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Racial Disparities in In-Hospital Death and Hospice Use Among Nursing Home Residents at the End-of-life

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Abstract

Background—Significant racial disparities have been reported regarding nursing home residents' use of hospital and hospice care at the end-of-life.

Objective—To examine whether the observed racial disparities in end-of-life care are due to within- or across-facility variations.

Research Design and Subjects—Cross-sectional study of 49,048 long-term-care residents (9.23% Black and 90.77% White) in 555 New York State nursing homes who died during 2005–2007. Minimum Data Set was linked with Medicare inpatient and hospice claims.

Measures—In-hospital death determined by inpatient claims and hospice use determined by hospice claims. For each outcome, risk factors were added sequentially to examine their partial effects on the racial differences. Hierarchical models were fit to test whether racial disparities are due to within- or across-facility variations.

Results—40.33% of Blacks and 24.07% of Whites died in hospitals; 11.55% of Blacks and 17.39% of Whites used hospice. These differences are partially due to disparate use of feeding tubes, Do-Not-Resuscitate **(DNR)** and Do-Not-Hospitalize **(DNH)** orders. We find no racial disparities in in-hospital death (OR of race=0.95, CI:0.87–1.04) or hospice use (OR of race=0.90, CI:0.79–1.02) within same facilities. Living in facilities with 10% more Blacks increases the odds of in-hospital death by 22% (OR=1.22, CI:1.17–1.26) and decreases the odds of hospice use by 15% (OR=0.85, CI:0.78–0.94).

Conclusions—Differential use of feeding tubes, DNR and DNH orders lead to racial differences in in-hospital death and hospice use. The remaining disparities are primarily due to overall end-of-life care practices in predominately-Black facilities, not to differential hospitalization and hospice-referral patterns within facilities.

Keywords

Racial disparities; end of life care; nursing home; hospice; hospitalization

INTRODUCTION

Nursing homes are increasingly becoming an important setting for end-of-life (EOL) care for all Americans. The proportion of all US deaths occurring in nursing homes was about 22% in the past decade and is expected to increase as the baby boomer generation ages. (1, 2) Although nursing homes assume important responsibilities for providing EOL care, the quality of such care is reported to be inadequate. Residents are frequently transferred to hospitals at the EOL, (3, 4) and many die there shortly thereafter. (5) Such EOL transfers often result in iatrogenic nosocomial infections, irreversible functional decline, stress, and disruption of care plans. (6, 7) Research has shown that 40% of transfers may be considered inappropriate, suggesting that residents could have been treated in nursing homes without compromising their outcomes.(6)

Medicare hospice benefit is designed to provide EOL-appropriate care to the terminally ill. In nursing homes, residents under hospice care have been shown to receive better quality EOL care and to have better outcomes, including fewer hospitalizations, better pain management and greater attention to emotional needs. (8–10) Despite the benefit that hospice may offer, its utilization in nursing homes is typically low. (11, 12) The prevalence of hospice use among nursing home decedents ranges between 6% and 33%, depending on the year and state.(8, 13–16)

As is the case with many nursing home health outcomes,(17–19) racial disparities also have been reported with regard to EOL care. The Institute of Medicine (IOM) defines disparities as unequal treatment of patients based on race or other characteristics that cannot be justified by the underlying health conditions or treatment preferences.(20, 21)

In nursing homes, Black residents are more likely to be hospitalized at the EOL and less likely to use hospice, after controlling for health, preferences and other predisposing and enabling factors.(16, 22) Racial disparities may be due to within-facility differences in the treatment accorded to Black and White residents living in the same facility. They may also be due to across-facility variations, reflecting differences in practice patterns and resource availability in facilities that are largely separated by race. (23–26) It is important to understand and disentangle these within- and across-facility differences as different interventions may be required to appropriately deal with racial disparities driven by each mechanism. To date, two studies have examined the relationship between nursing homes' racial composition and residents' risk of hospitalization at the EOL.(22, 27) However, neither study has distinguished between the within- and the across-facility variations and their effect on racial disparities. To our knowledge, no study has specifically attempted to understand and disentangle the within-and across-facility racial differences in in-hospital death and hospice use in nursing homes.

