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Are Hospice Admission Practices Associated with Hospice Enrollment for Older African Americans and Whites?

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Abstract

Context—Hospices that enroll patients receiving expensive palliative therapies may serve more African Americans because of their greater preferences for aggressive end-of-life care.

Objectives—Examine the association between hospices' admission practices and enrollment of African Americans and Whites.

Methods—This was a cross-sectional study of 61 North and South Carolina hospices. We developed a hospice admission practices scale; higher scores indicate less restrictive practices, i.e., greater frequency with which hospices admitted those receiving chemotherapy, inotropes, etc. In separate multivariate analyses for each racial group, we examined the relationship between the proportion of decedents (age ≥65) served by a hospice in their service area (2008 Medicare Data) and admission practices while controlling for health care resources (e.g., hospital beds) and market concentration in the area, ownership and budget.

Results—Nonprofit hospices and those with larger budgets reported less restrictive admission practices. In bivariate analyses, hospices with less restrictive admission practices served a larger proportion of patients in both racial groups ($P<0.001$). However, in the multivariate models, nonprofit ownership and larger budgets but not admission practices predicted the outcome.

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Disclosures

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Conclusion—Hospices with larger budgets served a greater proportion of African Americans and Whites in their service area. Although larger hospices reported less restrictive admission practices, they also may have provided other services that may be important to patients regardless of race, such as more in-home support or assistance with nonmedical expenses, and participated in more outreach activities increasing their visibility and referral base. Future research should explore factors that influence decisions about hospice enrollment among racially diverse older adults.

Keywords

hospice; African Americans; racial disparities; end-of-life care

Introduction

Between 2000 and 2011, the proportion of Medicare beneficiaries who enrolled in hospice nearly doubled from 23% to 45% (1, 2). However, despite this growth, African Americans continue to use hospice at lower rates than Whites. In 2011, 47% of White Medicare beneficiaries used hospice compared to only 35% of African Americans (2). With evidence that hospice enrollment improves end-of-life care, efforts have increased to understand and reduce racial differences in hospice use (3–9). Increasing hospice use among African Americans may help to address documented disparities in pain management, communication, and satisfaction with end-of-life care (10, 11).

There is substantial variation in hospice use across geographic areas. For example, in 2002, the proportion of African-American Medicare beneficiaries who used hospice ranged from 10% in New York to 49% in Arizona. The proportion of Whites who used hospice ranged from 11% in Alaska to 49% in Arizona (12). At least some of this variation has been attributed to the availability of other health care resources (e.g., hospital beds, specialists) and patient characteristics (i.e., age, diagnosis) (13–15). However, in one study of county-level variation in hospice use, even after controlling for these factors, there was a significant amount of unexplained variation (16).

Another potential reason for variation in hospice use across areas is variation in the mix of services and practices of hospice providers. For example, hospice ownership and size are associated with variation in services provided, patients served, and staffing (17–20). In a national survey, over three-fourths of hospices had at least one policy that restricted enrollment of patients receiving high-cost medical care, such as chemotherapy, radiation, or blood transfusions; such practices were more common among smaller and for-profit hospices (21). These practices are likely driven by the fixed, daily per diem payment structure of the Medicare Hospice Benefit ($156 per day for routine care) (22). Some hospices also restrict admission of patients based on social factors, such as having a primary caregiver in the home (23).

Among potential barriers to hospice use for African Americans are greater preferencesfor the use of expensive, life-prolonging therapies at the end of life, less traditional social support systems, such as the more frequent absence of a single, full-time primary caregiver in the home and a caregiver structure that may include multiple caregivers in different locations (24–33). As such, hospices that restrict enrollment of patients who desire high-cost

palliative therapies or without a primary caregiver in the home may serve disproportionately fewer African Americans than Whites. In this way, restrictive admission practices may contribute to the gap between African Americans and Whites in rates of hospice enrollment. Hospice providers with less restrictive admission practices may serve a greater proportion of African Americans in their service areas.

Currently, there are no data examining the association between hospice admission practices, beyond the Medicare hospice eligibility criteria, and use of hospice by different racial groups. These data could provide evidence for the design of new care models or changes to the Medicare Hospice Benefit that increase use of hospice by traditionally underserved groups. Therefore, this study examined the association between hospice providers' admission practices and their enrollment of African-American and White Medicare beneficiaries.

