Racial and Ethnic Disparity in Palliative Care and Hospice Use

Tricia Johnson, PhD; Surrey Walton, PhD; Stacie Levine, MD; Erik Fister, MA; Aliza Baron, MA; and Sean O'Mahony, MB, BCh, BAO

Multiple studies have shown that hospitals with inpatient palliative medicine consultation teams reduce direct costs,[1-6] decrease intensive care unit utilization,[3-5,7] and improve quality of care.[7-9] In addition, patients who receive an inpatient palliative care consultation are more likely to be referred to and enroll in hospice care.[3,10,11] Despite recent evidence that hospice use among racial and ethnic minorities has increased, racial disparities in palliative and end-of-life care persist.[12-15]

Evidence on the role of race and ethnicity in explaining differences in inpatient palliative care and hospice use has been mixed. Several multisite studies found that African American and Hispanic patients were less likely to use hospice or advanced care planning,[16-18] whereas 1 single-site study, by Sharma et al,[19] found that African American patients with cancer were more likely than white patients to receive palliative care consultation and more likely than Hispanic cancer patients to be referred to hospice. Burgio et al[20] found no racial or ethnic differences in inpatient palliative care use across 6 Veterans Affairs hospitals. Several single-site studies have also found no difference in use of inpatient palliative care consultations[8,21] or hospice enrollment[22] by race or ethnicity, suggesting that differences may be due to between-hospital variation.

Further, substantial variation exists across hospitals in end-of-life care,[23] and several studies have reported that racial discrepancies in end-of-life treatment intensity and cost were partially explained by geographical region and institution.[24-26] However, Hardy et al[27] found uniform racial disparities in hospice use in urban and rural areas alike. Also, although interdisciplinary consultation teams are commonly used in palliative care in the hospital setting,[28] there is substantial variation in the structure and organization of those programs. It remains an open question whether observed differences in palliative care and hospice use among racial and ethnic groups are due to hospital-level variation or disparities within hospitals. The objectives of this study were to (1) compare inpatient palliative care consultation and hospice use by race/ethnicity for hospitalized patients at the end of life and (2) evaluate the extent to which variation in the receipt of inpatient palliative care consultation and hospice use were explained by hospital site versus race/ethnicity and other patient characteristics.

ABSTRACT

OBJECTIVES: Prior research has demonstrated differences across race and ethnicity, as well as across geographic location, in palliative care and hospice use for patients near the end of life. However, there remains inconsistent evidence regarding whether these disparities are explained by hospital-level practice variation. The goals of this study were to evaluate whether inpatient palliative care consultation use and discharge to hospice differed by race/ethnicity and whether hospital-level variations explained these differences.

STUDY DESIGN: Retrospective, cross-sectional study.

METHODS: This study evaluated 5613 patients who were discharged to hospice or died during their hospital stay between 2012 and 2014 in 4 urban hospitals with an inpatient palliative care service. The main outcomes were receipt of an inpatient palliative care consultation and discharge to hospice.

RESULTS: The sample was 43% white, 44% African American, and 13% Hispanic. After adjusting for patient characteristics and hospital site, race/ethnicity was not significantly associated with receipt of inpatient palliative care consultation. Hispanic race/ethnicity was associated with a higher likelihood of discharge to hospice (odds ratio, 1.22; $P = .036$), and inpatient palliative care consultation was associated with 4 times higher likelihood of discharge to hospice ($P < .001$). Hospital site was also associated with both receipt of inpatient palliative care consultation and discharge to hospice.

CONCLUSIONS: Our results illustrate significant variation across hospitals in palliative care consultation use and discharge to hospice. No significant racial/ethnic disparities in the use of either palliative care or hospice at the end of life were found within hospitals.

Am J Manag Care. 2020;26(2):e36-e40

TAKEAWAY POINTS

This study evaluated whether inpatient palliative care consultation use and discharge to hospice differed by race/ethnicity and whether hospital-level variations explained differences in 4 urban hospitals with an inpatient palliative care service.

- We found significant variation in palliative care consultation use and discharge to hospice across hospitals.
- After controlling for patient demographic characteristics and hospital, we found no evidence of racial/ethnic disparities in the use of either palliative care or hospice at the end of life.
- Future work should evaluate whether standardized palliative care education reduces hospital-level variation in the use of both palliative care and hospice.

METHODS

This was a retrospective study of discharge-level data for 2012 to 2014 from 4 hospitals with a fellow (physician, nurse, social worker, or chaplain) participating in the Coleman Palliative Medicine Training Program.[29,30] The purpose of the training program was to improve access to and quality of palliative care services in Chicago. The study protocol was approved by the Rush University Medical Center institutional review board. Hospitals provided data for end-of-life patients, defined as those who were discharged to hospice or died during the hospital stay, and indicated whether each patient received an inpatient palliative care consultation during the final hospitalization. The hospitals were located within the Chicago metropolitan area and included 2 academic medical centers and 2 community hospitals, with a combined total of more than 80,000 discharges annually. The time frame included discharges between January 2012 and December 2014. When a patient had multiple hospital admissions, only the last admission was included in the analysis. The sample was further limited to patients with a race or ethnicity of non-Hispanic white, non-Hispanic African American, or Hispanic.