This study extends the current literature by using the most recent data to address the following questions. 1) What contributes to the observed racial differences in in-hospital death and hospice use in nursing homes? 2) After controlling for health characteristics and treatment preferences, are the remaining racial differences driven by within- and/or across-facility variations?

METHODS

Data and population

The study population focused on Black and White nursing home decedents in New York State (NYS) in CY2005–2007. Other minority groups were not included as they represent

less than 2% of the total nursing home population.(22) We employed four sources of data. The Medicare beneficiary file was used to identify Medicare beneficiaries who died during the study period. The Minimum Data Set (MDS) was used to select decedents who were nursing home residents at or shortly prior to death. The MDS is a federally mandated process for clinical assessment of residents in Medicare and/or Medicaid certified nursing homes. The MDS contains detailed information about residents' health status completed at admission and at least quarterly thereafter. (28) We then linked the MDS assessments with the Medicare inpatient and hospice claims to identify the two outcome variables—in-hospital death (occurring within eight days of nursing home transfer) and hospice use.

We included only long-term care residents defined as those with a nursing home stay longer than three months or whose care was not paid by Medicare (i.e. was non-rehabilitative and/or post-acute). Rehabilitative and/or post-acute residents were excluded because they are typically not expected to die and therefore not treated as EOL residents. We excluded decedents who: 1) did not have any comprehensive MDS assessment (admission, annual or significant change), and therefore were missing important EOL health information; 2) were transferred to a different nursing home after the last MDS health assessment, thus their outcomes reflect care practices of multiple facilities; 3) were younger than 65 years old so their treatment expectations may have been different from those for older residents; 4) were in coma and therefore faced different EOL care expectations and decision making processes; and 5) enrolled in managed care in the last month of life and may have had incomplete inpatient claims data. We also excluded decedents from facilities that are: 1) less than 70 beds (bottom 10% of all facilities); and 2) with no Black residents (bottom 10%) or with more than 90% of residents being Black (top 1%), as these facilities may not provide enough information to examine within-facility variations. In total, 49,048 decedents (85.96% of the total population) from 555 nursing homes (84.35% of NYS facilities) formed the analytical sample.

Variable construction

Outcome variables—Death was defined as occurring in a hospital when the date of death overlapped with a hospital stay or with a hospital-based hospice stay, immediately following a hospitalization event. Hospice use was defined as having received hospice care in a nursing home at any point in the last 100 days of life.

Key independent variables—Individual-level race and facility-level race-mix were the key independent variables. A decedent's race was dichotomized as White or Black based on the MDS records. Facility-level race-mix was calculated as the average proportion of Black residents in each facility, over a three year period, 2005–2007.

Covariates—We categorized the covariates into four groups: demographic factors (e.g. age and gender), health characteristics (e.g. chronic diseases and health conditions), presence of feeding tubes and hospice use (the latter was included in the model for in-hospital death only), and presence of Do-Not-Resuscitate (DNR) and Do-Not-Hospitalize (DNH) orders.

Based on the literature review and consultations with clinical experts, two separate lists of individual-level risk factors for in-hospital death and hospice use were compiled using the MDS.(8, 29, 30) Risk factors were obtained from the last MDS assessment before death (the average time difference between the last assessment and death is about 50 days [Table 1]). Because the quarterly MDS assessments do not contain full information about disease presence, we imputed the presence of chronic diseases from the prior available full

assessment for decedents whose last MDS assessment was quarterly assessment (59.94% of sample).

