Racial Variation in the Use of Do-Not-Resuscitate Orders

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OBJECTIVE: To compare the use of do-not-resuscitate (DNR) orders in African-American and white patients using a large, multisite, community-based sample.

MEASUREMENTS: Our sample included 90,821 consecutive admissions to 30 hospitals in a large metropolitan region with six nonsurgical conditions from 1993 through 1995. Demographic and clinical data were abstracted from medical records. Admission severity of illness was measured using multivariate risk-adjustment models with excellent discrimination (receiver-operating characteristic curve areas, 0.82–0.88). Multiple logistic regression analysis was used to determine the independent association between race and use of DNR orders, adjusting for age, admission severity, and other covariates.

MAIN RESULTS: In all patients, the rate of DNR orders was lower in African Americans than whites (9% vs 18%; $p < .001$). Rates of orders were also lower ($p < .001$) among African Americans in analyses stratified by age, gender, diagnosis, severity of illness, and in-hospital death. After adjusting for severity and other important covariates, the odds of a DNR order remained lower ($p < .001$) for African-Americans relative to whites for all diagnoses, ranging from 0.38 for obstructive airway disease to 0.71 for gastrointestinal hemorrhage. Results were similar in analyses limited to orders written by the first, second, or seventh hospital day. Finally, among patients with DNR orders, African Americans were less likely to have orders written on the first hospital day and more likely to have orders written on subsequent days.

CONCLUSIONS: The use of DNR orders was substantially lower in African Americans than in whites, even after adjusting for severity of illness and other covariates. Identification of factors underlying such differences will improve our understanding of the degree to which expectations for care differ in African American and white patients.

KEY WORDS: African Americans; race; resuscitation orders; do-not-resuscitate order; decision making.

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The appropriate use of do-not-resuscitate (DNR) orders and other forms of treatment limitations is increasingly recognized as an important element in the quality of hospital care. Although the use of DNR orders has increased since the passage of the Patient Self-Determination Act of 1990 (Omnibus Budget Reconciliation Act of 1990, Public Law 101-508, 1990), the use of such measures may be inconsistent with patient and family preferences for resuscitation.^{1–3} Thus, identification of sources of variation in the use of such measures may have important implications for assessing quality of care. Though investigation of racial and ethnic variation in the utilization of

surgical procedures and in access to primary care has provided important insights into inequities in the current delivery system,^{4–12} relatively few studies have examined racial variation in the use of DNR orders. Moreover, prior studies largely focused on patient preferences for end-of-life care and often involved small sample sizes,^{13–15} single institutions,^{14,16} or highly selected patient populations,^{13,15,17–22} raising questions about their generalizability. In addition, some larger studies involved patients hospitalized prior to the Patient Self-Determination Act,^{23,24} and thus, may not be representative of current practice.

We conducted the current study to address many of the limitations of prior research. Utilizing data collected for a community-based initiative to discern variations in patient outcomes, we sought to examine whether the use of DNR orders differed in white and African-American patients who were recently admitted to 30 hospitals. We studied a wide spectrum of hospitals and chose six nonsurgical conditions that historically represented common reasons for hospitalization and for which there was marked variation in the use of DNR orders.

METHODS

Hospitals

This study utilized data collected by the Cleveland Health Quality Choice Coalition, a regional initiative to evaluate hospital performance in the Cleveland metropolitan area. Of the 30 participating hospitals, 29 were private

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not-for-profit institutions and 1 was publicly supported at the onset of data collection; during the study interval, 3 hospitals were acquired in whole or in part by for-profit entities. Five hospitals were members of the Council of Teaching Hospitals of the Association of American Medical Colleges, and six other hospitals had one or more approved residency programs.²⁵ Mean hospital bed size was 370 (range 97–1,014); 15 hospitals had more than 250 beds.

