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Physician Characteristics Strongly Predict Patient Enrollment In Hospice

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ABSTRACT Individual physicians are widely believed to play a large role in patients' decisions about end-of-life care, but little empirical evidence supports this view. We developed a novel method for measuring the relationship between physician characteristics and hospice enrollment, in a nationally representative sample of Medicare patients. We focused on patients who died with a diagnosis of poor-prognosis cancer in the period 2006–11, for whom palliative treatment and hospice would be considered the standard of care. We found that the proportion of a physician's patients who were enrolled in hospice was a strong predictor of whether or not that physician's other patients would enroll in hospice. The magnitude of this association was larger than that of other known predictors of hospice enrollment that we examined, including patients' medical comorbidity, age, race, and sex. Patients cared for by medical oncologists and those cared for in not-for-profit hospitals were significantly more likely than other patients to enroll in hospice. These findings suggest that physician characteristics are among the strongest predictors of whether a patient receives hospice care—which mounting evidence indicates can improve care quality and reduce costs. Interventions geared toward physicians, both by specialty and by previous history of patients' hospice enrollment, may help optimize appropriate hospice use.

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There is increasing evidence that hospice care addresses patients' needs and preferences at the end of life, improves care experiences for both patients and caregivers, is associated with decreased health care costs, and even prolongs survival in some populations.[1–4] Although hospice use has grown over the past decades, there is substantial variation in use among patients with similar diagnoses and indications.[2] Many experts and policy makers believe that hospice remains underused.[2,5–7]

A variety of factors are known to predict whether or not patients will enroll in hospice. These include demographic factors such as sex,[6] race,[6,8,9] and age;[8–10] geographical factors;[8,10,11] and health system factors such as the number of physicians and the availability of hospice beds.[12–15] However, these factors collectively explain only 10 percent of observed variation in hospice use and end-of-life care patterns.[14,15] Furthermore, the available data indicate that patients' preferences for the intensity and nature of services have little correlation with the use of hospice care.[12,16–18] This means that most of the variation in this important aspect of care delivery, quality, and Medicare costs remains unaccounted for.

Many researchers and policy makers believe that individual physicians matter a great deal in shaping their patients' choices regarding end-of-life care. While this view seems intuitive, it has been difficult to substantiate empirically. Small survey-based studies have shown correlations between physician specialty, board certification, and beliefs about hospice with patients' decisions about hospice.[19–21] However, the generalizability of these results to outcomes at the national level is unknown.

A study in a large integrated health system found that the health center where patients received their care was significantly associated with their likelihood of receiving hospice care. The contribution of the individual physician was less clear.[22]

In this study we developed a novel method for measuring how individual physicians affect their patients' hospice enrollment, in a large nationally representative sample of Medicare beneficiaries. We studied patients with poor-prognosis cancers—for example, primary tumors with poor prognoses such as those originating in the lung, pancreas, or brain; certain hematologic malignancies; and metastatic disease—to focus on people for whom palliative treatment and hospice would be considered the standard of care.

We quantified the relationship between physician characteristics and patients' hospice enrollment using logistic regression, adjusting for a range of other factors known to affect hospice use: physician specialty; patients' age, sex, race, and comorbidity; geographic region; and year. We also explored the association of hospice enrollment with the profit status of hospitals with which physicians were associated.

Study Data And Methods

STUDY COHORT Using a nationally representative 20 percent sample of Medicare fee-for-service beneficiaries in the continental United States, we identified people who died in the period 2006–11 after a poor-prognosis cancer diagnosis and who had at least one year of claims data ($N = 198,948$). To identify poor-prognosis cancers, we adapted a palliative care screening instrument used at a major US cancer center. The diagnoses used in the algorithm were developed by clinicians treating a wide range of cancer patients to identify those with poor prognoses and lack of options for curative treatments. We further restricted our study population to patients with diagnostic codes observed to have high mortality rates in the year after diagnosis, calculated using previous years of Medicare data. A detailed description of the creation of the study cohort is available in the online Appendix.[23]

PHYSICIAN CHARACTERISTICS To quantify the impact of physician characteristics and physician-level variability on hospice enrollment, we constructed a measure of an individual patient's likelihood to enroll in hospice if he or she were under treatment by a given physician. This was accomplished by calculating the fraction of a physician's patients with poor-prognosis cancer enrolled in hospice and then evaluating the impact of this measure on a patient's likelihood of enrolling in hospice (see the analysis below).