Feeding tubes were identified as a risk factor for both outcomes. Feeding tubes can cause tube-related complications (e.g. leaking, removal by residents) that often require hospital care. (31–34) Nursing homes may be reluctant to refer tube-fed residents who are on Medicaid (the majority of residents) to hospice due to financial disincentives. In states with Medicaid case-mix reimbursement policy, including New York, a feeding tube merits a higher Medicaid per diem rate.(35, 36) However, when tube-fed residents are enrolled in hospice a nursing home receives a lower Medicaid payment, reflecting only a bed and board rate.(37) Hospice was also identified as an independent variable for the in-hospital death outcome. Medicare beneficiaries have to forgo other Medicare covered benefits associated with treatment of their terminal illness (including hospital care) in order to receive hospice care. The causal effect of hospice enrollment on reducing the risk of hospitalization has already been empirically tested.(8) DNR and DNH orders, indicators of residents' preferences for non-aggressive care, have been consistently shown to be associated with lower risk of hospitalization and higher hospice use.(8, 22) The DNR and DNH completion rates in New York are very similar to the national average. During the study period (2005–2007), the completion rate of DNR in NY was 64%, compared to the national average of 68%. The completion rate of DNH in NY was 7%, which is the same as the national average. Although the two measures have not been validated against external criteria, the low missing rates in both measures (0.10% and 0.13% for DNR and DNH, respectively) suggest good reliability.

Statistical analysis

Several analytical steps were performed, all of which were conducted at the individual-level using STATA/SE 10.1 (StataCorp LP., College Station, TX). First, we fit a series of logistic regression models to examine factors contributing to racial differences in in-hospital deaths and hospice use. In each model, groups of risk factors were added sequentially. First we included only individual-level race and year of death. In model 2 we added demographic and health characteristics. Feeding tube status, hospice and DNR and DNH orders were added sequentially in the next three models. Finally, facility fixed-effects were included to account for the heterogeneity among facilities (e.g. resources and practice patterns). In this step (Model 6), facilities with 0% or 100% prevalence of each outcome (six facilities including 82 individuals with the in-hospital death outcome and 101 facilities housing 5,823 decedents with the hospice outcome, respectively) were automatically dropped, due to lack of within-facility variations. To evaluate possible bias resulting from estimating the sequential models on different samples, sensitivity analysis has been done by repeating Models 1 through 5 on the samples used for Model 6 (the most restrictive samples). Estimation based on the two sets of samples yielded similar results. Odds-ratios, from the samples containing the maximum available information, are therefore presented. Sensitivity analysis results are available upon request.

The sequential changes in the odds ratios of race, as control variables were added in each subsequent model (models 1–5), allow us to examine the impact of these covariates on the differential rates of in-hospital death and hospice use between Black and White residents, i.e. their contribution to the observed racial differences. Model 6, in which facility fixed-effects were included, allow us to examine the effect of the within-facility variations on the remaining racial differences in each outcome. This method for identifying the within-facility differences has been demonstrated and used in prior studies.(17, 38) To sum up, the first 5 models examined which factors contribute to the observed racial differences while the 6th models tested whether within-facility variations accounted for the observed racial disparities.

In the second analytical step, we examined whether across-facility variations explain the racial disparities. For each outcome we fit a facility random-effects model, which included individual-level race and facility-level race-mix, other covariates and year of death. Facility random-effects models allow us to assess the effects of certain facility characteristics (i.e. facility-level race-mix) on the outcomes of interest. In each model, the estimated odds ratios of race, similarly although not as directly as the fixed-effects model, represent the effect of racial disparities within facilities. The odds ratios of facility race-mix indicate the effect of across-facility variations, i.e. whether an average resident, either Black or White, has higher odds of experiencing the outcome if s/he lives in a facility with higher percentage of Blacks. In these two models, the facility heterogeneity besides race-mix was accounted by the facility random-effects.

RESULTS

Table 1 shows the descriptive statistics of the study sample stratified by race. Among the sample decedents, 9.23% are Black and 90.77% are White, which is similar to the overall racial composition of nursing home decedents in NYS for the same period (10.63% Black vs. 89.37% White). Blacks and Whites appear to be different with regard to the outcome variables. Unadjusted for any covariates, higher percentage of Blacks have died in hospitals than Whites (40.33% vs. 24.07%). However, smaller proportion of Blacks have used hospice compared to White residents (11.55% vs. 17.39%).