Patient and Hospital Characteristics

Other independent variables included race/ethnicity (non-Hispanic African American, non-Hispanic white, Hispanic), gender, age, primary payer, and primary diagnosis. Primary diagnosis was classified into 6 categories using the Healthcare Cost and Utilization Project Clinical Classification Software: circulatory disease, infectious disease, injury or poisoning, neoplasms, respiratory disease, and all other conditions. Additionally, unique identifiers were created for each hospital.

Outcomes

The outcomes of interest were receipt of an inpatient palliative care consultation during the final hospital admission (yes/no) and location of death (hospice, hospital). Patients were classified as dying with hospice if they were discharged to hospice in a medical facility or discharged to hospice in home.

Statistical Analysis

T tests and χ^2 tests were used to assess differences in patient characteristics by race/ethnicity, receipt of inpatient palliative care consultation, and location of death. Standard binary logistic regression models were constructed to test the association of race/ethnicity with receipt of an inpatient palliative care consultation using different sets of controls and assumptions regarding the influence of hospital site. The first model included race/ethnicity and other patient characteristics as covariates, and the second model added hospital site as a covariate. Goodness of fit was compared across the models using a likelihood ratio test and by comparing the Aikake information criterion and Bayesian information criterion.[31] Predictive accuracy was assessed by comparing the area under the receiver operating characteristic (ROC) curve. In a sensitivity analysis, hierarchical binary logistic regression models that included hospital site as a random intercept and all patient characteristics as covariates were used to evaluate whether hierarchical models improved goodness of fit. For the hierarchical models, the interclass correlation and proportion of variance within the model explained by site were reported.

An analogous series of models was constructed with location of death being hospice as the dependent variable. A level of significance of .05 was used for all statistical tests. Data were analyzed using SAS version 9.3 (SAS Institute; Cary, North Carolina).

RESULTS

Overall, 5613 patients were discharged to hospice or died in hospital between January 2012 and December 2014, and 42.9% had a reported race/ethnicity of white, 43.8% African American, and 13.3% Hispanic. A larger proportion of African American patients received an inpatient palliative care consultation than white or Hispanic patients, but there was no significant difference in location of death by race/ethnicity (**Table 1**).

In the binary logistic regression model with patient characteristics only (**Table 2**; detail in **eAppendix Table 1** [eAppendix available at **ajmc.com**]), the likelihood of consultation was significantly higher for African American relative to white race/ethnicity (odds ratio [OR], 1.14; 95% CI, 1.01-1.29), and the model had moderate predictive accuracy, with an area under the ROC curve (AUC) of 0.65. Inclusion of hospital site in the model improved the AUC to 0.71, and race/ethnicity was no longer significantly associated with receipt of inpatient palliative care consultation.

In the initial binary logistic regression model for hospice, Hispanic race/ethnicity was associated with an increased likelihood of hospice use (OR, 1.27; 95% CI, 1.06-1.53) compared with white race/ethnicity, and the predictive accuracy of the model was 0.73 (**Table 3**; detail in **eAppendix Table 2**). The inclusion of site increased the predictive accuracy of the model, and the likelihood of hospice remained significantly higher for Hispanic race/ethnicity (OR, 1.22; 95% CI,

TABLE 1. Description of the Sample by Race/Ethnicity, n (%) (N = 5613)

Variable	White	African American	Hispanic	*P*
Inpatient palliative care consultation				.046
No	1481 (61.5)	1443 (58.6)	467 (62.8)	
Yes	927 (38.5)	1018 (41.4)	277 (37.2)	
Location of death				.207
Hospital	1460 (60.6)	1532 (62.3)	438 (58.9)	
Hospice	948 (39.4)	929 (37.8)	306 (41.1)	
Age in years				<.001
0-54	394 (16.4)	613 (25.3)	200 (27.6)	
55-64	478 (19.9)	554 (22.8)	131 (18.1)	
65-74	588 (24.5)	511 (21.1)	175 (24.2)	
75-84	500 (20.8)	433 (17.8)	128 (17.7)	
≥85	443 (18.4)	316 (13.0)	90 (12.4)	
Sex				<.001
Male	1270 (52.7)	1059 (43.0)	394 (53.0)	
Female	1138 (47.3)	1402 (57.0)	350 (47.0)	
Diagnosis				<.001
Neoplasms	317 (13.2)	234 (9.5)	93 (12.5)	
Circulatory disease	384 (16.0)	312 (12.7)	130 (17.5)	
Infectious disease	339 (14.1)	266 (10.8)	136 (18.3)	
Respiratory disease	205 (8.5)	133 (5.4)	57 (7.7)	
Injury/poisoning	115 (4.8)	93 (3.8)	54 (7.3)	
Other	1048 (43.5)	1423 (57.8)	274 (36.8)	
Primary payer				<.001
Commercial	607 (25.2)	391 (15.9)	125 (16.8)	
Medicare	1560 (64.8)	1420 (57.7)	397 (53.4)	
Medicaid/self-pay	241 (10.0)	650 (26.4)	222 (29.8)	