Patients

The sample was drawn from 125,075 consecutive hospital admissions of patients aged 18 years and older with a primary diagnosis of acute myocardial infarction (MI), congestive heart failure (CHF), gastrointestinal (GI) hemorrhage, obstructive airway disease, pneumonia, or stroke. Patients discharged from study hospitals from January 1993 through December 1995 were identified on the basis of specific ICD-9-CM principal diagnosis codes.²⁶ Patients transferred from other acute care facilities were ineligible for this study because of potential bias in measuring severity of illness.²⁷ Among the eligible sample, only initial admissions to each hospital were examined, excluding 32,592 admissions (26%) that represented repeated hospitalizations in the same hospital. We were unable to identify patients who were admitted to more than one hospital during the study period. In addition, 807 (0.9%) of the remaining admissions were excluded because of missing data for age, gender, race, admission date, or severity of illness (see below). Finally, because the proportion of patients who were neither white nor African American was less than 1.0% ($n = 855$), these patients were excluded, leaving a final study sample of 90,821 white and African-American patients.

Data

Sociodemographic and clinical data were obtained from patients' medical records and included patient race, as determined from the admission history and physical or hospital discharge summary, comorbid conditions, admission source (e.g., nursing home, home), medications, admission vital signs and neurologic status, laboratory and radiologic (including computerized tomography, magnetic resonance imaging, and chest radiography) results, discharge vital status, discharge destination, length of hospital stay, and the date of the first in-hospital DNR order. Do-not-resuscitate orders included physicians' orders that explicitly limited the use of cardiopulmonary resuscitation in the event of a cardiac arrest or mechanical ventilation in the event of a respiratory arrest. For 291 patients who had DNR orders but for whom the date was not collected (2.0% of all patients with DNR orders), the date of admission was substituted because this was the most common date (50%) on which DNR orders were written. Our results were nearly identical when we excluded these

patients from the analyses, or when we used the date of discharge or midpoint of the hospitalization as the date of the DNR order.

As previously described,²⁸ participating hospitals followed strict protocols to standardize the collection of each data element. To ensure reliability, electronic editing was used to correct variables with missing or out-of-range values, and independent reviews were conducted of randomly selected medical records from each hospital.²⁶

Admission severity of illness was measured using diagnosis-specific multivariate models, which estimated the predicted risk of in-hospital death (0%–100%) for each patient. The models were based on clinical variables collected during the first 48 hours following admission that were independently ($p < .01$) related to in-hospital mortality for each of the diagnoses. Development and validation of these models has been previously reported.²⁸ The receiver-operating characteristic (ROC) curve areas of the models used in the current analyses were 0.82 for CHF, 0.84 for pneumonia, 0.86 for acute MI, 0.86 for GI hemorrhage, 0.87 for obstructive airway disease, and 0.88 for stroke. For the current analysis, DNR status, admission neurologic status, and the presence of cancer and cirrhosis were excluded from the models, so that the effect of these factors on the use of DNR orders could be directly evaluated. (Variables included in the current models are available from the authors on request.)

Analysis

Bivariate associations between the use of DNR orders and patient characteristics in all patients and in groups stratified according to age, gender, and diagnosis were compared using the χ^2 test. We also classified patients into quintiles on the basis of their predicted risk of death and examined associations between race and DNR orders in each quintile.

To assess the independent association between race and the use of DNR orders, we conducted multivariate logistic regression analyses that controlled for several potential confounding factors including age; gender; health insurance (modeled as five dummy variables and using commercial insurance as the referent group); predicted risk of in-hospital death; admission from a skilled nursing facility; admission via the emergency department; admission diagnosis; the presence of specific comorbidities (cancer, cirrhosis, and renal failure); coma, lethargy, or stupor on admission neurologic examination; and admission to a major teaching hospital (defined on the basis of membership in the Council of Teaching Hospitals). Because the use of DNR orders varied between patients who died and those who were discharged alive, we repeated the above analyses stratified according to in-hospital death. All logistic analyses included an indicator variable for African-American race. The coefficient associated with the variable was used to estimate the adjusted odds of a DNR order in African-American patients relative to white patients.

