The Influence of Race/Ethnicity and Socioeconomic Status on End-of-Life Care in the ICU

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Background: There is conflicting evidence about the influence of race/ethnicity on the use of intensive care at the end of life, and little is known about the influence of socioeconomic status.

Methods: We examined patients who died in the ICU in 15 hospitals. Race/ethnicity was assessed as white and nonwhite. Socioeconomic status included patient education, health insurance, and income by zip code. To explore differences in end-of-life care, we examined the use of (1) advance directives, (2) life-sustaining therapies, (3) symptom management, (4) communication, and (5) support services.

Results: Medical charts were abstracted for 3,138/3,400 patients of whom 2,479 (79%) were white and 659 (21%) were nonwhite (or Hispanic). In logistic regressions adjusted for patient demographics, socioeconomic factors, and site, nonwhite patients were less likely to have living wills (OR, 0.41; 95% CI, 0.32-0.54) and more likely to die with full support (OR, 1.59; 95% CI, 1.30-1.94). In documentation of family conferences, nonwhite patients were more likely to have documentation that prognosis was discussed (OR, 1.47; 95% CI, 1.21-1.77) and that physicians recommended withdrawal of life support (OR, 1.57; 95% CI, 1.11-2.21). Nonwhite patients also were more likely to have discord documented among family members or with clinicians (OR, 1.49; 95% CI, 1.04-2.15). Socioeconomic status did not modify these associations and was not a consistent predictor of end-of-life care.

Conclusions: We found numerous racial/ethnic differences in end-of-life care in the ICU that were not influenced by socioeconomic status. These differences could be due to treatment preferences, disparities, or both. Improving ICU end-of-life care for all patients and families will require a better understanding of these issues.

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Abbreviations: DNR = do not resuscitate

A growing body of evidence demonstrates the existence of important racial and ethnic differences in health care. Although many studies report on disparities in health care for acute and chronic conditions,¹⁻⁵ relatively few address racial disparities in the

ICU, and those report conflicting findings. Some have reported that black patients receive fewer medical interventions,^{6,7} have shorter lengths of stay, and use fewer resources.⁷ In contrast, others have found increased resource utilization, including larger numbers of ICU admissions and higher numbers of medical interventions for minority than for white patients.^{8,9}

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Importantly, the ICU is a common site for the delivery of end-of-life care, with approximately one in five deaths in the United States occurring in or shortly after a stay in the ICU.¹⁰ Differences in end-of-life care within the ICU setting may be the result of health-care disparities as well as due to other factors, such as treatment preferences, that are different across racially and ethnically diverse groups.¹¹⁻¹³ There is evidence of disparities in end-of-life care, with racial minorities receiving lower quality of care than whites.^{14,15} Eliminating racial and ethnic disparities in end-of-life care will require a better understanding of the sources of these differences.¹ We hypothesized that a better understanding of differences in end-of-life care in the ICU will help to inform the discrepancies previously reported in the literature regarding racial and ethnic differences in ICU care and guide future research to identify, understand, and eliminate disparities.

A critical confounder in the study of racial and ethnic differences in health care is the influence of socioeconomic status. Independent of racial and ethnic differences, socioeconomic status, as measured by income, education, or insurance status, significantly affects health-care delivery.¹⁶⁻¹⁸ For example, a recent systematic review found that uninsured patients were less likely to receive critical care services and once in the ICU, were less likely to receive invasive procedures and more likely to have life support withdrawn.¹⁸ Another important potential confounder is differences in care across different hospitals, as prior research has shown that some of the differences attributed to patient race/ethnicity actually are due to differences in quality of care among hospitals.⁸ Therefore, when investigating racial and ethnic disparities in health care, it is important to consider the influence of socioeconomic status and to adjust for hospital effects.

In this study of end-of-life care in the ICU, we examined three questions: (1) Is race/ethnicity alone associated with end-of-life care provided to patients who die in the ICU or shortly after a stay in the ICU? (2) Does socioeconomic status as measured by education, income, and insurance status, alter the associations between race/ethnicity and end-of-life care? (3) Is socioeconomic status associated with end-of-life care after adjusting for patient race/ethnicity?