TABLE 2. Adjusted Results for Receipt of Inpatient Palliative Care Consultation (N = 5613)[a]

	Model 1: All Patient Characteristics		Model 2: All Patient Characteristics + Hospital Site	
	Odds Ratio (95% CI)	*P*	Odds Ratio (95% CI)	*P*
African American	1.14 (1.01-1.29)	.040	0.91 (0.80-1.05)	.201
Hispanic	1.06 (0.89-1.27)	.518	1.02 (0.84-1.23)	.841
Medicare	0.80 (0.67-0.95)	.013	0.85 (0.71-1.02)	.078
Medicaid	0.58 (0.48-0.70)	<.001	0.79 (0.66-0.96)	.017
Female	1.19 (1.07-1.34)	.002	1.16 (1.03-1.30)	.015
Site 1			0.21 (0.17-0.27)	<.001
Site 2			0.15 (0.12-0.19)	<.001
Site 3			0.98 (0.82-1.18)	.826
Area under the ROC curve	0.65		0.71	

ROC indicates receiver operating characteristic.

[a]Reference group includes white, commercial insurance, age 0 to 54 years, male, year 2012 discharges, circulatory conditions, and site 4. Model 2 also controls for patient age, year of discharge, and clinical condition.

TABLE 3. Adjusted Regression Results, Discharge to Hospice (N = 5613)[a]

	Model 1: All Patient Characteristics		Model 2: All Patient Characteristics + Hospital Site	
	Odds Ratio (95% CI)	*P*	Odds Ratio (95% CI)	*P*
African American	0.95 (0.83-1.08)	.423	1.13 (0.98-1.30)	.105
Hispanic	1.27 (1.06-1.53)	.012	1.22 (1.01-1.48)	.036
Inpatient palliative care consultation	3.58 (3.18-4.04)	<.001	4.20 (3.68-4.78)	<.001
Medicare	0.97 (0.80-1.17)	.759	0.94 (0.78-1.14)	.534
Medicaid	1.00 (0.82-1.22)	.970	0.90 (0.74-1.10)	.318
Female	1.38 (1.23-1.56)	<.001	1.37 (1.22-1.55)	<.001
Site 1			1.11 (0.88-1.38)	.381
Site 2			1.50 (1.24-1.81)	<.001
Site 3			0.40 (0.34-0.49)	<.001
Area under the ROC curve	0.73		0.74	

ROC indicates receiver operating characteristic.

[a]Reference group includes white, commercial insurance, age 0 to 54 years, male, year 2012 discharges, circulatory conditions, and site 4. Model 2 also controls for patient age, year of discharge, and clinical condition.

1.01-1.48). Additionally, patients who received an inpatient palliative care consultation were more than 4 times as likely to be discharged to hospice (OR, 4.20; 95% CI, 3.68-4.78). Accounting for hospital site as a random intercept did not improve model goodness of fit or predictive accuracy for receipt of a palliative care consultation or discharge to hospice (results not shown).

In a secondary analysis limited to Medicare patients (**eAppendix Tables 3** and **4**), race/ethnicity was not associated with receipt of a palliative care consultation after controlling for patient characteristics and hospital site. The likelihood of hospice as site of death remained significantly higher for Hispanic race/ethnicity (OR, 1.28; 95% CI, 1.00-1.64) and was also significantly higher for African American race/ethnicity (OR, 1.23; 95% CI, 1.02-1.48) compared with white race/ethnicity.

DISCUSSION

This study provides new evidence regarding racial and ethnic differences in the use of inpatient palliative care consultations and hospice care within a large urban population, as well as the relationship between the receipt of an inpatient palliative care consultation and hospice enrollment. The results of the multivariable analyses indicate that African American patients were more likely to receive an inpatient palliative care consultation in the final hospital stay compared with white patients, before controlling for hospital site, whereas there were no differences in inpatient

palliative care consultation use between white and Hispanic patients. After controlling for hospital site, rates of inpatient palliative care consultations between African American and white patients were similar, demonstrating significant between-hospital variation. The results of the study also indicate that Hispanic patients were more likely to be discharged to hospice than white or African American patients.