We excluded physicians who treated fewer than three poor-prognosis cancer patients, and we conducted a sensitivity analysis that excluded physicians who treated five or fewer patients. We also evaluated the impact of additional physician-level variables, such as physician specialty and the profit status of the physician's primary hospital, on patients' hospice enrollment.

ATTRIBUTION OF PATIENTS TO PHYSICIANS We identified all face-to-face encounters in which a patient in our sample received care for his or her poor-prognosis cancer, and we attributed each patient to the physician involved in the highest number of those encounters. We also explored two alternative methods for attributing patients to physicians: using the first or the last physician who treated the patient for his or her poor-prognosis cancer. More details are in the online Appendix.[23]

ANALYSIS Our primary outcome, hospice enrollment, was ascertained based on at least one claim for hospice care. Using logistic regression, we modeled hospice enrollment as a function of the fraction of a physician's patients with poor-prognosis cancer enrolled in hospice; patients' age, sex, race, and comorbidity;[24] physician specialty; profit status of the physician's primary hospital; year; and hospital referral region. To avoid endogeneity when predicting a given patient's hospice enrollment, we removed that patient from the calculation of the fraction of a physician's patients with poor-prognosis cancer enrolled in hospice. Standard errors were clustered at the level of the individual physician.

We conducted additional analyses to estimate the amount of variance in the likelihood of hospice enrollment that was explained by individual predictors. This kind of exercise is straightforward when explaining variance in continuous variables (for example, cost, utilization, or proportion of patients using hospice), but it is more difficult with binary variables (such as individual-level hospice enrollment).[25]

We simulated the effect of a given beneficiary's hypothetical movement from the lowest to the highest decile of continuous variables (the fraction of a physician's patients with poor-prognosis cancer enrolled in hospice and patients' comorbidity and age) or moving between categories of binary variables (patients' sex and race

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and the facility's profit status), holding all other factors constant. Recording the resulting mean variation in likelihood of hospice enrollment in this population allowed us to quantify and compare the explanatory power of key individual variables.

LIMITATIONS Several limitations in our study warrant mention. Our study used fee-for-service Medicare claims data to identify patients who died after receiving specific cancer diagnoses. This allowed us to investigate care patterns in people with poor-prognosis cancer who would be suitable candidates for hospice. However, Medicare data have important limitations in this regard, which could have biased our results. For example, if patients with more or less severe disease clustered in the practices of certain doctors, hospice enrollment patterns would differ because of patient factors, not physician factors.

This is just one of the many potential biases that can affect the validity of retrospective studies of end-of-life care for cancer patients, leading to questions regarding the validity of this approach.[26] To reduce the risk that such biases would influence our results, our inclusion criteria were designed based on a limited set of *International Classification of Diseases*, Ninth Revision (ICD-9), codes (for a complete list of ICD-9 codes used, see the online Appendix)[23] that identified patients with known severe disease.[27]

We verified that this method did identify high-mortality subgroups by applying it to a year of claims data, without first restricting the sample to beneficiaries who died. We calculated one-year mortality rates among patients with these ICD-9 codes and found the overall mortality rate to be high (46 percent). This suggests that we did identify patients with prospectively evident poor-prognosis cancers. However, we cannot say for certain that we identified such patients in our own study cohort.

More broadly, this study was observational, meaning that it could quantify associations but not infer causality. If unmeasured variables caused both hospice enrollment and treatment by a given physician, we could have over- or underestimated the true effect of physician characteristics on patient hospice enrollment.

