Advance Care Planning and Treatment Intensity Before Death Among Black, Hispanic, and White Patients Hospitalized with COVID-19

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BACKGROUND: Black and Hispanic people are more likely to contract COVID-19, require hospitalization, and die than White people due to differences in exposures, comorbidity risk, and healthcare access.

OBJECTIVE: To examine the association of race and ethnicity with treatment decisions and intensity for patients hospitalized for COVID-19.

DESIGN: Retrospective cohort analysis of manually abstracted electronic medical records.

PATIENTS: 7,997 patients (62% non-Hispanic White, 16% non-Black Hispanic, and 23% Black) hospitalized for COVID-19 at 135 community hospitals between March and June 2020

MAIN MEASURES: Advance care planning (ACP), do not resuscitate (DNR) orders, intensive care unit (ICU) admission, mechanical ventilation (MV), and in-hospital mortality. Among decedents, we classified the mode of death based on treatment intensity and code status as treatment limitation (no MV/DNR), treatment withdrawal (MV/DNR), maximal life support (MV/no DNR), or other (no MV/no DNR).

KEY RESULTS: Adjusted in-hospital mortality was similar between White (8%) and Black patients (9%, OR=1.1, 95% CI=0.9–1.4, p=0.254), and lower among Hispanic patients (6%, OR=0.7, 95% CI=0.6–1.0, p=0.032). Black and Hispanic patients were significantly more likely to be treated in the ICU (White 23%, Hispanic 27%, Black 28%) and to receive mechanical ventilation (White 12%, Hispanic 17%, Black 16%). The groups had similar rates of ACP (White 12%, Hispanic 12%, Black 11%), but Black and Hispanic patients were less likely to have a DNR order (White 13%, Hispanic 8%, Black 7%). Among decedents, there were significant differences in mode of death by race/ethnicity (treatment limitation: White 39%, Hispanic 17% (p=0.001), Black 18% (p<0.0001); treatment withdrawal: White 26%, Hispanic 43% (p=0.002), Black 28% (p=0.542); and maximal life support: White 21%, Hispanic 26% (p=0.308), Black 36% (p<0.0001)).

CONCLUSIONS: Hospitalized Black and Hispanic COVID-19 patients received greater treatment intensity than White patients. This may have simultaneously mitigated disparities in in-hospital mortality while increasing burdensome treatment near death.

KEY WORDS: COVID-19; racial disparities; terminal care; mortality; intensive care unit; mechanical ventilation; do not resuscitate order; advance care planning; hospital medicine; medical decision-making.

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INTRODUCTION

People who are Black and Hispanic people are more likely to contract COVID-19, require hospitalization, and die than White people.[1] These differences are attributed to racial/ethnic group-related exposures and comorbidity risk.[2] An early study from a single 40-hospital health system in Louisiana found that, conditional upon hospitalization for COVID-19, risk-adjusted case fatality was the same for Black and White patients,[1] a finding confirmed by at least four other regional analyses.[3–6] A much larger cohort study of nearly 45,000 hospitalized Medicare Advantage beneficiaries, however, found that the Black-White mortality disparity among hospitalized COVID-19 patients persisted after administrative risk adjustment and could be explained by the hospitals treating Black patients.[7] Another study of nearly 35,000 all-payer hospitalized patients found a survival advantage among Black patients after clinical risk adjustment for COVID-19 complications, such as organ failures (e.g., acute respiratory failure, shock, sepsis, acute kidney failure, liver damage).[8] Finally, a multicenter study with more granular clinical risk adjustment data found that neighborhood disadvantage, as measured by the area deprivation index (ADI), independently predicted in-hospital COVID-19 mortality.[9] Taken together, this body of literature suggests that case fatality rates among Black patients

hospitalized with COVID-19 are mitigated by younger age and female sex but aggravated by pre-existing chronic conditions, severity of organ failure, and residential segregation that results in neighborhood disadvantage and differential access to high-quality hospitals.