The findings for Hispanic patients differ from those of much of the literature on hospice use. For example, in 2017, just 6.4% of Medicare hospice enrollees were Hispanic.[32] One potential explanation for low hospice enrollment by Hispanic patients is that they are more likely to be uninsured or have Medicaid coverage than white patients. In 2016, 22% of Hispanic adults aged 18 to 64 years were uninsured and 24% had Medicaid coverage compared with just 9% of non-Hispanic white adults being uninsured and 17% having Medicaid coverage.[32] The association between Medicaid/uninsured and underutilization of hospice care in Hispanic patients was thought to be mediated by higher rates of poverty and lower likelihood of having a designated primary care provider who would endorse the patient as being eligible for hospice by virtue of an expected prognosis of 6 months or less.[33] In this study, having Medicaid or Medicare did not predict lower likelihood of utilization of hospice.

Consistent with our finding of significant practice variation across hospital sites, other research has found that hospital structural factors, such as hospital bed size, ownership, teaching status, and not-for-profit status, are associated with health outcomes,[34-36] suggesting that institutional differences in resource availability, training, and culture may play an important role. Additionally, for palliative care consultation use, patient race/ethnicity was no longer a significant predictor after accounting for hospital site. Variation in the structure and experience of the palliative care teams across hospital sites in our study may explain the variation in both inpatient palliative care consultation use and hospice use. Two of the hospital sites had relatively new and smaller palliative care teams. Additionally, the 4 hospitals in our analyses served somewhat different patient populations. There was marked variability in average household incomes for the zip codes of the communities surrounding the study hospitals, with the income of one hospital's zip code being 59% higher than that of another. Further, some of the hospital effect may have been associated with differences in admission source, including the proportion of patients with complex critical diagnoses, particularly patients in septic shock, who were transferred from other hospitals due to their illness complexity. Future work should examine patient admission source to disentangle the impact of hospital quality from patient complexity.

Although the median income of Hispanic patients in Chicago is just 57% of that of non-Hispanic whites, the percentages of families living in extreme poverty (ie, median household incomes of less than $15,000 per year) are relatively similar, at 12% for Hispanic households versus 10% for non-Hispanic white households.[37,38] The younger age of Latino decedents in this study sample is reflective of the general Latino population in Chicago, where the average age of Latinos is 25 years, 13 years younger than that of non-Latino whites. The younger age of decedents may also suggest that family caregivers are younger and therefore better able to assume caregiver roles for their family member at the end of life. Additionally, some indications suggest that the Latino community in Chicago, which is 75% of Mexican origin, has more social ties and higher kin support,[39] which may also account for the higher observed rates of hospice.[40]

Not surprisingly, a strong relationship existed between receiving a palliative care consultation and hospice discharge. Patients who received an inpatient palliative care consultation were 3.58 times more likely to be discharged to hospice compared with patients without a consultation, before accounting for hospital site. When accounting for the role of hospital, the likelihood increased to 4.20 compared with those without a consultation, which suggests substantial variation in this relationship across the 4 sites. Multisite studies that do not account for hospital site may overlook an important source of variation in hospice enrollment.

Our data include discharges from 2012 to 2014, and it is possible that use of palliative care by racial and ethnic groups at the end of life may have differentially changed over time. Nationally, however, the proportion of Medicare beneficiaries receiving hospice care by race and ethnicity has remained remarkably consistent, with 8.6% being African American and 6.9% Hispanic in 2012 compared with 8.2% and 6.4%, respectively, in 2017.[32,41] According to data from the National Hospice and Palliative Care Organization, white Medicare decedents were more likely to use hospice care (33.8%) compared with African American (27.1%) and Hispanic (28.0%) Medicare decedents, although these statistics were not risk-adjusted and may reflect differences in the underlying reasons for death.[32] Future work should examine patterns of palliative care and hospice utilization over time by race and ethnicity to better clarify whether use of these services has become more similar or differences have widened.

Limitations

Although this study provides new insight into the role that hospitals play in end-of-life outcomes, there are several important limitations. Our analysis used retrospectively collected data that were principally for administrative purposes and did not include detailed information regarding psychosocial support, social ties, or other social factors. Additionally, data on palliative care consultations were during the final hospital stay, and therefore, our estimates regarding receipt of an inpatient palliative care consultation are a lower bound, given that consultations could have occurred prior to the final hospital stay. Additionally, although we evaluated the association of patient race/ethnicity on palliative care and hospice use, information about the race/ethnicity of the clinicians or hospital staff caring for the patients was unavailable. Future work should evaluate the potential impact of racial/ethnic concordance of patients and clinicians to understand whether having hospital staff who are racially and ethnically similar to patients improves end-of-life care.