Methods

Design

This study was a cross-sectional survey of North and South Carolina hospices, conducted between December 1, 2009 and September 1, 2010 to examine the association between the practices of hospice providers and the use of hospice by older African Americans. The Institutional Review Board of the Duke University Health System approved this study. Participating hospices received $125.

Study Population

We identified hospices using data collected by the Carolinas Center for Hospice and End of Life Care, a non-profit organization committed to the growth of end-of-life care resources and services throughout the Carolinas. We identified 118 hospices meeting our eligibility criterion of being in operation for at least two years. Of these, 80 (68%) completed the survey. In these analyses, we only included 61 of the 80 hospices (76%) with the following additional criteria: Medicare-certified; operating for three years or more; enrolled 20 or more Medicare beneficiaries who died in 2008; and hospice service area included 20 or more African-American and 20 or more White Medicare beneficiaries who died in 2008. We imposed these additional criteria to exclude hospices that were very small or that were in service areas with a small number of decedents.

We contacted the hospices' executive director who identified a staff member to complete the study. Of the survey respondents, 21 (34%) were executive directors and 27 (44%) were directors in some other capacity (e.g., compliance, quality, nursing). The remainder included social workers, chief medical officers, and clinical managers or administrators.

Hospice Provider Admission Practices Scale

We developed a scale of hospice admission practices based on patients' clinical and social factors using items from prior work (23) and additional items that we developed. The scale was reviewed by hospice and palliative care providers and researchers for face validity and tested in a sample of five hospices outside of North and South Carolina. The final scale

included 14 items. Practices queried in the scale include admission of patients receiving chemotherapy, radiation therapy, total parenteral nutrition, inotropes, desiring hospitalization and those without a primary caregiver in the home or a payment source. Participants were asked, “If presented with the situation, how often does your hospice admit patients who… (e.g., do not have a primary caregiver in the home or who are receiving chemotherapy)?” They responded using the Likert scale: never, rarely, sometimes, often, or always. The score for each item ranged from 1 (never) to 5 (always) and for the total scale (all items) ranged from 14 to 70. Higher scores indicate less restrictive admission practices. Cronbach’s alpha for the scale was 0.90.

Outcome

The outcome was the proportion of decedents (African American or White) served by a hospice in the hospice’s service area (HSA). We completed separate analyses for each racial group. Data were extracted from the 2008 Medicare Denominator and Hospice Standard Analytic Files for all age-eligible (65 years or older) African-American (listed as Black in file) and White beneficiaries residing in North and South Carolina who died in 2008. The denominator of the outcome included the total number of decedents (African American or White) in a HSA (Denominator File) and the numerator included the number of decedents (African American or White) who received care from the hospice provider (Hospice Standard Analytic File) in the HSA.

We defined the hospice service area as any county or counties where at least 20% of the hospice’s patients resided. We used a county-level definition because hospices generally define their service area at the level of the county, and data for the outcome and covariates were available at the county level. Other investigators have used similar designations (16, 34). We used 20% because we did not want to attribute counties where hospices saw few patients to their service area. Hospices vary significantly in their service to patients who are distant from their office or who live in counties outside of the area where the majority of their patients reside. Further, hospices may only serve patients who reside in a small area of a county. For example, in our sample, there were some counties where a particular hospice saw only one patient. In this preliminary work, our goal was to include those counties where hospices had the largest reach and were staffed to see the maximum number of patients and exclude those counties where hospices saw very few patients.

Covariates

The primary predictor was hospice admission practices as measured by our scale. We chose covariates based on their association with rates of hospice enrollment in a specific area, including volume of other health care resources, rurality, patient demographics, and hospice characteristics (14–21, 35–37).

Health Care Resources—We used the Area Health Resources File to obtain county-level variables of health care resources for each HSA (38). These included hospital beds, skilled nursing facility beds, nursing home beds and physicians per 1000 people age 65 years or older, and the percentage of physicians who were generalists (medical doctors or doctors of

osteopathic medicine whose major professional activity specialty was General Practice or Family Medicine).

Hospice Characteristics—For each hospice, we extracted the following from the Carolinas Center database: Medicare provider number; agency type (free-standing, home-health affiliated, hospital affiliated); ownership (for-profit, and nonprofit, which included government; there were only four government-run hospices); average daily census (<50, 51–100, >100); and budget size (< 1 million, 1 million to < 4 million, ≥ 4 million).