Blacks tend to reside in facilities with higher concentration of Blacks (33.60% of residents being Black) compared to their White counterparts (7.24% of residents being Black). Black residents are younger (83.96 years of age), compared to Whites (87.41). Blacks appear to be somewhat more disabled, compared to Whites, both in functional and cognitive status. More Black residents have feeding tubes compared to Whites (31.12% vs. 10.08%). Fewer Blacks have DNR and/or DNH orders, compared to Whites (41.21% vs. 75.45% and 2.61% vs. 7.82%, respectively).

In Table 2 we present the results from the sequential models predicting in-hospital death and hospice use. When the model includes only race and year of death (Model 1), Black residents are more than twice as likely as Whites to die in hospitals (OR=2.13, CI:2.00–2.27). When demographic and health characteristics are also included (Model 2), the effect of race diminishes, but remains statistically significant (OR=2.05, CI:1.92–2.19). Adding feeding tube status (Model 3) further diminishes the odds ratio of dying in hospitals for Black residents to 1.85 (CI:1.73–1.98). Including hospice as an independent variable (Model 4) again results in a moderate decline in the effect of being Black (OR=1.79, CI:1.67–1.92). When DNR and DNH are included (Model 5), the odds ratio of in-hospital death declines quite substantially for Black residents (OR=1.41, CI:1.31–1.51). Finally, when nursing home fixed-effects are taken into account (Model 6), race at the individual-level is no longer a significant predictor of dying in hospitals (OR=0.95, CI:0.87–1.04), i.e. we detect no within-facility disparity. The trend with regard to hospice use is very similar. When only race and year of death are included (Model 1), Black residents' odds of using hospice is 40% lower than for Whites (OR=0.62, CI:0.56–0.68). Adding demographic and health characteristics (Model 2) barely reduces racial disparities (OR=0.65, CI: 0.58–0.71). Taking feeding tubes into account (Model 3) further decreases the effect of Black race (OR=0.71, CI:0.64–0.79). Another decline happens when DNH and DNR are introduced into the model (Model 5; OR=0.79, CI:0.72–0.88). The effect of individual race disappears when facility fixed-effects are in included in estimating hospice use (Model 6; OR=0.90, CI:0.79–1.02).

The results from the random-effects models, examining whether the observed racial disparities are due to across-facility variations, are exhibited in Table 3 for in-hospital death

and Table 4 for hospice, respectively. Consistent with the results from the fixed-effects models, individual-level race is not a significant predictor of either outcome (OR=0.95, CI: 0.87–1.03 for in-hospital death [Table 3] and OR=0.89, CI:0.78 –1.01 for hospice [Table 4], respectively). Facility race-mix, on the other hand, is a strong predictor of both outcomes. For every 10% increase in the proportion of Black residents in a facility, we note a 22% increase in the odds of in-hospital deaths (OR=1.22, CI:1.17 –1.26 [Table 3]), and a 15% reduction in the odds of hospice use (OR=0.85, CI:0.78 –0.94 [Table 4]). Because the random-effects and the fixed-effects models yield similar estimates for individual covariates, we only present the estimates for the former.

DISCUSSION

Racial disparities in nursing homes have been reported for a number of outcomes, including pressure ulcers, influenza vaccination rates, pain management, hospice use and in-hospital death.(16–19, 22) Our findings confirm that compared to Whites, Black residents experience more aggressive EOL care with higher rates of in-hospital deaths and lower rates of hospice use. Having observed these overall large racial differences, we examined whether racial disparities in these outcomes are the result of differential within-facility treatments and/or of across-facility variations.