For example, if patients shopped for physicians based on shared preferences regarding care intensity, we would have overestimated the impact on hospice enrollment attributable to the physician (just as that would have been the case if patients with lower rates of mortality clustered within specific physician practices). Our sensitivity analyses with alternative attribution methods—particularly the analysis using the first physician to treat each patient for his or her poor-prognosis cancer, since initial assignment to a physician unknown to the patient is unlikely to reflect shared preferences—were attempts to address this possibility.

Furthermore, we included variables such as age, comorbidity, race, sex, and geographic region in our analysis. However, we were unable to include other factors that might affect hospice use but that cannot be measured with Medicare claims data: patients' preferences, physicians' beliefs, or various supply-side factors such as geographic access to hospice or other palliative care interventions.

Data on physician specialty from self-reports or claims may not have accurately reflected the physician's residency training or board certification.

Finally, our results are not generalizable outside the defined study population of Medicare fee-for-service beneficiaries with poor-prognosis cancers.

Study Results

PATIENT CHARACTERISTICS Our study cohort of 198,948 patients with poor-prognosis cancers had a mean age of seventy-eight; 88 percent were white, and 52 percent were men. The 131,757 patients (66 percent) enrolled in hospice were older, were more likely to be female and more likely to be white, and lived in ZIP codes with higher median incomes, compared to the patients not enrolled in hospice.

Use of inpatient, emergency, and home health services did not differ between the two groups. However, patients enrolled in hospice had slightly more clinic visits during the year before hospice enrollment than patients not enrolled had over a similar period before death. Patients in the two groups had the same median comorbidity scores, reflecting a similar burden of disease. A full description of the study cohort is available in the online Appendix.[23]

PHYSICIAN CHARACTERISTICS We identified 70,073 physicians who cared for patients with poor-prognosis cancers. Patient load was concentrated among a relatively small pool of physicians: The top 10 percent of physicians cared for 47 percent of all patients in the study. Patient load also varied by specialty: Medical and radiation oncologists cared for an average of fifteen and seventeen patients, respectively, while internists, other medical specialists, and surgeons cared for three to five patients, on average. Thus, medical and radiation oncologists made up only 19 percent of the physicians in our cohort, but they cared for 57 percent of all patients with poor-prognosis cancer and accounted for 77 percent of all poor-prognosis cancer encounters.

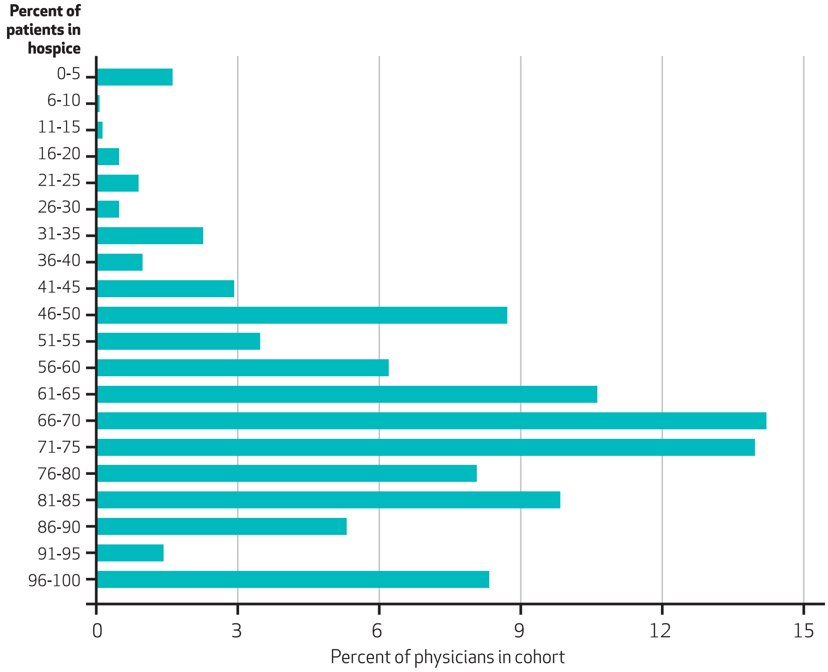
The fraction of a physician's patients with poor-prognosis cancer enrolled in hospice varied greatly across physicians. For example, 1.6 percent of physicians had fewer than 5 percent of their poor-prognosis cancer patients enrolled in hospice, while 8.3 percent of physicians had more than 95 percent of their patients enrolled (Exhibit 1).