Market Competition—We calculated market competition among hospices in a HSA by estimating a Herfindahl-Hirschman Index (HHI) (34, 39, 40). We calculated the HHI for the county or counties in a HSA by summing the squares of the market share (percent of all hospice patients served by each hospice in the HSA). In a perfectly competitive market, the HHI approaches 0, and in a monopoly, HHI approaches 10,000. The range of HHIs for HSAs in our study was 1004 to 8548, with a median of 4258.

Rurality—We classified counties in the HSAs by Rural Urban Continuum Codes. The scheme orders counties from one (counties in metro areas of one million population or more) to nine (completely rural or less than 2500 urban population) (41).

Decedent Demographics—We used the Medicare Denominator file to obtain information about age and gender of decedents in each HSA, and the online CDC Wonder Underlying Cause of Death Detailed Mortality Files (42) to obtain proportion of decedents whose death was the result of cancer, the single most common diagnosis among hospice enrollees. However, because none of these variables were significantly associated with the outcome in bivariate analyses, we did not include them in our final model.

Statistical Analyses

Using descriptive statistics (frequencies, percentages), we examined the characteristics of participating hospices and responses to individual items on the Hospice Provider Admission Practices Scale. For categorical variables, we used non-parametric Wilcoxon tests and for continuous variables, we used Spearman correlations to examine the relationship between all covariates and the outcome.

We used multivariable regression to determine whether the Hospice Provider Admission Practices Scale score was an independent predictor of the proportion of African- American and White Medicare beneficiaries (one analysis for each race) served by hospices in their service area. Covariates for the models were included if they were significantly associated with the outcome in the bivariate analyses. Given our small sample size and relatively large number of variables, we constructed our final regression model using backward elimination for variable selection. Based on the findings of the bivariate analyses, candidate variables included percent of generalists, physicians/population 65 years or older, average daily census, ownership, budget, and market competition (HHI) in the regression model. For Whites, we also included skilled nursing facility beds/population years or older. In addition to the variables selected via backward elimination, total score (main predictor) also was included as the final model. To achieve normality, we transformed the outcome by taking its

square root. We used adjusted R-squared to examine the explanatory power of the model. A *P*-value less than 0.05 was considered statistically significant. We used SAS 9.3 for all analyses (SAS Institute Inc., Cary, NC).

Results

The characteristics of the 61 participating hospices and their association with the Hospice Provider Admission Practices Scale are included in Table 1. Nearly three-quarters were nonprofit (72.13%) and over half were free-standing (55.74%). Most had an annual budget exceeding $4 million (57.38%), and 41.67% had an average daily census of over 100 patients. The average total score on the Hospice Provider Admission Practices Scale for the entire sample was 47.34. Non-profit hospices, those with larger budgets, and larger average daily censuses ($P<0.0001$) had higher mean scores, indicating less restrictive admission practices (i.e., greater frequency with which they admitted the types of patients queried in the scale). On average, hospices had served 18% of decedent African-American and 22% of decedent White Medicare beneficiaries in their service area.

Table 2 summarizes the hospices' admission practices. Over 80% of hospices often/always admitted patients who did not have a payment source or who wanted cardiopulmonary resuscitation. Over half often/always admitted patients who did not have a primary caregiver in the home (63.93%), wanted to be hospitalized (60.66%), were receiving nasogastric (NG) or percutaneous endoscopic gastrostomy (PEG) tube feeding (52.46%) or who were without a primary care physician (59.02%). Slightly less than half, often/always enrolled those with an automated implantable defibrillator that had not been deactivated (49.18%) or who were receiving intravenous fluids (47.54%). Less than one-third of hospices often or always admitted patients who wanted to receive blood transfusions (29.5%), mechanical ventilation (24.59%), or XRT (26.23%). The most restrictive practices related to patients who wanted to receive total parenteral nutrition (TPN), intravenous inotropes or chemotherapy, with only 19.67%, 19.67% and 21.3% of hospice providers, respectively, reporting that they often/always admitted patients receiving these therapies.

The Hospice Provider Admission Practices Scale score was similarly, positively correlated with the proportion of decedents of both races served by a hospice in the HSA. That is, in the bivariate analyses, less restrictive admission practices (higher scores on scale) were associated with a greater proportion of both African-American ($r=0.44$, $P<0.0001$) and White Medicare beneficiaries ($r=0.47$, $P<0.0001$) served by a hospice in the HSA. Among the other hospice characteristics (Table 3), nonprofit hospices and those with larger budgets and censuses served on average a larger proportion of African Americans and Whites in their service area. Hospices whose service areas included a larger proportion of generalists, less market competition (higher HHI) and fewer physicians per population of those age 65 years or older served a larger proportion of decedents in both racial groups. Additionally, the number of skilled nursing facility beds was positively correlated with service to Whites but not significantly with service to African Americans. None of the HSA decedent demographic variables were associated with service to either racial group.