Based on the changes in the odds ratios for race, we show that demographic and health characteristics explain a very small portion of the observed racial differences in each outcome. However, feeding tubes and DNR and DNH orders account for significant proportions of racial differences in in-hospital deaths and hospice use. These findings are consistent with the literature reporting that African-Americans are less likely to have documented advance directives, including DNR and DNH orders.(39) The lower prevalence of DNR and DNH orders in this population may be a reflection of their overall preferences for more aggressive and curative medical treatments.(40–43) It could also be the result of poor or lacking communication between nursing home staff and residents/families regarding advanced care planning, thus reflecting perhaps an incomplete understanding of the inherent risks and benefits associated with aggressive treatments, such as hospitalization, at the EOL. (44, 45) Research needs to further explore why Black residents are less likely to have a DNR or a DNH order.

For the two outcomes of interest we find no within-facility racial disparities, i.e. Black residents are no more likely to die in hospitals or less likely to use hospice than White residents in the same facilities. Cai et al. found that the risk of pressure ulcers is not different between Black and White residents in the same facilities.(17) Our findings further suggest that even for the more complex decision making processes, such as those at the EOL, which tend to involve multiple parties (e.g. nurses, directors of nursing, medical directors, hospice personnel), nursing homes do not tend to systematically treat Black residents differently from White residents residing in the same facility.

The findings also suggest that the primary source of the observed racial differences in EOL care outcomes is due to the across-facility variations. Other conditions being equal, residents from facilities with higher concentration of Blacks have higher risk of in-hospital death and lower probability of using hospice. One plausible reason could be that these facilities provide overall poorer quality of EOL care. This is supported by a recent study demonstrating that residents from predominantly Black facilities are at high risk of pressure ulcers, ceteris paribus.(17) Therefore, it may be important to address issues impacting the overall quality of care in facilities where Black residents tend to congregate. For example, nursing homes with large proportions of Black residents are more likely to derive their revenues from Medicaid which reimburses nursing homes at a lower rate than Medicare or

private funds. (17) Some have suggested that Medicaid pay-for-performance strategies, by providing additional resources and financial incentives for improving care quality, may be useful in also eliminating the across facility racial disparities.(17) However, none of the current state programs with Medicaid pay-for-performance in nursing homes focus on care provided to EOL residents. (46, 47) The Centers for Medicare and Medicaid Services (CMS) routinely evaluate and publish quality of care in nursing homes using 19 quality indicators, as a market-based strategy for quality improvement. Yet, none of these quality measures specifically focus on quality of EOL care. Risk-adjusted EOL quality measures based on the MDS data are presently under development.(48) If these measures prove valid and become part of the CMS nursing home report cards, they may provide an opportunity for bridging the gap in EOL quality of care across-facilities. But such report cards alone may not be sufficient to improve care quality and they may need to be paired with other incentives, such as the pay-for-performance programs.

The rate of potentially avoidable hospitalizations (including congestive heart failure, COPD, urinary tract infection) is one performance measure employed by the Medicare Nursing Home Value-Based Purchasing Demonstration (NHVBP).(49) Under the NHVBP, CMS will reward nursing homes if their performance measures rank in the top 20 percentile or if they are in the top 20 percentile in terms of improvement in their performance measures. If the NHVBP can incentivize nursing homes to reduce hospitalizations, all residents, including those at the EOL, may benefit. Specifically, nursing homes which tend to hospitalize more residents may be incentivized to reduce hospitalizations due to the expected reward for performance improvement. As a result, the across-facility variations in in-hospital death may be reduced, which may reduce racial disparities in this measure.

Alternatively, more frequent in-hospital death and lower hospice utilization in Black-dominated facilities could be the reflection of preferences at aggregate level. The “treatment norm” in these facilities may be determined by the common preferences of the vast majority. Consequently, Blacks in these facilities may simply be receiving the type and level of care that is in accordance with their preferences for aggressive care. However, whether White residents in these facilities receive the care at the level of aggressiveness that they prefer is unclear. More research is necessary to evaluate the care provided to end-of-life residents in predominantly Black-nursing homes.