Results were similar for both alternative attribution strategies. More detailed information on physicians is available in the online Appendix.[23]

IMPACT OF PHYSICIAN AND PATIENT CHARACTERISTICS ON HOSPICE ENROLLMENT After we assigned patients to the physicians who saw them most frequently for poor-prognosis cancer care, we found that several factors were significantly associated with patients' hospice enrollment. There was substantial variation in hospice use among hospital referral regions, but no clear regional patterns (for data on hospital referral regions, see the online Appendix).[23] The likelihood of hospice enrollment generally increased over time (Exhibit 2). After we adjusted for geographical and temporal factors, we found that greater medical comorbidity, older age, female sex, and white race were associated with hospice enrollment.

EXHIBIT 1

Variation In The Percentage Of A Physician's Patients With Poor-Prognosis Cancer Enrolled In Hospice Before Death, 2006–11



SOURCE Authors' analysis of a 20 percent sample of Medicare fee-for-service beneficiaries.

Patients treated by physicians with claims predominantly linked to not-for-profit hospitals were significantly more likely to enroll in hospice, compared to patients treated by physicians linked to for-profit facilities (Exhibit 2). The specialty of a patient's attributed physician was also significantly associated with the patient's hospice enrollment: Compared to patients attributed to medical oncologists, patients attributed to internists or family practitioners, medical subspecialists, or surgeons were significantly less likely to enroll in hospice. The fraction of a physician's patients with poor-prognosis cancer enrolled in hospice was also significantly associated with hospice enrollment.

We compared the amount of variance in the likelihood of hospice enrollment explained by physician characteristics (Exhibit 3). Moving from the lowest to the highest decile of the fraction of a physician's patients with poor-prognosis cancer enrolled in hospice would have increased the mean likelihood of hospice enrollment from 0.58 to 0.73 in our study cohort—a 27 percent relative increase. This effect was greater than the effects of other predictors of enrollment.

SENSITIVITY ANALYSIS When we used alternative patient attribution strategies, the fraction of a physician's patients with poor-prognosis cancer enrolled in hospice remained significantly and strongly associated with hospice enrollment by that physician's other patients. The magnitude of the association was smaller in the model that used the first physician to treat the patient for poor-prognosis cancer (odds ratio: 2.26; 95% confidence interval: 2.1, 2.38) than in the primary analysis (OR: 2.67; 95% CI: 2.53, 2.82). In contrast, the magnitude was larger in the model that used the last physician (OR: 2.81; 95% CI: 2.67, 2.96) and when we restricted the analysis to physicians who saw more than five poor-prognosis patients (OR: 4.16; 95% CI: 3.87, 4.48). For complete results, see the online Appendix.[23]

EXHIBIT 2

Associations Between Patient And Physician Characteristics And Enrollment In Hospice By Patients With A Poor-Prognosis Cancer Diagnosis Who Died In 2006–11

	Odds ratio	95% CI
PATIENT CHARACTERISTICS		
Age[a]	1.02	(1.02, 1.02)
Male sex	0.77	(0.75, 0.78)
White race	1.42	(1.38, 1.47)
Comorbidity[b]	1.03	(1.03, 1.04)
PHYSICIAN CHARACTERISTICS		
Facility for-profit status[c]	0.93	(0.90, 0.96)
Physician specialty[d]		
Medical oncology	1.00	—[e]
Internal or family medicine	0.90	(0.88, 0.93)
Medical subspecialty	0.77	(0.75, 0.80)
Other	0.96	(0.87, 1.05)
Radiation oncology	0.97	(0.94, 1.00)
Surgery (general or subspecialty)	0.72	(0.69, 0.75)
Fraction of patients with poor-prognosis cancer enrolled in hospice	2.67	(2.53, 2.82)
YEAR AT THE TIME OF ENROLLMENT OR DEATH		
2007	1.00	—[e]
2008	1.01	(0.98, 1.04)
2009	1.06	(1.03, 1.10)
2010	1.11	(1.07, 1.14)
2011	1.04	(1.01, 1.07)