Results of the multivariate regressions are shown in Table 4. In the final model, the Hospice Provider Admission Practices Scale score was not significantly associated with service to African Americans or Whites. Only nonprofit ownership, larger budgets, and less competition (higher HHI) were associated with a larger proportion of African-American and White decedents served by a hospice in the HSA. A larger proportion of generalists in the HSA was also an independent predictor of greater service to African Americans. A point to note is that since the outcome is square-root transformed, the regression coefficients have the corresponding interpretation. For example, a 1% increase in the proportion of generalists is associated with a 0.52% (square root of 0.27) increase in the proportion of African Americans served by a hospice in the HSA. Nonprofit hospices served a 0.32% (square root of 0.10) higher proportion of Whites in their service area than did for-profit hospices. The hospice budget variable includes the categories in Tables 1 and 3 (<$1,000,000; $1,000,000 to $3,999,999; and ≥ $4,000,000). Based on the findings of the multivariate analyses, the proportion of African Americans served by a hospice in the HSA increased by 0.17% (square root of 0.03) for each one category increase in the budget (e.g., <$1,000,000 versus $1,000,000 to $3,999,999). Similarly, a one-point increase in the HHI was associated with a 0.006% (square root of 0.00004) increase in the proportion of African Americans served; because the range of the HHI is 0 to 10,000, a one-point change in the HHI does not represent a significant change in market competition. A 1000-point increase in HHI would be associated with a 6% (0.006 times 1000) increase in the proportion of African Americans served by a hospice in the HSA. Based on the adjusted R-squareds, the models explained over 80% of the variance in the outcome for both racial groups.

Discussion

The findings of this study are consistent with other work showing variation in hospice provider admission practices beyond the requirements of the Medicare Hospice Benefit (21, 23). Nonprofit hospices and those with larger budgets and average daily censuses had the least restrictive admission practices. Restrictive practices were more common for more expensive therapies like TPN and chemotherapy and less common for social factors, like not having a primary caregiver in the home or a primary care physician to direct care. In the bivariate analyses, less restrictive admission practices were associated with a greater proportion of both African Americans and Whites served by the hospice in the HSA. However, in the final adjusted models, only larger budgets and less market competition in the HSA independently predicted the outcome for both racial groups. Nonprofit hospice ownership was associated with a greater proportion of Whites served (P=0.001) and approached statistical significance for African Americans (P=0.06); despite the differences in the P-values, given the similarities in the coefficients in the multivariable analyses (0.057 for African Americans and 0.10 for Whites), the association of hospice ownership with outcome is likely similar for both racial groups. A larger proportion of generalist physicians (vs. specialists) also was associated with a greater proportion of African Americans served by a hospice in the HSA. These findings have implications for efforts to increase hospice use among diverse groups of older adults.

African Americans have greater preferences for the use of potentially life-prolonging therapies at the end of life and more frequently lack a single, full-time primary caregiver in

the home (24–32). Given this, we hypothesized that hospices with less restrictive admission policies would serve a greater proportion of African Americans in their service area. Even if a similar relationship existed for Whites, we hypothesized that the strength of the associated would be stronger for African Americans. However, the findings of this study do not support these hypotheses. Less restrictive admission practices alone were not associated with greater service to seriously ill patients. In addition to more expensive palliative therapies (less restrictive practices), nonprofit hospices and those with larger budgets also may provide other services important to dying patients and their families, such as more in-home support, equipment, supplies (17–20), and assistance with nonmedical expenses. They also may have funds to support greater visibility through more active community outreach and other activities that expand their referral base. Because African Americans and Whites within a given hospice service area are likely to be more similar than they are different with respect to needs, preferences, and awareness of hospice services, those hospices in a given area that can more completely meet common needs and honor common preferences (i.e., larger hospices in this study) may serve more patients regardless of race than their competitors. This is further substantiated by research showing that often, within a given geographic location, when rates of hospice enrollment are high for Whites, they are also high for African Americans and vice versa (12, 43).