CONCLUSIONS

Rates of inpatient palliative care consultations have grown markedly over the past several years in the hospitals included in this study and other hospitals that participated in this regional primary interdisciplinary palliative education program.[29,30] Standardized education and training in conjunction with benchmarking process and health outcomes across hospitals may help decrease variation and improve the equity of palliative care provided across hospitals. Future work should evaluate whether standardized palliative care education reduces hospital-level variation in both palliative care and hospice utilization. Such improvements are likely to reduce costs and reduce remaining disparities in end-of-life care. ■

Author Affiliations: Department of Health Systems Management (TJ) and Rush Medical College (EF), Rush University, Chicago, IL; Pharmacy Systems, Outcomes and Policy, University of Illinois at Chicago (SW), Chicago, IL; Geriatrics and Palliative Medicine, University of Chicago Medicine (SL, AB), Chicago, IL; Section of Palliative Medicine, Department of Internal Medicine, Rush University Medical Center (SO), Chicago, IL.

Source of Funding: Coleman Foundation.

Author Disclosures: The authors report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (TJ, SW, SO); acquisition of data (TJ, AB, SO); analysis and interpretation of data (TJ, SW, EF, SO); drafting of the manuscript (TJ, SW, EF, SO); critical revision of the manuscript for important intellectual content (TJ, SL, AB); statistical analysis (TJ); provision of patients or study materials (TJ); obtaining funding (TJ, SL, SO); administrative, technical, or logistic support (SL, EF, AB); and supervision (TJ, SO).

Address Correspondence to: Tricia Johnson, PhD, Department of Health Systems Management, Rush University, 1700 W Van Buren St, TOB Ste 126B, Chicago, IL 60612. Email: tricia_j_johnson@rush.edu.