MATERIALS AND METHODS

Population and Setting

Hospitals in Seattle or Tacoma, Washington, were eligible if they had enough ICU deaths to meet sample size requirements.¹⁹ Of 16 eligible hospitals, 15 (94%) agreed to participate in a study of a quality improvement intervention to improve palliative care

in the ICU.^{20,21} These hospitals included three university-affiliated teaching hospitals; three community-based teaching hospitals; and nine community-based, nonteaching hospitals. The number of ICU beds for each hospital ranged from 10 to 65, with a median of 24 (interquartile range, 16-44). There were no significant differences attributed to the intervention; therefore, we combined all patients into a single sample for this analysis.¹⁹ Patients were identified using ICU admission and discharge logs for deaths occurring between August 2003 and February 2008. Because our goal was to examine end-of-life care, eligible patients were those who died in the ICU after a minimum stay of 6 h or within 30 h after being transferred to another hospital location. (These time restrictions allowed ICU clinicians sufficient opportunity to affect end-of-life care.) Data were collected from medical records and death certificates. All study procedures were approved by institutional review boards at all hospitals (UW HSC#23503).

Data Collection and Variables

Patient medical records were reviewed by trained chart abstractors using a standardized abstraction protocol. Abstractor training included at least 80 h of formal training, as described previously.²² After initial training, 5% of the charts were coreviewed to ensure >95% agreement on the 440 abstracted elements. Death certificates were obtained from Washington State and included identifiers that allowed us to link the death certificate data with the patient sample.

Predictor Variables: Race/ethnicity was the primary predictor in this study and was determined from death certificates, which were less likely to be missing data for race/ethnicity than medical records. Patients were identified as either white (non-Hispanic white) or nonwhite, which included all other racial (eg, African American, Asian, Pacific Islander, American Indian) or ethnic (Hispanic) groups. Multiracial patients were included in the non-white group. We also compared race/ethnicity between death certificates and the medical record when both were available and found excellent agreement between these two sources for the four largest race/ethnicity categories (κ , 0.85-0.95).

We used three variables to estimate socioeconomic status: median household income by zip code, educational attainment, and health insurance coverage. Median household income was obtained from the death certificate on the basis of a validated method using the patients' home zip code and census tract data for median income in each zip code.^{23,24} Educational attainment was an ordered categorical variable also obtained from the death certificate, with values ranging from less than ninth grade through postgraduate schooling. Health insurance status was obtained from the medical record and grouped into two categories identified a priori: The insured category included all patients covered by Medicare, private insurance, and Veteran Affairs, and the underinsured category included patients with no insurance, governmental subsidies such as Medicaid, self-pay, and unknown/undocumented insurance coverage.

Covariates: Additional variables in the regression analyses included hospital site, patient age, and patient sex. We controlled for hospital site because hospital has been found to be an important predictor of end-of-life care in the ICU.⁸

Outcome Variables: Outcomes were derived from chart abstraction and included documentation of the following categories of processes of care: (1) evidence of advance directives, (2) use or nonuse of life-sustaining therapies (eg, use of do not resuscitate [DNR] orders, comfort-care orders), (3) symptom management (eg, assessment and presence of pain, dyspnea, and anxiety in final 24 h), (4) communication about end-of-life care (eg, presence

of family conference, prognostic discussions, patient wishes expressed), and (5) use of support services (social work, spiritual care). Dying in the setting of full support was defined as the absence of withdrawal of any life-sustaining treatments but could include withholding CPR. All outcomes were dichotomously categorized as present or not.

Analyses

We compared differences in patient characteristics between white and nonwhite groups using *t* tests for normally distributed variables (age, median income), Mann-Whitney analyses for non-normally distributed variables (ICU length of stay), and χ^2 analyses for categorical variables (cause of death, sex, education, and insurance type). To examine the differences in end-of-life care in the ICU between whites and nonwhites, we first explored the association of race/ethnicity with processes of care using logistic regression controlling for only hospital site, patient age, and sex. To examine the unique association of all predictors (race/ethnicity and socioeconomic status), we repeated the logistic regression analyses for each outcome, using a fully adjusted model that included all covariates (hospital site, age, sex) and all predictors (race/ethnicity, median income, educational attainment, health insurance). We also completed analyses clustered by zip code for those models in which we examined the influence of socioeconomic variables and, finding no important differences, present unclustered analyses. Statistical significance for all tests was set at $P < .05$.

