.40
Renal disease	6.11	6.91	9.04
Parkinson's disease	10.15	9.14	9.32
Alzheimer's disease	33.85	31.96	27.11
Bipolar disease	1.55	1.78	1.27
COPD	15.25	15.53	16.94
Paraplegia	14.28	14.79	16.63
Hemiplegia	0.24	0.19	0.35
Aphasia	13.57	13.57	13.39
Pre-admission goals of care, %			
DNR	53.89	49.62	41.17
DNH	1.41	1.48	1.16
<i>Hospitalization characteristics:</i>			
Generalist continuity, %	62.10	24.91	1.97
Specialist continuity, %	1.84	1.72	32.04
Hospice discharge, %	5.36	7.51	5.56

Source: Medicare fee-for-service claims data, 2000–2010.

Notes: \*mean (standard deviation). ADL is Activities of Daily Living, as measured by the Late Loss Activities of Daily Living Scale, CHESS is Changes in Health, End-Stage Disease, Signs and Symptoms Scale, CPS is Cognitive Performance Scale, CHF is congestive heart failure, COPD is

chronic obstructive pulmonary disease, DNR is do not resuscitate order in place, DNH is do not hospitalize order in place. This sample is limited to those included in the regression model: hospital length of stay  $\geq 3$  days, did not die in the hospital.

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**Table 2**

Within Hospital Fixed Effects Association of Hospice Referral and Physician Type During Hospitalizations of Nursing Home Residents with Advanced Dementia, 2000–2010

	<b>Bivariate models, OR (95% CI)</b>	<b>Model 1: Adjusting for patient characteristics and physician type</b>	<b>Model 2: Adjusting for all + pre-admission continuity</b>	<b>Model 3: Adjusting for all + % hospital admissions cared for by hospitalist</b>
<i>Physician Type:</i>				
Generalist	(reference)	(reference)	(reference)	(reference)
Hospitalist	1.27 (1.19–1.36) *	1.29 (1.20–1.40) *	1.17 (1.09–1.26) *	0.97 (0.89–1.06)
Specialist	1.01 (0.92–1.13)	1.06 (0.94–1.19)	0.98 (0.89–1.11)	0.97 (0.86–1.09)
<i>Pre-admission continuity:</i>				
Generalist continuity	–	–	0.78 (0.73–0.85) *	0.78 (0.73–0.84) *
Specialist continuity	–	–	0.83 (0.70–0.97) *	0.83 (0.70–0.97) *
Highest vs. lowest decile of hospitalist prevalence	–	–	–	1.75 (1.50–1.86) *

Data source: Medicare claims data. All models adjusted for: DNR/DNH orders, ADL, cognitive performance scale, CHES score, age, race, pre-admit diagnoses including Parkinson's, bipolar disease, schizophrenia, COPD, Alzheimer's, renal failure, hip fracture, pneumonia, length of stay, time between admission and minimum data set assessment. Models 2 and 3 additionally adjust for if a billing generalist or specialist for the admission had billed a patient visit prior to the admission. Model 3 additionally adjusts for the % of hospital admissions cared for by hospitalists for a hospital, measured in deciles of all US hospitals sampled.

\* p-value<0.05