There are several limitations to the current study. First, our study is based exclusively on New York State facilities. Therefore, generalizing from our findings to other states should be done with caution. Second, we only focus on two EOL care outcomes—in-hospital death and hospice use. For other outcomes, patterns of racial differences with regard to within and across facility variations may be different. Furthermore, although we provide several plausible reasons for the across-facility variations, future studies are needed to further investigate the differences between facilities that are predominantly Black versus those that are predominantly White.

In conclusion, we find that several factors, including Black residents’ higher use of feeding tubes and lower use of documented DNR and DNH orders, partially contribute to racial differences in in-hospital deaths and hospice use. The remaining racial disparities are primarily related to the overall EOL care practices in facilities with higher proportions of Black residents, not to differential hospitalization and hospice referral patterns within facilities.

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Table 1

Descriptive statistics by race

	Black	White
	n = 4,528 (9.23%)	n = 44,520 (90.77%)
Dependent variables	**Mean (SD)/%**	**Mean (SD)/%**
In-hospital death	40.33	24.07
Hospice use	11.55	17.39
Independent variables		
Percentage of Black residents in facility	**33.60% (0.22)**	**7.24% (0.11)**
Year of death		
2005	34.03	35.78
2006	32.69	33.07
2007	33.28	31.15
Age	83.96 (8.92)	87.41 (7.65)
younger than 80	33.22	16.63
80–90	40.68	43.43
older than 90	26.10	39.94
Female	63.54	71.38
Activities of daily living (range 0–28)	22.54 (6.97)	21.02 (6.78)
Cognitive performance score (range 1–7)	4.81 (1.92)	4.44 (1.84)
Diabetes	44.61	26.14
Number of heart/circulation diseases	1.46 (1.02)	1.49 (1.13)
Number of neurological diseases	0.46 (0.63)	0.29 (0.53)
Asthma and/or COPD	18.18	22.86
Cancer	14.18	11.82
Renal failure	11.68	7.32
Arthritis	19.21	28.95
Depression	26.10	46.86
Tuberculosis	0.19	0.03
Pneumonia	6.39	6.54
Cataracts	21.42	16.93
Septicemia	2.80	1.31
HIV infection	1.32	0.05
Syncope	0.54	0.35
Ulcers	36.35	23.93
Fracture in the last 180 days	1.63	4.59
Severe pain	10.84	9.26
Dyspnea	11.40	16.00
Surgical wounds	4.84	2.91
Infection of the foot	1.30	1.28

	Black	White
	n = 4,528 (9.23%)	n = 44,520 (90.77%)
Dependent variables	**Mean (SD)/%**	**Mean (SD)/%**
Endstage diagnosis	5.50	8.10
Feeding tube	31.12	10.08
Do-Not-Resuscitate	41.21	75.45
Do-Not-Hospitalize	2.61	7.82
Time difference between last MDS assessment and death	52.08 (39.81)	47.67 (34.54)

Table 2

Odds ratios of individual-level race (ref = White) on in-hospital death and hospice use: results of the sequential models

Outcome	**In-hospital death**					**Hospice use**				
Independent variables	**N**[a]	**Pseduo-R2**	**Odds ratio**[b]	**95% CI**		**N**[a]	**Pseduo-R2**	**Odds ratio**[b]	**95% CI**	
Model 1: race and year of death	49048	0.01	2.13*	2.00	2.27	49048	<.01	0.62*	0.56	0.68
Model 2: Model 1 + demographics and health characteristics	48942	0.04	2.05*	1.92	2.19	48942	0.08	0.65*	0.58	0.71
Model 3: Model 2 + feeding tube status	48942	0.05	1.85*	1.73	1.98	48942	0.09	0.71*	0.64	0.79
Model 4: Model 3 + hospice use	48942	0.09	1.79*	1.67	1.92			NA		
Model 5: Model 4 + DNR and DNH orders	48942	0.12	1.41*	1.31	1.51	48942	0.09	0.79*	0.72	0.88
Model 6: Model 5 + facility fixed effects	48860	0.11	0.95	0.87	1.04	43119	0.08	0.90	0.79	1.02
Goodness of fit[c]	C-statistics = 0.720					C-statistics = 0.692				

[a] N differs in different models due to missing data. In model 6, facilities with 0% or 100% prevalence of each outcome were automatically dropped when estimating fixed-effects models. Sensitivity analysis has been done by repeating Models 1 to 5 on the samples used for Model 6. Estimation results are similar. Sensitivity analysis results are available upon request.