RESULTS

Patient Characteristics

There were 3,400 eligible patients who died in the ICU or within 30 h of transfer from the ICU. Of these, we were able to abstract medical records for 3,138 (92%). Seventy-nine percent ($n = 2,479$) were white, and 21% ($n = 659$) were nonwhite. The nonwhite cohort was 2.8% ($n = 87$) Hispanic, 6.8% ($n = 213$) black, 8.6% ($n = 270$) Asian, 2.0% ($n = 64$) American Indian/Alaskan Native, 0.9% ($n = 27$) Pacific Islander, and 0.5% ($n = 16$) other race. Because patients were allowed to endorse more than one race, totals add to $> 100\%$. The race/ethnicity of this sample is representative of the Seattle-Tacoma area, with a slightly smaller percentage (2.8%) of Hispanic individuals represented than reported for this area (5.5%).

Compared with white patients, nonwhite study patients were significantly younger, lived in a lower median income area, had lower educational attainment, and were more likely to be underinsured (Table 1). The groups did not differ significantly by sex, ICU length of stay, or cause of death (Table 1).

Association of Race/Ethnicity With End-of-Life Care: Not Adjusted for Socioeconomic Status

In the analyses adjusted for hospital site, age, and sex only, nonwhite patients were less likely to have documentation of advance care planning, including a living will or durable power of attorney for health

care, than white patients. Nonwhite patients were consistently less likely to have life-sustaining therapies withdrawn and to have DNR orders (Table 2). Nonwhite patients were more likely to have CPR and to die in the setting of full support. Nonwhite patients were also more likely to have had medical interventions during their ICU stay, including dialysis, pressors, and mechanical ventilation. For symptoms, restlessness and delirium were less likely to be documented as assessed for nonwhite patients, but none of the symptoms was differentially documented as present by racial group.

There were a number of differences by race/ethnicity in documentation of clinician-family communication. Although family conferences were equally likely to occur in the first 72 h of ICU care regardless of race/ethnicity, nonwhite patients were more likely to have had conferences for which there was documentation of the following: (1) discussions of prognosis, (2) physician recommendations for withdrawal of life support, and (3) discord within families or between families and the health-care team. Nonwhite patients were less likely to have documentation that patients' preferences were expressed during a family conference and if preferences were expressed, were less likely to have documentation that the patient would have preferred withdrawal of life support. Nonwhite patients were more likely to have social work involvement. There was no difference in documentation of discussion of spirituality during the family conference or in spiritual care involvement between the two groups.

Association of Race/Ethnicity and Socioeconomic Factors With End-of-Life Care

In this fully adjusted model, racial/ethnic differences in end-of-life care were consistent with those obtained in the analyses that were not adjusted for socioeconomic status, with only two exceptions (Table 3). Symptoms of pain and anxiety were significantly less likely to be documented as present in nonwhite patients after controlling for socioeconomic status. The following socioeconomic variables were independent predictors of processes of end-of-life care: (1) Higher income was associated with having a family conference in the first 72 h, fewer dyspnea assessments but higher levels of dyspnea when assessed, and lower levels of restlessness/agitation. (2) Higher educational attainment was associated with more documentation of advance directives. (3) Underinsured patients were less likely to have documentation of advance directives or comfort-care orders, more likely to have mechanical ventilation but less likely to have dialysis, and more likely to use social worker services (Table 3).