REFERENCES

1. May P, Normand C, Morrison RS. Economic impact of hospital inpatient palliative care consultation: review of current evidence and directions for future research. *J Palliat Med*. 2014;17(9):1054-1063. doi: 10.1089/jpm.2013.0594.
2. McCarthy IM, Robinson C, Huq S, Philastre M, Fine RL. Cost savings from palliative care teams and guidance for a financially viable palliative care program. *Health Serv Res*. 2015;50(1):217-236. doi: 10.1111/1475-6773.12203.
3. Morrison RS, Dietrich J, Ladwig S, et al. Palliative care consultation teams cut hospital costs for Medicaid beneficiaries. *Health Aff (Millwood)*. 2011;30(3):454-463. doi: 10.1377/hlthaff.2010.0929.
4. Morrison RS, Penrod JD, Cassel JB, et al; Palliative Care Leadership Centers' Outcomes Group. Cost savings associated with US hospital palliative care consultation programs. *Arch Intern Med*. 2008;168(16):1783-1790. doi: 10.1001/archinte.168.16.1783.
5. Penrod JD, Deb P, Dellenbaugh C, et al. Hospital-based palliative care consultation: effects on hospital cost. *J Palliat Med*. 2010;13(8):973-979. doi: 10.1089/jpm.2010.0038.
6. May P, Normand C, Cassel JB, et al. Economics of palliative care for hospitalized adults with serious illness: a meta-analysis. *JAMA Intern Med*. 2018;178(6):820-829. doi: 10.1001/jamainternmed.2018.0750.
7. Gade G, Venohr I, Conner D, et al. Impact of an inpatient palliative care team: a randomized control trial. *J Palliat Med*. 2008;11(2):180-190. doi: 10.1089/jpm.2007.0055.
8. Bhatraju P, Friedenberg AS, Uppal A, Evans L. Factors associated with utilization of an inpatient palliative care consultation service in an urban public hospital. *Am J Hosp Palliat Care*. 2014;31(6):641-644. doi: 10.1177/1049909113502845.
9. Kavalieratos D, Corbelli J, Zhang D, et al. Association between palliative care and patient and caregiver outcomes: a systematic review and meta-analysis. *JAMA*. 2016;316(20):2104-2114. doi: 10.1001/jama.2016.16840.
10. Paris J, Morrison RS. Evaluating the effects of inpatient palliative care consultations on subsequent hospice use and place of death in patients with advanced GI cancers. *J Oncol Pract*. 2014;10(3):174-177. doi: 10.1200/JOP.2014.001429.
11. Kerr CW, Donohue KA, Tangeman JC, et al. Cost savings and enhanced hospice enrollment with a home-based palliative care program implemented as a hospice–private payer partnership. *J Palliat Med*. 2014;17(12):1328-1335. doi: 10.1089/jpm.2014.0184.
12. Cohen LL. Racial/ethnic disparities in hospice care: a systematic review. *J Palliat Med*. 2008;11(5):763-768. doi: 10.1089/jpm.2007.0216.
13. Greiner KA, Perera S, Ahluwalia JS. Hospice usage by minorities in the last year of life: results from the National Mortality Followback Survey. *J Am Geriatr Soc*. 2003;51(7):970-978. doi: 10.1046/j.1365-2389.2003.51310.x.
14. Hanchate A, Kronman AC, Young-Xu Y, Ash AS, Emanuel E. Racial and ethnic differences in end-of-life costs: why do minorities cost more than whites? *Arch Intern Med*. 2009;169(5):493-501. doi: 10.1001/archinternmed.2008.616.
15. Kwak J, Haley WE, Chiriboga DA. Racial differences in hospice use and in-hospital death among Medicare and Medicaid dual-eligible nursing home residents. *Gerontologist*. 2008;48(1):32-41. doi: 10.1093/geront/48.1.32.
16. Smith AK, Earle CC, McCarthy EP. Racial and ethnic differences in end-of-life care in fee-for-service Medicare beneficiaries with advanced cancer. *J Am Geriatr Soc*. 2009;57(1):153-158. doi: 10.1111/j.1532-5415.2008.02081.x.
17. Fairfield KM, Murray KM, Wierman HR, et al. Disparities in hospice care among older women dying with ovarian cancer [erratum in *Gynecol Oncol*. 2012;126(3):509-510]. *Gynecol Oncol*. 2012;125(1):14-18. doi: 10.1016/j.ygyno.2011.11.041.
18. Lackan NA, Ostir GV, Freeman JL, Mahnken JD, Goodwin JS. Decreasing variation in the use of hospice among older adults with breast, colorectal, lung, and prostate cancer. *Med Care*. 2004;42(2):116-122. doi: 10.1097/01.mlr.0000108765.86294.1b.
19. Sharma RK, Cameron KA, Chmiel JS, et al. Racial/ethnic differences in inpatient palliative care consultation for patients with advanced cancer. *J Clin Oncol*. 2015;33(32):3802-3808. doi: 10.1200/JCO.2015.61.6458.
20. Burgio KL, Williams BR, Dionne-Odom JN, et al. Racial differences in processes of care at end of life in VA medical centers: planned secondary analysis of data from the BEACON trial. *J Palliat Med*. 2016;19(2):157-163. doi: 10.1089/jpm.2015.0311.
21. Worster B, Bell DK, Roy V, Cunningham A, LaNoue M, Parks S. Race as a predictor of palliative care referral time, hospice utilization, and hospital length of stay. *Am J Hosp Palliat Care*. 2018;35(1):110-116. doi: 10.1177/1049909116686733.
22. Rhodes RL, Nazir F, Lopez S, et al. Use and predictors of end-of-life care among HIV patients in a safety net health system. *J Pain Symptom Manage*. 2016;51(1):120-125. doi: 10.1016/j.jpainsymman.2015.08.010.
23. DeCato TW, Engelberg RA, Downey L, et al. Hospital variation and temporal trends in palliative and end-of-life care in the ICU. *Crit Care Med*. 2013;41(6):1405-1411. doi: 10.1097/CCM.0b013e318287f289.
24. Johnson KS, Kuchibhatla M, Payne R, Tulsky JA. Race and residence: intercounty variation in black-white differences in hospice use. *J Pain Symptom Manage*. 2013;46(5):681-690. doi: 10.1016/j.jpainsymman.2012.12.006.
25. Baicker K, Chandra A, Skinner JS. Geographic variation in health care and the problem of measuring racial disparities. *Perspect Biol Med*. 2005;48(suppl 1):S42-S53.
26. Wennberg JE, Fisher ES, Stukel TA, Skinner JS, Sharp SM, Bronner KK. Use of hospitals, physician visits, and hospice care during last six months of life among cohorts loyal to highly respected hospitals in the United States. *BMJ*. 2004;328(7440):607. doi: 10.1136/bmj.328.7440.607.
27. Hardy D, Chan W, Liu CC, et al. Racial disparities in the use of hospice services according to geographic residence and socioeconomic status in an elderly cohort with nonsmall cell lung cancer. *Cancer*. 2011;117(7):1506-1515. doi: 10.1002/cncr.25669.
28. Hughes MT, Smith TJ. The growth of palliative care in the United States. *Annu Rev Public Health*. 2014;35:459-475. doi: 10.1146/annurev-publhealth-032013-182406.
29. Levine S, O'Mahony S, Baron A, et al. Training the workforce: description of a longitudinal interdisciplinary education and mentoring program in palliative care. *J Pain Symptom Manage*. 2017;53(4):728-737. doi: 10.1016/j.jpainsymman.2016.11.009.
30. O'Mahony S, Levine S, Baron A, et al. Palliative workforce development and a regional training program. *Am J Hosp Palliat Care*. 2018;35(1):138-143. doi: 10.1177/1049909116685046.
31. Dziak JJ, Coffman DL, Lanza ST, Li R. Sensitivity and specificity of information criteria. The Methodology Center website. methodology.psu.edu/files/2019/03/12-119-2e90hc6.pdf. Published June 27, 2012. Accessed January 24, 2020.
32. NHPCO facts and figures: 2018 edition. National Hospice and Palliative Care Organization website. nhpco.org/wp-content/uploads/2019/07/2018_NHPCO_Facts_Figures.pdf. Published July 2, 2019. Accessed January 24, 2020.
33. O'Mahony S, McHenry J, Snow D, Cassin C, Schumacher D, Selwyn PA. A review of barriers to utilization of the Medicare hospice benefits in urban populations and strategies for enhanced access. *J Urban Health*. 2008;85(2):281-290. doi: 10.1007/s11524-008-9258-y.
34. Reeves MJ, Gargano J, Maier KS, et al. Patient-level and hospital-level determinants of the quality of acute stroke care: a multilevel modeling approach. *Stroke*. 2010;41(12):2924-2931. doi: 10.1161/STROKEAHA.110.598664.
35. Carretta HJ, Chukmaitov A, Tang A, Shin J. Examination of hospital characteristics and patient quality outcomes using four inpatient quality indicators and 30-day all-cause mortality. *Am J Med Qual*. 2013;28(1):46-55. doi: 10.1177/1062860612444459.
36. Zheng NT, Mukamel DB, Caprio T, Cai S, Temkin-Greener H. Racial disparities in in-hospital death and hospice use among nursing home residents at the end of life. *Med Care*. 2011;49(11):992-998. doi: 10.1097/MLR.0b013e318236384e.
37. B19001I: household income in the past 12 months (in 2017 inflation-adjusted dollars) (Hispanic or Latino householder). US Census Bureau website. factfinder.census.gov/bkmk/table/1.0/en/ACS/17_5YR/B19001I. Accessed January 24, 2020.
38. B19001A: household income in the past 12 months (in 2017 inflation-adjusted dollars) (white alone householder). US Census Bureau website. factfinder.census.gov/bkmk/table/1.0/en/ACS/17_5YR/B19001A. Accessed January 24, 2020.
39. Almeida J, Molnar BE, Kawachi I, Subramanian SV. Ethnicity and nativity status as determinants of perceived social support: testing the concept of familism. *Soc Sci Med*. 2009;68(10):1852-1858. doi: 10.1016/j.socscimed.2009.02.029.
40. Almeida J, Kawachi I, Molnar BE, Subramanian SV. A multilevel analysis of social ties and social cohesion among Latinos and their neighborhoods: results from Chicago. *J Urban Health*. 2009;86(5):745-759. doi: 10.1007/s11524-009-9375-2.
41. NHPCO's facts and figures: hospice care in America: 2013 edition. National Hospice and Palliative Care Organization website. stateserv.com/wp-content/uploads/Hospice-Care-in-America-2013-Facts-Figures.pdf. Published 2013. Accessed January 24, 2020.