SOURCE Authors' analysis of a 20 percent sample of Medicare fee-for-service beneficiaries. **NOTES** Odds ratios of less than 1 mean a negative relationship, and odds ratios of more than 1 mean a positive relationship, between the variable and the outcome (a patient's likelihood of enrolling in hospice). Hospital referral region was controlled for in the analysis but not presented in this exhibit. For a version of the exhibit with that variable, see the Appendix (see Note 23 in text). CI is confidence interval. [a]Patient's age at the time of hospice enrollment or death. [b]Patient's Gagne comorbidity score (see Note 24 in text). [c]Profit status of a physician's affiliated hospital. [d]The taxonomy used to classify physician specialty is described in the online Appendix. [e]Not applicable, reference category.

EXHIBIT 3

Simulated Impacts Of Patient And Physician Characteristics On Enrollment In Hospice By Patients With A Poor-Prognosis Cancer Diagnosis Who Died In 2006–11

	Likelihood of enrollment with:			
Characteristic	Lowest decile of characteristic or absence of risk factor	Highest decile of characteristic or presence of risk factor	Change in likelihood (%)	95% CI
PATIENT				
Male sex	0.69	0.64	−8.39	(−8.40, −8.38)
White race	0.59	0.67	13.88	(13.86, 13.89)
Age[a]	0.62	0.71	15.95	(15.93, 15.98)
Comorbidity[b]	0.62	0.71	15.33	(15.31, 15.36)
PHYSICIAN				
Facility profit status[c]	0.66	0.65	−2.47	(−2.48, −2.47)
Fraction of patients with poor-prognosis cancer enrolled in hospice	0.58	0.73	26.79	(26.75, 26.82)

SOURCE Authors' analysis of a 20 percent sample of Medicare fee-for-service beneficiaries. **NOTES** The exhibit shows simulated changes in key variables, holding all other factors constant. For example, moving from the absence of the risk factor "male sex" to its presence meant an 8.39 percent decrease in the likelihood of enrollment. Similarly, moving from the lowest decile of age to the highest decile meant a 15.95 percent increase in the likelihood of enrollment. Physician specialty, hospital referral region, and year were controlled for in the analysis but are not presented in this exhibit. CI is confidence interval. [a]Patient's age at the time of hospice enrollment or death. [b]Patient's Gagne comorbidity score (see Note 24 in text). [c]Profit status of a physician's affiliated hospital.

Discussion

Despite growing evidence that hospice can improve care quality and reduce costs,[1–4] hospice use among patients with poor-prognosis illness remains suboptimal. We found that physician-level characteristics strongly predicted patients' enrollment in hospice, in a large, nationally representative sample of Medicare beneficiaries with poor-prognosis cancers. The magnitude of this effect was larger than other measured predictors of hospice enrollment, including patients' age, race, sex, and medical comorbidity. This finding was robust to several different methods of attributing patients to physicians.

The physician-level variation that we observed could have several sources. For example, existing research suggests that physicians' preferences[18] and practice settings[28] both have a significant impact on patients' enrollment in hospice.

Together with the findings of other studies,[14,17,18] our results demonstrate that which physician a patient sees is one of the most important predictors of whether or not he or she enrolls in hospice. This has important implications for the development of policies to advance high-quality end-of-life care. Structural changes to Medicare's criteria for hospice eligibility could increase the use of hospice,[29] but those changes might be insufficient without concurrent efforts to change physicians' behavior. This would require concerted efforts by the payers, providers, and professional societies most involved with the care of patients with advanced illness.