Moreover, because DNR orders may be written in response to prior failed treatments, we conducted further bivariate and multivariate analyses that examined racial differences in the use of DNR orders that were written by the first, second, and seventh hospital days. Finally, among patients with DNR orders, we examined differences in the timing of orders in white and African-American patients using the χ^2 test.

RESULTS

The mean age of the 90,821 study patients was 68 years; 21% were African American; and 54% were women (Table 1). Nearly two thirds of the patients were insured by Medicare. Patients with CHF comprised approximately one quarter of the study sample. Hospital sample sizes ranged from 765 to 6,275, and 24% of patients were admitted to the five major teaching hospitals. The mean length of stay of the study sample was 7.9 days, and ranged from 6.6 days for GI hemorrhage to 8.9 days for stroke and pneumonia. The overall hospital mortality rate was 7.0%, and ranged from 2.3% for obstructive airway disease to 11.3% for acute MI.

Sixteen percent ($n = 14,343$) of patients had DNR orders written during their hospitalizations. Of these, 50%, 69%, and 88% had their orders written by hospital days 1, 2, and 7, respectively. Rates of DNR orders were lower in African Americans than in whites (9.4% vs 17.5%; $p < .001$). The lower rate of DNR orders in African-American patients compared with white patients was also found in analyses that considered DNR orders written by the first hospital day (3.9% vs 8.7%; $p < .001$), second hospital day (6.1% vs 12.1%; $p < .001$), or seventh hospital day (8.1% vs 15.5%; $p < .01$). This relation between race and DNR orders was consistent across individual hospitals. In all but one hospital, rates of DNR orders were lower in African Americans compared with white patients. In 12 hospitals DNR orders were used more than twice as frequently in white patients than in African-American patients, and in one hospital more than five times as frequently.

Rates of DNR orders were directly related to age (4.4%, 11.0%, 20.8%, and 42.1% in patients aged 18–65, 65–74, 75–84, and 85 years and older, respectively; $p < .001$) and to predicted risk of death (3.2%, 6.7%, 10.6%, 18.5%, and 39.9% in severity quintiles 1, 2, 3, 4, and 5, respectively; $p < .001$). In addition, rates of DNR orders varied ($p < .001$) across diagnoses, ranging from 7.3% in patients with obstructive airway disease to 24.0% in patients with pneumonia (Fig. 1), and were lower in men than in women (13.7% vs 17.6%; $p < .001$).

To further examine the relation between race and DNR orders, we conducted stratified analyses according to age, gender, severity of illness, and diagnosis (Table 2). Analyses considered four end points: any DNR order written during hospitalization and DNR orders that were written by hospital days 1, 2, and 7 only. Rates of DNR orders were lower ($p < .001$) in African-American patients than

Table 1. Baseline Sociodemographic and Clinical Characteristics of the 90,821 Study Patients

Characteristic	
Age in years, mean (SD)	68.3 (16.2)
Median (interquartile range)	72 (60–80)
Days of hospital stay, mean (SD)	7.9 (7.1)
Median (interquartile range)	6 (4–9)
Gastrointestinal hemorrhage	6.6 (7.1)
Obstructive airway disease	6.7 (7.2)
Acute myocardial infarction	7.9 (6.2)
Congestive heart failure	7.9 (6.9)
Pneumonia	8.9 (7.3)
Stroke	8.9 (7.3)
Race, % (n)	
African American	20.7 (18,773)
White	79.3 (72,048)
Gender, % (n)	
Female	53.8 (48,906)
Male	46.2 (41,915)
Health Insurance, % (n)	
Commercial	23.4 (21,235)
Medicare	66.1 (60,005)
Medicaid	5.4 (4,942)
Other government	1.0 (924)
Uninsured	3.1 (2,808)
Not documented	1.0 (907)
Admission from emergency dept., % (n)	78.3 (71,114)
Comorbidities, % (n)	
Cancer	3.3 (3,039)
Cirrhosis	0.7 (679)
Renal failure	1.2 (1,048)
Diagnosis, % (n)	
Congestive heart failure	25.3 (22,971)
Pneumonia	21.4 (19,436)
Obstructive airway disease	16.1 (14,612)
Acute myocardial infarction	13.9 (12,583)
Stroke	12.4 (11,252)
Gastrointestinal hemorrhage	11.0 (9,967)
Rate of DNR orders, % (n)	
Day 1	7.7 (7,024)
Day 2	10.9 (9,857)
Day 7	14.0 (12,670)
All DNR orders	15.8 (14,343)