Table 1—Sample Characteristics

Characteristic	Overall Sample (N = 3,138)	White (n = 2,479)	Nonwhite (n = 659)	P Value ^a
Patient age, y	69.2 ± 15.6	70.3 ± 15.1	65.0 ± 16.5	< .001
Female sex	41.6 (1,304)	41.3 (1,025)	42.3 (279)	.65
ICU LOS, d	2.7 (1.0, 6.7)	2.7 (1.0, 6.7)	2.8 (1.0, 6.6)	.80
Income by zip code, \$	49,700 ± 13,500	50,800 ± 13,700	45,600 ± 12,200	< .001
Cause of death				.64
Trauma	9.9 (311)	10.0 (249)	9.4 (62)	
Cancer	14.4 (448)	14.0 (347)	15.3 (101)	
Other cause	75.8 (2,379)	76 (1883)	75.3 (496)	
Education level				< .001
No high school diploma	17.0 (521)	14.1 (341)	28.4 (180)	
High school diploma	63.9 (1953)	66.1 (1,604)	55.1 (349)	
College degree	19.1 (584)	19.8 (480)	16.4 (104)	
Insurance				< .001
Insured	84.5 (2,651)	88.2 (2,187)	70.4 (464)	
Underinsured	15.5 (487)	11.8 (292)	29.6 (195)	

Data are presented as mean ± SD, median (interquartile range), or % (No.), unless otherwise indicated. LOS = length of stay.

^aProbabilities are associated with differences between white and nonwhite groups and are based on *t* tests for normally distributed variables, Mann-Whitney analyses for nonnormally distributed variables, and Pearson χ^2 tests for categorical variables.

DISCUSSION

In the present study, we found significant racial and ethnic differences in ICU end-of-life care in three areas: (1) advance directives, (2) the use of life-sustaining therapies at the end of life, and (3) family-clinician communication. We also found some racial and ethnic differences in symptom management, but these differences were inconsistent. Importantly, racial and ethnic differences in care were essentially unchanged after controlling for measures of socioeconomic status. We also found that socioeconomic status was not a consistent predictor of end-of-life care in the ICU, although there were some potentially important associations with income, education, and insurance status that warrant additional study to confirm and explore.

Our study adds to current literature on racial and ethnic differences in end-of-life care in several ways. First, our findings showing that nonwhite patients were less likely to have advance directives are congruent with studies from non-ICU settings.^{11,25-34} Previous research suggests multifactorial causes for this difference, including diverse cultural beliefs and values, geographic variation in advance directive use,^{32,35-37} and disparities in patient-clinician communication about advance care planning.^{12,14,15,26,34} Recent data support the potential value of advance directives in assuring that patients receive the care they would want.³⁸⁻⁴⁰ The present study is one of the few to examine advance directives among patients who died in the ICU, a setting where advance directives are particularly important because most critically ill patients are unable to make decisions.⁴¹ Our study shows that the relationship between race/ethnicity and advance directives is independent of three measures of socio-

economic status: education, income by zip code, and health insurance.

Second, we found differences in the intensity of ICU care at the end of life in nonwhite patients compared with white patients. Nonwhite patients were more likely to die with life-sustaining measures, whereas white patients were more likely to have DNR orders. Although these findings are similar to some studies reporting higher ICU utilization and lower use of DNR orders among nonwhite patients,^{9,15,42-45} our findings conflict with other studies that documented shorter ICU stays and fewer interventions among nonwhite patients.^{6,7} This discrepancy appears to be largely due to the fact that the studies showing nonwhite patients receiving more life-sustaining measures were of patients dying in the ICU and, therefore, reflect life-sustaining treatments during end-of-life care.^{8,16,46} By contrast, studies showing nonwhite patients receiving fewer interventions were in settings with lower ICU mortality.^{6,7} The use of fewer life-sustaining treatments among nonwhite patients who survive the ICU may reflect practices of care that are not influenced by treatment preferences and communication about end-of-life care.⁴⁶ Another potential explanation for the discrepant findings in prior studies may be related to variability in care among hospitals confounding the association between race/ethnicity and use of life-sustaining treatments. Barnato and colleagues⁸ showed that racial variation in end-of-life care in the ICU is due to differences in ICU use among hospitals with varying proportions of minority patients rather than to differences in care provided to patients from different racial/ethnic groups within a hospital. However, in the present study, controlling for hospital site did not alter racial/ethnic