Visit **ajmc.com/link/4484** to download PDF and eAppendix

eAppendix Table 1. Adjusted Results for Receipt of Inpatient Palliative Care Consultation, N = 5,613 (Full Model Results)

	Model 1 All patient characteristics		Model 2 All patient characteristics + hospital site	
	Odds Ratio (95% CI)	p-value	Odds Ratio (95% CI)	p-value
Black	1.14 (1.01 – 1.29)	0.040	0.91 (0.80 – 1.05)	0.201
Hispanic	1.06 (0.89 – 1.27)	0.518	1.02 (0.84 – 1.23)	0.841
Medicare	0.80 (0.67 – 0.95)	0.013	0.85 (0.71 – 1.02)	0.078
Medicaid	0.58 (0.48 – 0.70)	<0.001	0.79 (0.66 – 0.96)	0.017
Age 55-64	1.15 (0.97 – 1.36)	0.117	1.17 (0.98 – 1.39)	0.078
Age 65-74	1.33 (1.09 – 1.61)	0.005	1.45 (1.18 – 1.78)	<0.001
Age 75-84	0.98 (0.80 – 1.21)	0.872	1.25 (1.00 – 1.56)	0.049
Age 85+	0.82 (0.66 – 1.03)	0.086	1.26 (0.99 – 1.61)	0.057
Female	1.19 (1.07 – 1.34)	0.002	1.16 (1.03 – 1.30)	0.015
2013	1.16 (1.01 – 1.32)	0.030	1.17 (1.02 – 1.35)	0.022
2014	1.16 (1.01 – 1.33)	0.036	1.24 (1.07 – 1.43)	0.004
Injury	1.75 (1.30 – 2.37)	<0.001	1.80 (1.30 – 2.49)	<0.001
Neoplasm	4.04 (3.23 – 5.07)	<0.001	3.61 (2.84 – 4.58)	<0.001
Infectious Dis	1.17 (0.93 – 1.48)	0.169	1.68 (1.32 – 2.16)	<0.001
Respiratory Dis	1.42 (1.09 – 1.86)	0.010	1.99 (1.49 – 2.66)	<0.001
Other	2.43 (2.03 – 2.90)	<0.001	1.74 (1.39 -2.18)	<0.001
Site 1			0.21 (0.17 – 0.27)	<0.001
Site 2			0.15 (0.12 – 0.19)	<0.001
Site 3			0.98 (0.82 – 1.18)	0.826
Goodness-of-fit				
-2LL	7181		6686	
AIC	7215		6726	
Area under the ROC* curve	0.65		0.71	