Although some of the findings of this study were similar for African Americans and Whites, there was one notable difference. A higher proportion of generalist physicians (versus specialists) was associated with greater hospice use among African Americans but not Whites. This is consistent with other work and may suggest that because of their greater preferences for the use of life-sustaining therapies, African Americans may be less likely to enroll in hospice when more resources (i.e., more specialists) are available to deliver acute aggressive care (43).

This study has a number of limitations. First, the sample size was small and the analyses included hospices in two states, which limits generalizability. Importantly, our findings regarding the admission practices of the hospices are comparable to those reported in larger studies (21, 23). Second, similar to other studies, we relied on hospice provider self- report of admission practices via a Likert scale. We have no way of knowing the extent to which their reports represent actual admission practices. Third, we included only Medicare-certified hospices and Medicare beneficiaries in our outcome; these findings may not apply to hospices that lack Medicare certification or younger populations. Younger patients (less than age 65) and non-Medicare certified hospices represent only 17% of patients and 7% of hospices, respectively (1). Fourth, we collected data regarding hospice admission practices in 2010 but our outcome is calculated from 2008 data (at the time, the most recent data set available). We asked hospices to report practices over a three-year period and expect that these practices are likely stable given that they are driven by reimbursement for hospice services, which has not significantly changed. Finally, our analyses examined associations not cause and effect and we were not able to further characterize the specific services and activities of nonprofit hospices and those with larger budgets which are associated with greater service to seriously ill patients.

Although the number of patients who access hospice care continues to increase, many patients who could benefit from these services do not enroll. Our findings suggest that changing reimbursement to allow hospices to accommodate more expensive palliative therapies alone may not be enough to substantially increase rates of hospice use. Future research should examine which services are most important to dying patients and their families and test care models and payment systems that accommodate a range of needs and preferences.

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Table 1

Hospice Provider Characteristics and Admission Practices

	N (%)	Hospice Admission Practices Scale Score [a] Mean (SD)	*P*-value
Ownership			<0.001
Nonprofit [b]	48 (72.13)	49.75 (9.47)	
For-profit	13 (21.31)	38.46 (38.46)	
Agency Type			0.16
Free-Standing	34 (55.74)	49.53 (10.82)	
Home-Health Affiliated	13 (21.31)	46.00 (9.50)	
Hospital Affiliated	14 (22.95)	43.29 (10.50)	
Budget			<0.001
< $1,000,000	10 (16.39)	39.50	
$1,000,000 to 3,999,999	16 (26.23)	41.13	
≥ $4,000,000	35 (57.38)	52.26	
Average Daily Census			<0.0001
≤ 50	22 (36.67)	40.82 (8.35)	
51 to 100	13 (21.31)	44.46 (7.83)	
>100	25 (41.67)	54.92 (9.30)	

[a]Higher scores are associated with less restrictive admission practices.

[b]Includes four government hospices

Table 2

Hospice Admission Practices

Scale Item [a] **Admits patients….**	**Often/Always *N* (%)**
who have no payment source.	51 (83.61)
who want to receive cardiopulmonary resuscitation (CPR).	50 (81.97)
for routine home care who do not have primary caregiver in home.	39 (63.93)
who want to be hospitalized for management of terminal illness.	37 (60.66)
who do not have a primary care physician or to direct hospice care.	36 (59.02)
who are receiving tube feedings (nasogastric or percutaneous endoscopic gastrostomy).	32 (52.46)
who have an automated implantable defibrillator that has not been deactivated.	30 (49.18)
who are receiving or want to receive intravenous fluids.	29 (47.54)
who are receiving or who want to receive blood transfusions.	18 (29.51)
who are receiving radiation therapy or XRT.	16 (26.23)
who want to receive mechanical ventilation.	15 (24.59)
who are receiving chemotherapy.	13 (21.31)
who are receiving total parenteral nutrition.	12 (19.67)
who are receiving intravenous inotropes for end-stage heart failure.	12 (19.67)

[a]Hospice Provider Admission Practices Scale.