Missing from this literature is any information about preferences for life-supporting treatment and associated treatment intensity. Individual preferences for life-supporting treatment strongly influence outcomes of critical illness.[10] White people are more likely to have advance care planning (ACP) conversations and advance directives (ADs) than minoritized groups.[11] Disparities in ACP and differences in life-supporting treatment may influence outcomes across racial/ethnic groups hospitalized for COVID-19. In this study, we describe differences between non-Hispanic White, non-Black Hispanic, and Black or African American patients hospitalized with COVID-19 in their rates of inpatient ACP conversations, do not resuscitate (DNR) orders, intensive care unit (ICU) admission, mechanical ventilation, and in-hospital mortality.

METHODS

Setting

The data for this study comes from Sound Physicians, a national medical group that specializes in hospital medicine, critical care, and emergency medicine. At most of the 200 community hospitals where it is based, this group is the only hospital medicine provider and manages the majority of admissions and discharges. This medical group serves many hospitals in states that were impacted by the early COVID-19 surge, including Washington, Michigan, and Ohio as well as several in the broader metropolitan area of New York City. Since 2017, the medical group has implemented a multilevel quality improvement initiative to increase ACP among inpatients.

Patients

This analysis is based on a database that includes review of the electronic health records (EHR) for adult patients who were hospitalized for treatment of COVID-19 infection between March and June 2020. Patients being treated for COVID-19 were identified using the medical group's electronic billing platform which provides clinical diagnoses supplied by treating physicians (hospitalists) who are prompted on patient admission to identify whether patients are being treated for COVID-19. Stratified (by month) random sampling of COVID-19 patients was used to restrict the number of records for review to 100 patients per hospital. We restricted analyses for the current study to those (n=7,997) treated at hospitals (n=135) with electronic health record systems that allowed chart reviewers employed by the medical group to access the ICU portions of the health record.

The EHR review was performed by trained abstractors at each hospital using a templated instrument specific to the EHR used in their hospital. The data abstracted included the following: patient demographics (age, sex, race/ethnicity) and comorbidity (cancer, coronary artery disease/myocardial infarction, cardiovascular disease/stroke, dementia, diabetes, HIV/AIDS, hypertension, heart failure, kidney disease, liver disease, respiratory disease, obesity, and smoking[12]), information regarding the elicitation (presence or absence of a billed (CPT codes 99497 or 99498) advance care planning conversation) or documentation of treatment preferences (code status: do not resuscitate (DNR), full code, or other), use of intensive treatments including intensive care unit (ICU) admission and mechanical ventilation (MV), and patient outcome (in-hospital mortality).

We focus on race/ethnicity in this study to explore different experiences with the healthcare system by racialized minority groups. In the USA, non-White race and Hispanic ethnicity are associated with adverse health exposures, poorer access to healthcare, and discrimination in their interactions with the health system due to systemic racism.[13–19] Studying healthcare delivery by racial/ethnic group should not be interpreted as reflecting any genetic or biologic risk for COVID-19 illness severity. We collected race and ethnicity data following NIH guidelines; race: White, Black or African American, Asian, American Indian or Alaska Native, and Native Hawaiian or Pacific Islander and ethnicity: Hispanic or non-Hispanic. For the purposes of this analysis, numbers of American Indian or Alaska Native (n=97), Asian (n=157), and Native Hawaiian or other Pacific Islander (n=22) were deemed too small for reliable estimates and so were dropped from the analysis. We further classified patients into mutually exclusive categories: non-Hispanic White (n=4,918), non-Black Hispanic (n=1,254), and Black or African American (n=1,825). We recognize that such categorizations are oversimplifications and do not measure the ways that intersectional identities (e.g., Black racial identity and Hispanic/Latinx ethnic identity) may further exacerbate inequities.

Among decedents, we classified the mode of death into four mutually exclusive groups based upon treatment intensity and code status: treatment limitation (no MV/DNR), treatment withdrawal (MV/DNR), maximal life support (MV/no DNR), and other (no MV/no DNR) and examined adjusted differences by race/ethnicity.

Statistical Analyses

Standard statistical methods including t-tests for continuous variables and chi-square tests for categorical variables were used to evaluate the statistical significance of differences in demographic characteristics and comorbidity for patients in each race/ethnic group. We used mixed effects logistic regression to examine the relationships between race/ethnicity and treatment intensity and mortality adjusted for adjusting for age category, sex, comorbidity, month of hospitalization, and

clustering within hospital. We used the White patient group as the reference standard in regressions because this group had the largest sample size.