Notes: ROC = receiver operating characteristics; reference group includes white, commercial insurance, age 0 – 54, male, year 2012 discharges, circulatory conditions, and Site 4.

eAppendix Table 2. Adjusted Regression Results, Discharge to Hospice, N= 5,613 (Full Model Results)

	Model 1 All patient characteristics		Model 2 All patient characteristics + hospital site	
	Odds Ratio (95% CI)	p-value	Odds Ratio (95% CI)	p-value
Black	0.95 (0.83 – 1.08)	0.423	1.13 (0.98 – 1.30)	0.105
Hispanic	1.27 (1.06 – 1.53)	0.012	1.22 (1.01 – 1.48)	0.036
Inpatient palliative care consultation	3.58 (3.18 – 4.04)	<0.001	4.20 (3.68 – 4.78)	<0.001
Medicare	0.97 (0.80 – 1.17)	0.759	0.94 (0.78 – 1.14)	0.534
Medicaid	1.00 (0.82 – 1.22)	0.970	0.90 (0.74 – 1.10)	0.318
Age 55-64	1.35 (1.12 – 1.62)	0.002	1.39 (1.15 – 1.68)	<0.001
Age 65-74	1.58 (1.28 – 1.96)	<0.001	1.65 (1.33 – 2.05)	<0.001
Age 75-84	2.16 (1.72 – 2.70)	<0.001	2.13 (1.69 – 2.68)	<0.001
Age 85+	3.37 (2.66 – 4.27)	<0.001	3.13 (2.45 – 3.99)	<0.001
Female	1.38 (1.23 – 1.56)	<0.001	1.37 (1.22 – 1.55)	<0.001
2013	0.98 (0.88 – 1.17)	0.724	0.97 (0.84 – 1.11)	0.640
2014	1.01 (0.88 – 1.17)	0.865	1.00 (0.86 – 1.15)	0.949
Injury	1.19 (0.86 – 1.63)	0.298	1.21 (0.87 – 1.66)	0.257
Neoplasm	3.78 (2.98 – 4.79)	<0.001	3.10 (3.01 – 4.86)	<0.001
Infectious Dis	1.09 (0.87 – 1.37)	0.465	1.02 (0.81 – 1.29)	0.847
Respiratory Dis	1.46 (1.12 – 1.91)	0.006	1.39 (1.06 – 1.83)	0.016
Other	1.47 (1.23 – 1.77)	<0.001	2.77 (2.23 – 3.45)	<0.001
Site 1			1.11 (0.88 – 1.38)	0.381
Site 2			1.50 (1.24 – 1.81)	<0.001
Site 3			0.40 (0.34 – 0.49)	<0.001
Goodness-of-fit				
-2LL	6633		6499	
AIC	6669		6541	
Area under the ROC* curve	0.73		0.74	

Notes: ROC = receiver operating characteristics; reference group includes white, commercial insurance, age 0 – 54, male, year 2012 discharges, circulatory conditions, and Site 4.

eAppendix Table 3. Adjusted Results for Receipt of Inpatient Palliative Care Consultation, Medicare Only, N = 3,377

	Model 1 All patient characteristics		Model 2 All patient characteristics + hospital site	
	Odds Ratio (95% CI)	p-value	Odds Ratio (95% CI)	p-value
African American	1.30 (1.10 – 1.52)	0.001	0.98 (0.82 – 1.17)	0.829
Hispanic	1.24 (0.98 – 1.57)	0.068	1.10 (0.86 – 1.42)	0.455
Site 1			0.19 (0.14 – 0.28)	<0.001
Site 2			0.16 (0.13 – 0.21)	<0.001
Site 3			0.93 (0.73 – 1.19)	0.561
Area under the ROC* curve	0.64		0.71	

Notes: ROC = receiver operating characteristics; reference group includes white and Site 4.

Models control for patient age, patient sex, year of discharge, and clinical condition.

eAppendix Table 4. Adjusted Regression Results, Discharge to Hospice, Medicare Only, N= 3,377

	Model 1 All patient characteristics		Model 2 All patient characteristics + hospital site	
	Odds Ratio (95% CI)	p-value	Odds Ratio (95% CI)	p-value
African American	0.98 (0.83 – 1.15)	0.808	1.23 (1.02 – 1.48)	0.027
Hispanic	1.33 (1.04 – 1.68)	0.021	1.28 (1.00 – 1.64)	0.047
Inpatient palliative care consultation	3.16 (2.72 – 3.68)	<0.001	3.72 (3.15 – 4.39)	<0.001
Site 1			1.09 (0.79 – 1.49)	0.613
Site 2			1.38 (1.10 – 1.74)	0.005
Site 3			0.33 (0.26 – 0.43)	<0.001
Area under the ROC* curve	0.71		0.73	

Notes: ROC = receiver operating characteristics; reference group includes white and Site 4.

Models control for patient age, patient sex, year of discharge, and clinical condition.