Table 3

Relationship Between Hospice Characteristics, Area Health Care Resources, Decedent Demographics and Proportion of African-American and White Medicare Beneficiaries Who Enrolled in Hospice in Hospice Service Area

	% African-American Decedents Served [a]	%White Decedents Served [a]
Hospice Characteristics		
	P-value Mean (SD)	
Ownership	<0.0001	<0.0001
Nonprofit	0.22 (0.13)	0.27 (0.14)
For-profit	0.06 (0.06)	0.07 (0.07)
Agency Type	0.20	0.33
Free-Standing	0.20 (0.15)	0.25 (0.17)
Home-Health Affiliated	0.12 (0.10)	0.16 (0.13)
Hospital Affiliated	0.18 (0.11)	0.23 (0.13)
Budget	<0.0001	0.0003
< $1,000,000	0.05 (0.05)	0.08 (0.08)
$1,000,000 to 3,999,999	0.13 (0.07)	0.18 (0.12)
$≥ 4,000,000	0.24 (0.14)	0.29 (0.16)
Average Daily Census	0.0003	0.0015
≤ 50	0.09 (0.07)	0.13 (0.09)
51 to 100	0.21 (0.11)	0.27 (0.16)
>100	0.25 (0.15)	0.28 (0.16)
Healthcare Resources in Hospice Service Area		
	Correlation r (*P*-value)	
MD/population ≥ 65 yrs	−0.267 (0.04)	−0.22 (0.09)
% generalists [b]	0.37 (0.003)	0.33 (0.01)
Hospital beds/population ≥ 65 yrs	−0.13 (0.31)	−0.15 (0.24)
Skilled nursing facility beds/population ≥ 65 yrs	0.20 (0.12)	0.25 (0.05)
Nursing home beds/population ≥ 65 yrs	0.09 (0.49)	0.08 (0.53)
Rurality	0.02 (0.88)	0.13 (0.31)
Market Competition Herfindahl Hirschman Index (HHI) [c]	0.82 (<0.0001)	0.88 (<0.0001)
Decedent Demographics in Hospice Service area		
	Correlation r (*P*-value)	
Age	0.09 (0.51)	0.12 (0.37)

	% African-American Decedents Served [a]	%White Decedents Served [a]
% female	0.07 (0.60)	0.16 (0.21)
% cancer deaths	−0.10 (0.51)	−0.24 (0.10)

[a]% served refers to % of decedents served by hospice in the hospice service area (HSA) and equals the total number of decedents (African American or White) who received care from the hospice provider in the hospice service area (HSA) divided by the total number of decedents (African-American or White) in a HSA. We defined the HSA for each hospice as any county or counties where at least 20% of the hospice's patients resided.

[b]% generalists refers to percentage of physicians in the hospice service area who were generalists (medical doctors or doctors of osteopathic medicine whose major professional specialty was General or Family Practice).

[c]Herfindahl Hirschman Index (HHI): This is a measure of market concentration or competition from other hospices in the service area. A higher HHI indicates a less competitive market.

Table 4

Multivariable Regression of Percent of Decedents Served by Hospices in Their Service Area by Race

	%African Americans Served [a]	%Whites Served [a]
	Coefficient [b] (*P*-value)	
Hospice Provider Admission Practices Scale (total score) [c]	0.0003 (0.81)	0.001 (0.34)
Herfindahl Index (market competition in hospice service area) [d]	0.00004 (<.0001)	0.00005 (<.0001)
% generalists in hospice service area [e]	0.27 (0.02)	---------
Hospice Ownership (Nonprofit vs. for-profit)	0.057 (0.06)	0.10 (0.001)
Hospice budget [f]	0.03 (0.001)	0.02 (0.006)

Note: Variable selection using backward elimination and including Hospice Provider Admission Practices Scale. Adjusted R-squared for African Americans 0.81 and for Whites 0.82

[a]% served refers to % of decedents served by hospice in the hospice service area (HSA) and equals the total number of decedents (African American or White) who received care from the hospice provider in the HSA divided by the total number of decedents (African American or White) in a HSA. We defined the HSA for each hospice as any county or counties where at least 20% of the hospice's patients resided.

[b]The outcome is square-root transformed; therefore, the regression coefficients have the corresponding interpretation. That is, a one-point increase in the HHI, 1% increase in % generalists, nonprofit vs. for-profit, or a one category increase in budget (see below) is associated with an increase in the outcome by the square root of the corresponding coefficient.

[c]Higher scores are associated with less restrictive admission practices.

[d]Herfindahl Hirschman Index (HHI): This is a measure of market concentration or competition from other hospices in the service area. Higher HHIs are associated with less competition.

[e]%generalists refers to percentage of physicians in the HSA who were generalists (medical doctors or doctors of osteopathic medicine whose specialty was General Practice or Family Medicine).

[f]The hospice budget variable includes the categories in Tables 1 and 3 (<$1,000,000; $1,000,000 to $3,999,999; and ≥ $4,000,000).