In our study, large numbers of patients with poor-prognosis cancers were concentrated in a relatively small pool of physicians, the top 10 percent of whom saw nearly half of all patients. This suggests that focused interventions to improve care among high-volume providers could have a major impact.

Focused interventions to improve care among high-volume providers could have a major impact.

Such interventions can be grouped into three categories. First, efforts to improve training in end-of-life care are needed in residency and fellowship programs for physicians who will care for large numbers of poor-prognosis patients (for example, medical oncologists and physicians specializing in nephrology and cardiology). This is particularly important given the known deficiencies in current educational curricula.[30]

Second, improved measurement of the quality of end-of-life care could help incentivize provider behavior change. The American Society for Clinical Oncology's Quality Oncology Practice Initiative[31] measures hospice use at the practice level and is one example of how professional societies can define standards to promote quality improvement.

A related point is that payers should identify and remove any existing elements of quality measures or payment structures that could represent disincentives for discussions about end-of-life care. This would give physicians—regardless of their personal beliefs—more incentive to engage in discussions about hospice care. The public reporting of metrics on end-of-life care could allow patients and caregivers to choose providers whose beliefs and preferences are consistent with their own when deciding on cancer-directed treatment before death is imminent.

Our sensitivity analysis showed that hospice enrollment was more strongly associated with the characteristics of patients' last physician than with those of their first physician (OR: 2.94 and 2.35, respectively). This may indicate that, over time, patients gravitate toward providers whose practices match their own preferences.

Third, payers and providers could deploy interventions to increase rates of hospice use among specific physicians who underuse hospice, as measured by mean hospice days per patient or fraction of poor-prognosis patients enrolled in hospice. Implementation of provisions of the Affordable Care Act such as those related to accountable care organizations is likely to provide incentives for such population health management strategies.

Few validated interventions exist, however, and previous efforts to improve joint physician-patient decision making for seriously ill patients have produced mixed results. For example, the Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatment (SUPPORT) randomized trial found no effect of integrating specially trained nurses into discussions of end-of-life care.[32] A more encouraging trial demonstrated that identifying eligible nursing home patients and asking their providers to discuss hospice care increased the patients' use of hospice.[33]

More research on effective interventions to increase the uptake of hospice use in real practice environments is needed. So are improved predictive analytic methods for identifying patients with poor prognoses, using the limited administrative data sets that are available to most payers and providers.

The specialty of a patient's physician played a key role in the patient's decision to enroll in hospice: Patients cared for by medical oncologists were significantly more likely than patients of other physicians were to enroll in hospice. These findings have several possible interpretations: Compared to other providers, oncologists may make better prognostic estimates, or they may be more comfortable with or effective in discussing hospice care with patients. In addition, these results could be due to the environment in which specialists practice: Again compared to other providers, oncologists may be more likely to work in practices featuring established relationships with hospice providers. Overall, our results demonstrate the need to concentrate care in high-volume, high-quality centers.[34]

We also found that being treated by a physician affiliated with a not-for-profit hospital was associated with a small but significant increase in the likelihood of hospice enrollment. Supply-side factors and system-level characteristics have been shown to affect hospice enrollment,[8,11,13,21] and we believe that this correlation reflects similar factors. Previous research has found that not-for-profit hospitals are more likely than others to have palliative care and hospice programs.[28,35] Also, patients who do not enroll in hospice receive more end-of-life care than hospice enrollees receive,[4] which generates additional revenue that may be particularly appealing to for-profit hospitals.

Conclusion

Continued development and evaluation of programs that target providers and clinical decision making will be necessary to improve decision making about hospice and end-of-life care in general. Given mounting evidence that hospice and palliative care improve quality and reduce costs, we hope that payers and provider organizations will prioritize the development and testing of new provider-oriented models to improve the uptake of high-quality end-of-life care. ■

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23 To access the Appendix, click on the Appendix link in the box to the right of the article online.

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