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**Title:** Association of physician specialty with hospice referral for hospitalized nursing home patients with advanced dementia.

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## Physician characteristics and hospice referral

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### 53 **Abstract:**

54 Background/Objectives: Hospitalists hospice referral patterns have been unstudied. This study  
55 aims to examine hospice referral rates by attending type for hospitalized nursing home (NH)  
56 residents with advanced cognitive impairment (ACI) at the time of discharge between 2000 and  
57 2010.

58 Design: Retrospective cohort study.

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

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

68 Results: Of the 105,329 hospitalized patients with ACI that survived to discharge (72.3% white,  
69 30.6% male), the hospice referral rate at the time of hospital discharge increased from 2.8% in  
70 2000 to 11.2% in 2010. Using a multivariate, hospital fixed effects model examining changes in  
71 the distribution of inpatient attending physicians, hospitalists compared to generalist physicians  
72 were more likely to refer these patients to hospice at discharge (AOR 1.17, 95% CI 1.09-1.26).  
73 Continuity of physician care from the outpatient setting to the hospital was associated with lower  
74 hospice referral (AOR 0.78, 95% CI 0.73-0.85).

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

78

### 79 Introduction:

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

85 Despite the benefits of hospice care, there is significant variation in who is enrolled in  
86 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>  
87 and socioeconomic status<sup>11</sup> contribute to hospice enrollment, as do health care system  
88 characteristics such as nonprofit status,<sup>12</sup> health maintenance organization (HMO)  
89 membership,<sup>8</sup> and region.<sup>11,13,14</sup> Physician characteristics are a major predictor of hospice  
90 enrollment, with physician race and age associated with hospice referral.<sup>14,15</sup> In a recent study  
91 in oncology patients with a poor prognosis, past oncologist hospice referral rates was

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92 demonstrated to be the strongest determinant of hospice referral among many patient and  
93 physician characteristics.<sup>12</sup>

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

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

### 106 **Methods:**

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

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

123         Hospice referral:

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

127 Physician characteristics:

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

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

145 Other variables:

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

154 Statistical analysis:

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

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

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

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

177

### 178 **Results:**

179 Between 2000 and 2010, there were 128,989 hospitalizations of seriously demented  
180 individuals with significant functional impairment from nursing homes in the cohort. Overall  
181 mortality in the year post-hospitalization was 66.6% with 10.6% dying during the index hospital  
182 admission. Characteristics of the cohort are described in Table 1. The characteristics of  
183 patients with generalist, hospitalist and specialist attending physicians were similar with several  
184 exceptions. Generalists were the attending for fewer black patients compared to hospitalists  
185 and specialists (17.4% vs. 24.4% and 24.9%). Specialists cared for a higher proportion of  
186 patients with stroke than generalists and hospitalists (35.8% vs. 33.0% and 33.2%) as well as  
187 renal disease (9.0% vs. 6.1% and 6.9%). Generalists had the highest rates of admissions with  
188 pre-admission DNR orders, followed by hospitalists, and then specialists (53.9% vs. 49.6% vs.  
189 41.2%). Over time, all physician groups had increasing hospice referral rates from 2.7%, 3.6%

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190 and 2.6% in 2000 for generalists, hospitalists, and specialists respectively; to 9.9%, 13.8% and  
191 10.2% in 2010.

192 Table 2 presents the unadjusted and adjusted results using the multivariate hospital  
193 fixed effect model. Our bivariate hospital fixed effect model with only the physician group in  
194 model found that hospitalist had 1.27 times the odds of hospice referral (95% CI 1.19-1.36)  
195 compared to non-hospitalists generalists for this cohort of nursing home residents with ACI.  
196 There was no significant difference between generalists and specialists in hospice referrals.

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

205 In Model 2, generalist and specialist pre-admission continuity was added to the model in  
206 order to see if the difference between physician groups in hospice referral was explained by the  
207 high rates of continuity in the generalist and specialist groups. Both generalist and specialist  
208 continuity were still independently associated with lower hospice referrals (OR 0.78, 95% CI  
209 0.73-0.85 and OR 0.83, 95% CI 0.70-0.97). Higher rates of generalist continuity associated with  
210 lower hospice referrals partially but did not completely remove the association of hospitalist vs.  
211 generalist physicians and hospice referral (OR 1.17, 95% CI 1.09-1.26).

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

220

221 **Discussion:**

## Physician characteristics and hospice referral

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

230 The increased likelihood of hospice referral for admissions where hospitalists are the  
231 attending physician is encouraging given the growing role of hospitalists in the care of  
232 hospitalized older adults. There are several possible hypotheses for this association. First,  
233 hospitalists are a new specialty with large numbers of recent residency graduates, and so  
234 efforts to expand palliative education in medical training may be impacting their practice  
235 patterns.<sup>29</sup> Second, hospitalists may see an increasingly greater volume of inpatients than  
236 generalists and specialists, making them more comfortable with hospital system quality  
237 improvement efforts in advance care planning and hospice referral, as demonstrated by the  
238 shorter hospital length of stay seen with hospitalist care.<sup>30</sup> Third, the lack of continuity that  
239 hospitalists have with patients may increase hospice referral from the hospital, either through  
240 improved prognostication,<sup>21</sup> or reduced fears of patient-perceived abandonment.<sup>31</sup> Finally,  
241 hospitalists may be utilized in health systems emphasizing hospice as a route to reduce  
242 readmissions or inpatient deaths, given growing financial incentives to do so.

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

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



## Physician characteristics and hospice referral

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

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

272 There are several limitations to this study. Given that our data source is claims data and  
273 the MDS assessment, there may be unmeasured differences in the characteristics of patients  
274 triaged to a hospitalist vs. generalist vs. specialist services that interviews or chart abstraction  
275 could better assess. While we can measure the association between hospitalists and hospice  
276 referral, we cannot assess the underlying mechanism. It will be important to pursue qualitative  
277 research that captures the mechanism for this finding if we are to capitalize on the higher  
278 referral rates of hospitalists through education, payment or practice structure interventions. Our  
279 fixed effects hospital-level analysis reduces confounding by regional hospice or hospital-level  
280 characteristics but limits our ability to comment on between-hospital effects, which may alter the  
281 association of specialty and referral.

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

287

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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 $\geq$ 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, %			

## Physician characteristics and hospice referral

DNR	53.89	49.62	41.17
DNH	1.41	1.48	1.16

### *Hospitalization characteristics:*

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, CHES 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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	Bivariate models, OR (95% CI)	Model 1: Adjusting for patient characteristics and physician type	Model 2: Adjusting for all + pre-admission continuity	Model 3: Adjusting for all + % hospital admissions cared for by hospitalist
<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	--	--	--	1.75 (1.50-1.86)*



## Physician characteristics and hospice referral

hospitalist prevalence				
<p>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&lt;0.05</p>				

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