Ethical Review and Approval

The analysis was approved by the Dartmouth College Committee for the Protection of Human Subjects.

RESULTS

Table 1 compares patient characteristics by race/ethnicity category. The most striking difference among the race/ethnic categories was in age; 22% of White, 9% of Hispanic, and 12% of Black patients were >80 years of age ($p<0.0001$). Hispanic patients were significantly more likely to be male (54%) than White (49%) or Black (48%) patients. In general, White patients had higher rates of cancer, heart disease, and dementia than Hispanic or Black patients. However, Black patients had higher rates of obesity, diabetes, hypertension, renal failure, and asthma than White or Hispanic patients. Similar trends in patient characteristics by race/ethnicity were apparent in the subgroup of decedents.

Crude in-hospital mortality rates (Fig. 1) were significantly lower among Hispanic (6%) than among White (12%) or Black (11%) patients ($p<0.0001$). In adjusted analyses (Fig. 1), in-hospital mortality was similar between White (8%) and Black patients (9%, OR=1.1, 95% CI=0.9–1.4, $p=0.254$), and lower among Hispanic patients (6%, OR=0.7, 95% CI=0.6–1.0, $p=0.032$).

Table 2 compares ACP, code status, and treatment intensity by race/ethnicity category. Overall and in the decedent subgroup, the crude rates of ICU and MV use were higher among Black and Hispanic patients and crude rates of ACP and DNR were significantly higher among White than among Hispanic or Black patients. In adjusted analyses (Table 3), Black and Hispanic patients were significantly more likely to be treated in the ICU (White 23%, Hispanic 27%, Black 28%) and with mechanical ventilation (White 12%, Hispanic 17%, Black 16). Rates of ACP were similar (White 12%, Hispanic 12%, Black 11%), yet Black and Hispanic patients were less likely to have a DNR order (White 13%, Hispanic 8%, Black 7%).

Among those who died (Fig. 2), there were significant differences in mode of death by race/ethnicity (treatment limitation: White 39%, Hispanic 17% (OR=0.3, 95% CI=0.1–0.6, $p=0.001$), Black 18% (OR=0.3, 95% CI=0.2–0.5, $p<0.0001$); treatment withdrawal: White 26%, Hispanic 43% (OR=2.6, 95% CI=1.4–4.8, $p=0.002$), Black 28% (OR=1.2, 95% CI=0.8–1.8, $p=0.542$); and maximal life support: White 21%, Hispanic 26% (OR=1.4, 95% CI=0.7–2.7, $p=0.307$), Black 36% (OR=2.4, 95% CI=1.5–3.47, $p<0.0001$)).

DISCUSSION

This analysis of medical records from patients hospitalized across the USA reproduces findings from many other studies

Table 1 Demographic and Clinical Characteristics of White Non-Hispanic, White Hispanic, and Black Patients Hospitalized with COVID-19 in 135 US Community Hospitals, March–June 2020

Variable	Overall				Decedents			
	White	Hispanic	Black	*p*-value	White	Hispanic	Black	*p*-value
n	4,918	1,254	1,825		586	77	203	
%	61	16	23		68	9	23	
Age category: <30 years	3	7	4	<0.0001	1	0	1	<0.0001
30–39 years	5	15	8		1	6	0	
40–49 years	8	19	11		3	6	3	
50–59 years	16	22	22		8	18	12	
60–69 years	23	17	26		17	25	31	
70–79 years	23	11	17		30	25	27	
80+ years	22	9	12		41	19	25	
Male	49	54	48	0.002	52	73	57	0.002
Cancer	10	4	7	<0.0001	15	4	11	0.021
Cirrhosis	2	2	2	0.290	2	1	1	0.372
CAD/MI	17	7	11	<0.0001	21	17	17	0.412
CVA/stroke	7	4	8	<0.0001	9	8	10	0.791
Dementia	8	3	4	<0.0001	16	13	7	0.006
Diabetes	28	32	34	<0.0001	29	46	42	<0.0001
HIV/AIDS	1	1	2	<0.0001	0	1	1	0.396
Hypertension	49	39	56	<0.0001	54	53	60	0.368
Heart failure	16	8	14	<0.0001	23	17	19	0.329
Chronic kidney disease	9	6	9	0.001	14	10	15	0.622
Renal failure	4	5	7	<0.0001	4	10	10	<0.0001
Asthma	8	5	9	0.002	6	0	4	0.087
Emphysema	22	6	10	<0.0001	24	12	12	<0.0001
Obesity	14	16	18	<0.0001	13	10	18	0.129
Smoker	22	11	18	<0.0001	17	13	15	0.478
Total comorbidities ≥3	35	22	34	<0.0001	42	38	45	0.474