[b] Odds ratios for individual-level race= Non-Hispanic Black(reference = Non-Hispanic White)

[c] Goodness of fit is evaluated based on the fixed-effects models (Model 6).

* $p < 0.05$

Table 3

Estimates of the random-effects model predicting in-hospital death(n = 48,942)

Independent variables	Odds Ratio	95% Confidence Interval	
Individual race (ref = White)	0.95	0.87	1.03
Percentage of Black residents in facility (per 10% increase)	1.22*	1.17	1.26
Covariates			
Year of death (ref= 2005)			
2006	1.00	0.94	1.05
2007	1.03	0.97	1.09
Age (ref = younger than 80)			
80–90	0.90*	0.85	0.96
older than 90	0.77*	0.72	0.82
Female	0.99	0.94	1.04
ADL (range 0–28)	0.98*	0.97	0.98
CPS	0.90*	0.89	0.92
Diabetes	1.12*	1.07	1.18
Number of heart/circulation diseases	1.03*	1.01	1.06
Number of neurological diseases	1.03	0.98	1.07
Asthma and/or COPD	1.06	1.00	1.12
Cancer	0.89*	0.83	0.96
Septicemia	0.96	0.80	1.16
Fracture in the last 180 days	0.97	0.87	1.09
Surgical wounds	1.08	0.95	1.23
Infection of the foot	1.20	0.98	1.46
Ulcers	0.92*	0.87	0.97
Tuberculosis	0.65	0.22	1.91
Renal failure	1.02	0.94	1.12
Syncope	1.19	0.84	1.69
Pneumonia	0.96	0.88	1.06
Endstage diagnosis	0.87*	0.77	0.98
Feeding tube	1.47*	1.36	1.58
Hospice	0.11*	0.10	0.12
Do-Not-Resuscitate	0.62*	0.59	0.65
Do-Not-Hospitalize	0.34*	0.29	0.39

* $p<0.05$

C-statistics = 0.741

Table 4

Estimates of the random-effects model predicting hospice(n = 48,942)

Independent variables	Odds Ratio	95% Confidence Interval	
Individual race (ref = White)	0.89	0.78	1.01
Percentage of Black residents in facility (per 10% increase)	0.85*	0.78	0.94
Covariates			
Year of death (ref= 2005)			
2006	1.08*	1.01	1.16
2007	1.22*	1.14	1.31
Age (ref = younger than 80)			
80–90	0.97	0.89	1.05
older than 90	0.84*	0.77	0.92
Female	1.15*	1.07	1.23
ADL (range 0–28)	1.02*	1.01	1.02
CPS	1.03*	1.01	1.05
Diabetes	0.98	0.92	1.05
Number of heart/circulation diseases	0.98	0.95	1.00
Number of neurological diseases	1.00	0.94	1.05
Asthma and/or COPD	0.92*	0.85	0.99
Cancer	1.96*	1.81	2.13
Renal failure	0.98	0.88	1.09
Arthritis	0.93*	0.87	0.99
Depression	1.11*	1.05	1.18
Cataracts	0.95	0.87	1.03
HIV infection	1.44	0.37	5.12
Syncope	1.23	0.71	1.80
Ulcers	1.16*	1.08	1.25
Fracture in the last 180 days	1.00	0.87	1.15
Severe pain	1.48*	1.35	1.63
Dyspnea	1.12*	1.03	1.22
Endstage diagnosis	7.07*	6.42	7.79
Feeding tube	0.51*	0.45	0.57
Do-Not-Resuscitate	1.51*	1.40	1.63
Do-Not-Hospitalize	1.24*	1.11	1.38

* $p<0.05$

C-statistics = 0.692