in white patients in each age, gender, and diagnosis stratum and for each end point. For example, in analyses of DNR orders written by the first hospital day, rates of DNR orders were lower ($p < .001$) in African-American patients than in whites in patients aged 18–64 years (1.1% vs 1.9%), 65–74 years (3.2% vs 4.7%), 75–84 years (7.4% vs 10.4%), and 85 years and older (16.6% vs 25.2%).

To examine the independent association of race and DNR order status, we conducted a series of multiple logistic regression analyses that adjusted for age, gender, severity of illness, and other potential covariates: for example, admission from a nursing home, admission via the emergency department, type of health insurance, comorbidities, admission neurologic status, and admission to a teaching hospital for each of the diagnoses. Odds ratios

FIGURE 1. Variation in the use of DNR orders according to diagnosis and when, during hospitalization, orders were written.

for the use of DNR orders in African Americans relative to whites were lower than 1.0 ($p < .001$) for all diagnoses, ranging from 0.38 for obstructive airway disease (i.e., odds of a DNR order were 62% lower in African Americans) to 0.71 for GI hemorrhage. These findings were consistent in other regression analyses that only considered DNR orders written by days 1, 2, or 7.

Rates of DNR orders were also lower in African Americans compared with whites, both in patients who were discharged alive (6.4% vs 12.6%; $p = .001$) and in patients who died in the hospital (64.1% vs 78.2%; $p = .001$). In multiple logistic regression analyses, adjusting for the same covariates as in the previous analyses, the odds of a DNR order in African Americans ranged from 0.35 (obstructive airway disease) to 0.75 (acute MI) among patients who were discharged alive, and from 0.42 (stroke) to 0.78 (GI hemorrhage) among patients who died.

Finally, in analyses of the 14,343 patients with DNR orders, African Americans tended to have orders written somewhat later during hospitalization. For example, African Americans had fewer DNR orders written on the first hospital day (44% vs 52%; $p < .001$), but had more DNR orders written on the second hospital day (21% vs 17%; $p < .001$), on days 3 to 7 (21% vs 19%; $p = .05$), and after day 7 (14% vs 11%; $p = .003$).

DISCUSSION

The current community-based study represents one of the largest assessments of racial variation in the use of DNR orders. Analyzing 90,821 hospital admissions of

Table 2. Racial Variation in Rates of Do-Not-Resuscitate Orders in Groups Stratified According to Age, Gender, Severity of Illness, and Diagnosis