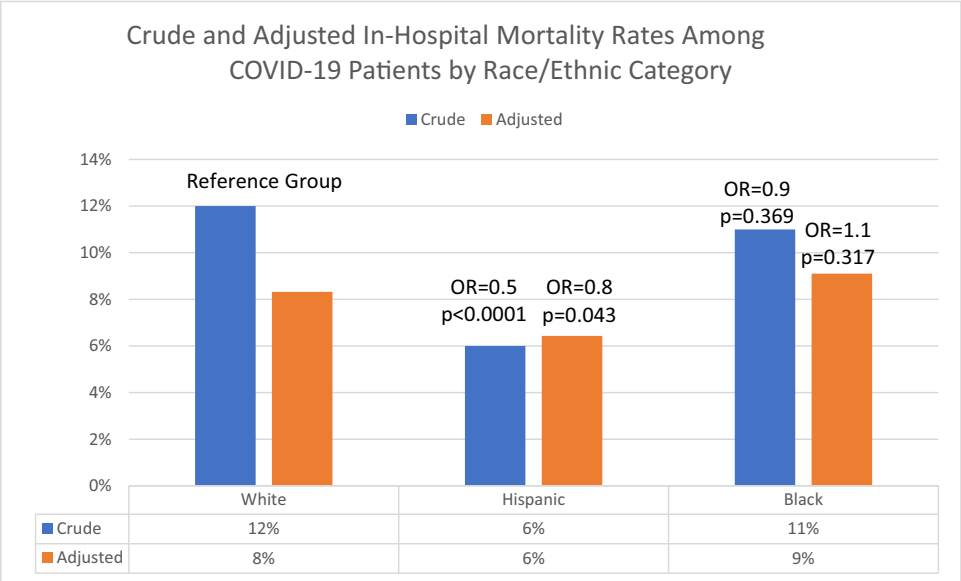


Fig. 1 Crude and adjusted in-hospital mortality rates among COVID-19 patients by race/ethnic group. Logistic regression models adjusted for age category, sex, comorbidity, month of hospitalization, and clustering within hospital.

of COVID-19—non-Hispanic White, non-Hispanic Black, and Hispanic persons had very different epidemiologic experiences of serious illness. After accounting for the substantial differences in age distributions across the three groups, we found similar rates of documented ACP conversations overall, but fewer DNR orders and greater treatment intensity among Black and Hispanic patients. Black and Hispanic patients' higher use of ICU and MV may reflect the absence of treatment limitations or greater unmeasured illness severity, in which case Black and Hispanic patients' greater treatment intensity would need to have been protective against inpatient death for these groups to have similar risk-adjusted death rates to White patients. Regardless, care patterns among decedents suggest different modes of death for the three groups: White patients were most likely to die with treatment limitations, Hispanic patients were most likely to die after a trial of life-supporting treatment, and Black patients were most likely to die on maximal life-supporting treatment.

Many studies have demonstrated that Black and Hispanic patients have lower rates of outpatient ACP and advance directive completion.[20,21] These differences persist across populations at high risk of dying, including patients with advanced cancer[22] and nursing home residents,[22] and have been variously attributed to religious and cultural values, lack of knowledge, problems with the trustworthiness of our health system, and failure by providers to broach the topic with minorities.[20,23–32] In the first weeks of the US COVID-19 surge, there were urgent calls for ACP and decisions about DNR orders.[33] In our sample, 14% of patients admitted with COVID-19 had a documented and billed ACP conversation. Time-based CPT billing codes are an accurate measure of conversations about treatment preferences because they require adherence to time and documentation requirements. Indeed, due to stringent documentation requirements, including completion of a separate ACP progress note, this is likely to be an undercount of conversations to establish the patient's healthcare proxy or to probe for pre-existing AD documentation. Interestingly, among all COVID-19 admissions, there were no statistically significant differences in the risk-adjusted rate of billed ACP by race/ethnicity; however, among decedents, Black patients were significantly less likely to have billed ACP than non-Hispanic White and Hispanic decedents.