Table 2—Results of Logistic Regression Analyses^a Testing Associations Between Race/Ethnicity and ICU End-of-Life Outcome Measures

Measure	No. Patients ^b (N = 3,138)	White, % (No.)	Nonwhite, % (No.)	Nonwhite Unadjusted for SES, OR (95% CI) ^c	Nonwhite Adjusted for SES, OR (95% CI) ^d
Advance planning					
Presence of living will	2,048	61.4 (1,026)	32.9 (124)	0.36 (0.28-0.41)	0.41 (0.32-0.54)
Documentation of DPOAHC	1,804	70.7 (1,048)	52.2 (168)	0.47 (0.36-0.63)	0.53 (0.40-0.71)
Life-sustaining therapies					
DNR order in place	3,121	82.7 (2,039)	76.9 (503)	0.77 (0.62-0.96)	0.76 (0.60-0.95)
Comfort-care orders in place	3,138	44.9 (1,114)	38.7 (255)	0.73 (0.60-0.88)	0.77 (0.62-0.94)
Ventilator withdrawn prior to death	2,630	70.2 (1,437)	55.9 (326)	0.58 (0.48-0.71)	0.59 (0.48-0.73)
Patient died in the setting of full support	3,121	24.9 (614)	35.6 (233)	1.61 (1.33-1.95)	1.59 (1.30-1.94)
CPR received in the last 24 h of life	3,119	15.6 (383)	21.5 (141)	1.39 (1.11-1.75)	1.39 (1.10-1.76)
Renal replacement therapy in last 72 h of life	3,136	8.6 (212)	12.6 (83)	1.33 (1.00-1.77)	1.46 (1.09-1.96)
Mechanical ventilation in last 24 h of life	3,126	69.1 (1,706)	79.0 (519)	1.58 (1.27-1.97)	1.64 (1.30-2.06)
Pressors in last 24 h of life	3,123	42.8 (1,057)	51.8 (339)	1.37 (1.14-1.63)	1.43 (1.18-1.72)
Enteral feedings in last 24 h of life	3,125	19.2 (475)	18.1 (119)	0.95 (0.76-1.20)	0.99 (0.78-1.26)
Documentation of symptom management ^e					
Pain assessed	3,137	81.7 (2,025)	78.9 (520)	0.94 (0.74-1.19)	0.98 (0.76-1.26)
Dyspnea assessed	3,137	47.4 (1,175)	42.5 (280)	0.84 (0.70-1.02)	0.84 (0.69-1.02)
Restlessness or agitation assessed	3,136	43.4 (1,075)	36.3 (239)	0.79 (0.65-0.95)	0.80 (0.66-0.97)
Anxiousness assessed	3,137	15.5 (383)	12.1 (80)	0.84 (0.64-1.10)	0.84 (0.63-1.11)
Confusion or delirium assessed	3,136	19.4 (481)	13.1 (86)	0.64 (0.50-0.84)	0.63 (0.48-0.82)
Pain present	2,542	41.7 (845)	35.7 (185)	0.82 (0.67-1.01)	0.79 (0.64-0.98)
Dyspnea present	1,455	60.4 (710)	58.6 (164)	1.02 (0.77-1.35)	1.05 (0.78-1.40)
Restlessness or agitation present	1,314	55.7 (599)	54.0 (129)	1.01 (0.75-1.37)	0.95 (0.69-1.30)
Anxiousness present	4,63	70.8 (271)	63.8 (51)	0.56 (0.31-1.01)	0.47 (0.25-0.87)
Confusion or delirium present	567	70.7 (340)	61.6 (53)	0.68 (0.41-1.12)	0.67 (0.39-1.13)
Documentation of conference and communication					
Family conference occurred within the first 72 h of admission to the ICU	3,122	73.1 (1,801)	72.9 (479)	1.03 (0.84-1.26)	1.14 (0.92-1.41)
Prognosis was discussed during conference	3,122	36.1 (889)	44.3 (291)	1.36 (1.14-1.63)	1.47 (1.21-1.77)
Family expressed wishes to withdrawal life support	3,122	45.3 (1,116)	39.6 (260)	0.87 (0.73-1.05)	0.89 (0.74-1.08)
Patient expressed wishes to withdrawal life support	3,122	11.2 (275)	5.3 (35)	0.47 (0.33-0.69)	0.45 (0.31-0.66)
The patient's opinion and wishes were expressed	3,122	25.6 (631)	17.2 (113)	0.62 (0.50-0.78)	0.63 (0.50-0.80)
Physician recommended withdrawal of life support	3,122	5.6 (137)	9.3 (61)	1.54 (1.11-2.15)	1.57 (1.11-2.21)
Discord occurred	3,122	4.9 (122)	7.9 (52)	1.52 (1.07-2.15)	1.49 (1.04-2.15)
Spirituality was addressed	3,041	32.2 (795)	35.0 (230)	1.10 (0.90-1.34)	1.10 (0.90-1.36)
Social and spiritual services					
Social work involved in care	3,132	41.8 (1,035)	45.3 (298)	1.33 (1.08-1.64)	1.28 (1.03-1.59)
Spiritual care involved in care	3,133	45.2 (1,119)	49.1 (323)	1.06 (0.87-1.29)	1.09 (0.89-1.34)