Patient Group	DNR Day 1, % (n)		DNR Day 2, % (n)		DNR Day 7, % (n)		DNR All†, % (n)	
	African American*	White	African American*	White	African American*	White	African American*	White
Total	3.9 (730)	8.7 (6,294)	6.1 (1,139)	12.1 (8,718)	8.1 (1,515)	15.5 (11,155)	9.4 (1,761)	17.5 (12,582)
Age groups								
18–65	1.1 (104)	1.9 (391)	1.9 (179)	3.0 (617)	2.7 (262)	4.1 (825)	3.4 (328)	4.9 (993)
65–74	3.2 (145)	4.7 (891)	5.4 (246)	6.9 (1,314)	7.3 (332)	9.4 (1,796)	8.9 (406)	11.5 (2,182)
75–84	7.4 (232)	10.4 (2,279)	10.9 (341)	14.4 (3,158)	14.5 (453)	18.8 (4,130)	16.8 (524)	21.4 (4,703)
≥85	16.6 (249)	25.2 (2,733)	24.8 (373)	33.4 (3,629)	31.1 (468)	40.6 (4,404)	33.4 (503)	43.3 (4,704)
Gender								
Male	3.1 (262)	6.9 (2,300)	5.2 (434)	9.7 (3,260)	7.1 (598)	12.8 (4,308)	8.5 (709)	15.0 (5,031)
Female	4.5 (468)	10.4 (3,994)	6.8 (705)	14.2 (5,458)	8.8 (917)	17.8 (6,847)	10.1 (1,052)	19.6 (7,551)
Severity of illness								
1	0.7 (35)	1.9 (251)	1.2 (60)	2.8 (369)	1.5 (76)	3.5 (461)	1.5 (79)	3.8 (498)
2	1.4 (55)	4.2 (594)	2.4 (93)	5.7 (809)	3.1 (120)	7.0 (996)	3.5 (136)	7.6 (1,087)
3	2.6 (88)	5.6 (833)	4.3 (147)	8.0 (1,177)	5.6 (191)	10.3 (1,522)	6.4 (218)	11.6 (1,714)
4	5.0 (158)	10.0 (1,498)	7.8 (245)	13.7 (2,051)	9.8 (309)	17.8 (2,672)	11.2 (352)	20.1 (3,016)
5	12.2 (394)	20.9 (3,118)	18.4 (594)	28.9 (4,312)	25.4 (819)	36.9 (5,504)	30.2 (976)	42.0 (6,267)
Diagnosis								
Acute myocardial infarction	2.6 (43)	5.5 (605)	4.9 (82)	8.5 (930)	7.3 (121)	11.4 (1,247)	8.2 (136)	13.0 (1,423)
Congestive heart failure	3.3 (166)	8.6 (1,546)	5.0 (249)	11.6 (2,083)	6.4 (319)	14.9 (2,685)	7.4 (370)	17.1 (3,074)
Gastrointestinal hemorrhage	4.5 (98)	6.8 (531)	6.9 (150)	9.4 (737)	8.5 (185)	11.4 (889)	9.6 (209)	12.7 (988)
Obstructive airway dis.	0.9 (31)	4.4 (485)	1.6 (57)	5.9 (658)	2.2 (76)	7.5 (836)	2.7 (95)	8.7 (965)
Pneumonia	7.6 (303)	13.9 (2,147)	11.1 (441)	18.7 (2,889)	14.1 (559)	23.2 (3,596)	16.1 (640)	26.0 (4,024)
Stroke	3.6 (89)	11.2 (980)	6.5 (160)	16.2 (1,421)	10.3 (255)	21.7 (1,902)	12.6 (311)	24.0 (2,108)

*For all groups, rates of DNR orders were lower in African-American patients than in white patients, $p < .001$.

†All refers to all DNR orders written during the entire hospitalization.

patients with acute MI, CHF, GI hemorrhage, obstructive airway disease, pneumonia, and stroke, we found that DNR orders were written nearly half as often for African-American patients as for white patients. This finding was consistent in analyses stratified according to age, gender, diagnosis, and admission severity of illness, and in multivariate analyses adjusting for these and other potential confounding factors. Moreover, relations between race and DNR orders were consistent in analyses limited to DNR orders written by the first, second, or seventh hospital day, and in analyses limited to patients who died in-hospital or who were discharged alive. Finally, in analyses limited to patients with DNR orders, orders were written somewhat later in the hospitalization for African-American patients.

Our findings support the results of several prior studies. In an earlier analysis that was limited to patients with stroke,²¹ we found that the use of DNR orders was lower in African-American patients after adjusting for severity of illness, age, admission from a nursing home, and other factors. In addition, in a national sample of Medicare patients hospitalized before the Patient Self-Determination Act of 1990 with CHF, acute MI, pneumonia, cerebrovascular accident, or hip fracture, Wenger et al. found that rates of DNR orders were approximately 20% higher in white patients than in African-American patients.²² This difference remained after adjustment for severity of illness, type of health insurance, and socioeconomic measures. In a study of 350 nursing home residents in New York, Kellogg and Ramos found that African-American patients were less likely to have DNR orders written in the nursing home and during subsequent hospital admissions.¹⁴

Our findings are also likely to be consistent with previous studies of racial variation in patient preferences. In The Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatment (SUPPORT),²⁹ nonwhite patients were less likely to choose comfort care over life-prolonging measures at the end of life. In addition, preferences of African-American patients for cardiopulmonary resuscitation tended to be more stable over time than preferences of white patients.²⁰

In other studies, Garrett et al. found that African Americans were nearly three times more likely than whites to prefer aggressive treatment even after adjusting for patients' perceived quality of life,¹⁷ while O'Brien et al. found that among patients in nursing homes, African Americans were more likely to prefer cardiopulmonary resuscitation.¹⁵ Finally, in a study of 1,051 seriously ill patients at an urban teaching hospital, Gramelspacher et al. found African-American patients preferred more aggressive treatment than white patients in the event of terminal illness.¹⁶

Thus, our findings in a more contemporary cohort of patients than has been studied previously confirm that DNR orders are used less often in African-American patients. Importantly, this finding was observed for each of six nonsurgical diagnoses that are common reasons for hospitalization and in nearly all of the 30 hospitals included in our sample.

Although we did not directly examine factors underlying the differences in DNR rates, it is possible that such factors reflect variation in patient and family preferences for care,^{13,15,17,18} or cultural or religious traditions valuing life-prolonging measures. It has also been postulated that differences may reflect previous social inequities, mistrust of the health care system by African Americans, or fears of receiving inadequate medical treatment,^{22,30} although a recent study of cancer patients found no racial differences in patients' trust in their physicians.³¹

Further, it is possible that our findings reflect differences in the way physicians who are predominantly white interact with African-American patients. These differences may reflect previous experiences and racial stereotypes, or poor social dynamics between patients and physicians.³⁰ Although we did not have information about each patient's physician, this possibly is supported by Haas et al., who found that nonwhite patients with a non-white physician were over four times as likely to discuss their resuscitation preferences as those with a white physician.¹³

Finally, racial variation in end-of-life decision making may reflect differences in continuity of care. Given that African Americans have lower access to primary care,³²⁻³⁵ and consequently are less likely to have an established doctor-patient relationship, racial variation in the use of DNR orders may reflect a lack of familiarity of patients and family members with hospital-based providers. Indeed, evidence suggests that African Americans were less likely to have had discussions with physicians regarding their preferences for end-of-life treatments,^{13,18} although patients' desires for such discussions did not vary by race.¹³

In interpreting our findings, it is important to acknowledge several potential methodologic limitations. First, our classification of race was based on information in patients' medical records and did not account for patients' self-identification of race or ethnicity. In addition, our classification failed to account for racial and ethnic diversity among African-American and white populations in our sample. Importantly, the generalizability of our findings to other regions with different ethnographic compositions of African-American and white populations should be established. Second, we were unable to measure patient and family preferences for aggressive care. Therefore, the degree to which our findings reflect racial differences in patient preferences or differences in physician decision making are uncertain. Third, although we adjusted for severity of illness and other factors our results may be confounded by unmeasured prognostic factors such as functional status, cognition, and social support. Fourth, our findings may reflect differences in patient selection and the location of death, as African-American patients may be more likely than white patients to die before hospital admission,³⁶ or after hospital discharge.³⁷

In conclusion, our large, multisite study indicates that the use of DNR orders was systematically lower in African Americans, even after adjusting for several important

covariates, including severity of illness. Although we did not examine the degree to which DNR orders were concordant with patient and family preferences for care, these findings suggest African Americans are more likely to prefer aggressive treatment. However, given that the use of DNR orders is often inconsistent with patient preferences,¹⁻³ and that African Americans may have more unmet needs regarding desires to discuss end-of-life issues with practitioners, our findings may have implications for quality of care. Thus, it is important that future studies directly examine reasons underlying the racial differences identified in the current study. Identification of such reasons will most likely improve our understanding of the degree to which expectations for care differ across particular subgroups of patients and serve as a basis for ensuring that patients' expectations for care are fulfilled.

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