$P \leq .05$ is highlighted in boldface type. DNR = do not resuscitate; DPOAHC = durable power of attorney for health care; SES = socioeconomic status.

^aEach outcome measure was tested separately, with simultaneous adjustment for hospital site, patient race/ethnicity, sex, and age.

^bDeviations from the total No. reflect missing data for the predictor.

^cOR with white group as comparison group.

^dEach outcome measure was tested separately, with simultaneous adjustment for income, education, and insurance in addition to hospital site, patient race/ethnicity, sex, and age.

^eSymptom assessment/presence documented in the last 24 h of life.

differences in care. In addition, there may be other important differences between whites and nonwhites that could contribute to racial variation in end-of-life care, such as disease characteristics and severity of illness on ICU admission.⁴⁷

Third, we found important racial and ethnic differences in the documentation of family conferences. Although there are limitations to analyzing documentation of family conference content, our findings suggest that patient preferences play an important role

Table 3—Results of Fully Adjusted Logistic Regression Analyses^a Testing Associations of Socioeconomic Factors on ICU End-of-Life Outcome Measures and Controlling for Race/Ethnicity

Measure	No. Patients ^b (N = 3138)	Income by Zip Code, OR (95% CI)	Education Level, OR (95% CI)	Underinsured, ^c OR (95% CI)
Advance planning				
Presence of living will	2,003	1.08 (0.99-1.19)	1.12 (1.03-1.23)	0.53 (0.38-0.75)
Documentation of DPOAHC	1,760	1.04 (0.94-1.16)	1.13 (1.02-1.24)	0.69 (0.49-0.96)
Life-sustaining therapies				
DNR order in place	3,040	1.00 (0.92-1.09)	1.01 (0.93-1.09)	1.11 (0.83-1.47)
Comfort-care orders in place	3,057	1.03 (0.96-1.11)	0.96 (0.90-1.02)	0.72 (0.56-0.92)
Ventilator withdrawn prior to death	2,562	1.04 (0.96-1.12)	0.97 (0.90-1.04)	0.78 (0.61-1.00)
Patient died in the setting of full support	3,040	0.94 (0.87-1.01)	1.03 (0.96-1.11)	1.14 (0.89-1.46)
CPR performed in the last 24 h of life	3,038	0.94 (0.86-1.03)	1.01 (0.93-1.10)	1.00 (0.75-1.34)
Renal replacement therapy in last 72 h of life	3,055	0.94 (0.84-1.05)	1.00 (0.90-1.11)	0.41 (0.27-0.62)
Mechanical ventilation in last 24 h of life	3,054	1.03 (0.96-1.11)	1.00 (0.94-1.08)	1.33 (1.00-1.78)
Pressors in last 24 h of life	3,055	1.05 (0.98-1.12)	1.00 (0.94-1.07)	1.03 (0.82-1.29)
Enteral feedings in last 24 h of life	3,056	1.06 (0.98-1.15)	0.94 (0.87-1.02)	0.82 (0.62-1.10)
Documentation of symptom management ^d				
Pain assessed	3,056	0.96 (0.88-1.05)	1.08 (0.99-1.17)	0.99 (0.73-1.35)
Dyspnea assessed	3,056	0.93 (0.87-0.99)	1.01 (0.95-1.08)	0.80 (0.63-1.02)
Restlessness or agitation assessed	3,055	1.02 (0.95-1.08)	0.99 (0.93-1.06)	0.99 (0.78-1.26)
Anxiousness assessed	3,056	0.97 (0.89-1.06)	0.99 (0.91-1.08)	0.84 (0.59-1.19)
Confusion or delirium assessed	3,055	1.00 (0.92-1.09)	1.02 (0.94-1.10)	1.07 (0.77-1.50)
Pain present	2,475	1.04 (0.97-1.12)	1.02 (0.95-1.09)	1.19 (0.92-1.54)
Dyspnea present	1,421	1.11 (1.01-1.23)	0.99 (0.90-1.09)	1.02 (0.71-1.48)
Restlessness or agitation present	1,284	0.90 (0.81-0.99)	1.03 (0.93-1.13)	1.18 (0.80-1.73)
Anxiousness present	452	1.06 (0.87-1.30)	0.90 (0.74-1.08)	1.58 (0.70-3.58)
Confusion or delirium present	556	1.01 (0.85-1.19)	1.03 (0.88-1.20)	1.15 (0.67-2.31)
Documentation of conference and communication				
Family conference occurred within the first 72 h of admission to the ICU	3,041	1.17 (1.09-1.26)	1.04 (0.97-1.11)	0.83 (0.65-1.06)
Prognosis was discussed during conference	3,041	1.05 (0.98-1.12)	1.03 (0.97-1.10)	0.80 (0.63-1.01)
Family expressed wishes to withdrawal life support	3,041	1.03 (0.97-1.10)	0.99 (0.93-1.05)	0.79 (0.63-1.00)
Patient expressed wishes to withdrawal life support	3,041	0.91 (0.81-1.01)	0.94 (0.85-1.04)	0.79 (0.50-1.24)
The patient's opinion and wishes were expressed	3,041	0.98 (0.91-1.06)	1.01 (0.94-1.09)	0.89 (0.67-1.18)
Physician recommended withdrawal of life support	3,041	1.00 (0.88-1.14)	0.98 (0.86-1.11)	1.00 (0.65-1.55)
Discord occurred	3,041	1.01 (0.88-1.16)	0.90 (0.79-1.03)	0.88 (0.56-1.39)
Spirituality was addressed	3,041	1.00 (0.93-1.08)	1.07 (1.00-1.15)	1.05 (0.81-1.35)
Social and spiritual services				
Social work involved in care	3,051	0.98 (0.91-1.06)	1.00 (0.93-1.08)	1.32 (1.02-1.72)
Spiritual care involved in care	3,052	1.03 (0.96-1.11)	1.02 (0.95-1.09)	1.04 (0.81-1.34)

$P \leq .05$ is highlighted in boldface type. See Table 2 legend for expansion of abbreviations.

^aEach outcome measure was tested separately, with simultaneous adjustment for income, education, insurance type, hospital site, patient race/ethnicity, sex, and age.

^bDeviations from the total No. reflect missing data for the predictor.

^cUnderinsured analyses with insured as comparison group.

^dSymptom assessment/presence documented in the last 24 h of life.

in racial and ethnic differences in end-of-life care. We found that families of nonwhite patients engaged in fewer discussions of patients' wishes, and when discussed, patients' preferences to withdraw life-sustaining measures were less likely to be documented. This finding supports data from outside the ICU that indicate a preference for more life-prolonging treatment at the end of life in African American patients.¹¹⁻¹³ We

also found that for nonwhite patients, a larger proportion of conferences had documentation of discussions about prognosis and physician recommendations for withdrawal of life support. These latter differences may occur because physicians may be more likely to document discussions in which families and physicians may not have agreed on withdrawal recommendations. However, it is also possible that race/ethnicity

may influence physician documentation.⁴⁸ Further study is needed to differentiate these possible explanations for differences in clinician-patient or clinician-family communication about end-of-life care.

Fourth, we found more documentation of intra-family and family-physician discord for nonwhite patients. Higher rates of intrafamily discord have been documented in terminally ill African American patients than in white patients.¹³ Family-physician discord has been shown to be prevalent in end-of-life care in the ICU,^{49,50} but racial effects have not been studied. Family-physician discord found in the present study could be related to differences in cultural communication styles⁵¹ or cultural preferences for end-of-life care.⁵²

Finally, we examined symptom management, an aspect of end-of-life care that we anticipated would be more independent of patients' preferences than advance care planning or withdrawal of life-sustaining therapies. We noted some differences by race/ethnicity, with restlessness and delirium assessed significantly less frequently for nonwhite patients. Symptom management, specifically pain management, has been reported to be an important area of disparity for minority patients.⁵³ However, we found that after controlling for socioeconomic status, nonwhite patients appeared to have a lower burden of pain and anxiety documented at the end of life. Although these findings may signify underlying inequities in assessment of symptoms, our data do not show a consistent association between symptom assessment and either race/ethnicity or socioeconomic status.

Our study has important limitations. First, because our nonwhite sample was relatively small, we combined all minority races and ethnicities into the nonwhite group and, therefore, were unable to differentiate among different racial and ethnic groups. If differences in end-of-life care are driven by cultural values, then there may be differences between these groups that we could not detect. Second, our results are based on documentation in the medical record and, therefore, are limited by the completeness of that documentation.⁵⁴ Third, our assessment of race/ethnicity and socioeconomic status may result in misclassification. For race/ethnicity, we relied on death certificates, which are more complete than the medical record but which may introduce misclassification. However, we found excellent agreement between these two sources. In addition, income was an ecological variable assigned to individuals but derived from census tract data aggregated by patients' home zip codes. Although ecologic variables derived in this way have been found to perform similarly to individual variables,^{23,24} aggregated variables may introduce bias and should be interpreted with caution.⁵⁵ Nonetheless, our approach provides more reliable data than

can be obtained from the medical record alone, and surveying patients or family members introduces important biases through nonresponse that is influenced by race/ethnicity.⁵⁶ Fourth, we did not assess severity of illness on ICU admission. Although all patients in this study died in the hospital and thus had the same severity as defined by outcome, the predicted severity of illness on hospital admission may also influence decision making. Fifth, we conducted multiple comparisons, and some of the significant findings may have occurred by chance. Therefore, these results should be considered as exploratory. Sixth, our goal was to study end-of-life care delivered to patients who died in the ICU or shortly after a stay in the ICU and may not generalize to all patients at risk for dying in the ICU.⁵⁷ Finally, this study took place in one region of the United States with predominantly white patient populations, and findings may not generalize to other regions.

In summary, this study shows that racial and ethnic differences are present in end-of-life care in the ICU and are not confounded by socioeconomic status as assessed by education, income, or health insurance status. There are significant differences in advance care planning, the intensity of treatment, and in documentation of family-clinician communication between white and nonwhite patients. This study supports the growing body of evidence that racial and ethnic differences exist in end-of-life care. Some of these differences are likely due to differences in treatment preferences and values, but others may represent disparities in health care at the end of life. Future research should examine the role that disparities in communication about end-of-life care and in health literacy play in these differences. Although this study provides information about the importance of race and ethnicity, improving end-of-life care and eliminating disparities in this care will require more complete understanding of these differences and development of interventions to address disparities.

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Dr Muni: contributed to the data collection and analyses, with input and oversight from all authors, and drafted the manuscript.

Dr Engelberg: contributed to the design of the study, data collection and analyses, obtaining funding for the original randomized trial, and review of the manuscript.

Ms Treece: contributed to data collection and analyses and review of the manuscript.

Ms Dotolo: contributed to data collection and analyses and review of the manuscript.

Dr Curtis: contributed to the design of the study, data collection and analyses, obtaining funding, and review of the manuscript.

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