Table 2 Crude Rates of Advance Care Planning (ACP) Conversations, Do Not Resuscitate Orders, Admission to the Intensive Care Unit, and Receipt of Invasive Mechanical Ventilation Among White Non-Hispanic, White Hispanic, and Black Patients Hospitalized with COVID-19 in 135 US Community Hospitals, March–June 2020

Variable	Overall				Decedents			
	White	Hispanic	Black	*p*-value	White	Hispanic	Black	*p*-value
n	4,918	1,254	1,825		586	77	203	
%	61	16	23		68	9	23	
Advance care planning	15	11	12	<0.0001	26	25	17	0.034
Do not resuscitate order	22	9	10	<0.0001	71	60	47	<0.0001
Intensive care unit	25	26	28	0.008	63	84	81	<0.0001
Mechanical ventilation	13	16	18	<0.0001	46	78	70	<0.0001

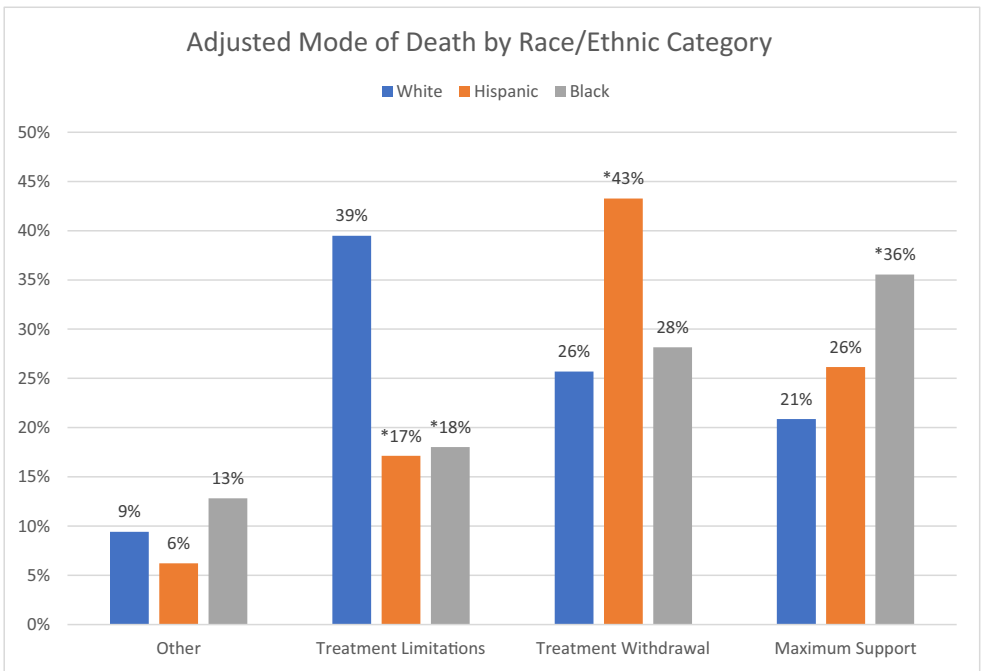
Table 3 Adjusted Rates of Advance Care Planning (ACP) Conversations, Do Not Resuscitate Orders, Admission to the Intensive Care Unit, and Receipt of Invasive Mechanical Ventilation Among White Non-Hispanic, White Hispanic, and Black Patients Hospitalized with COVID-19 in 135 US Community Hospitals, March–June 2020

Variable	Overall adjusted					Decedents adjusted				
	Rate	OR	LB 95% CI	UB 95% CI	*p*-value	Rate	OR	LB 95% CI	UB 95% CI	*p*-value
ACP (14% overall)										
White	12%					26%				
Hispanic	12%	0.9	0.7	1.2	0.478	30%	1.3	0.7	2.4	0.482
Black	11%	0.9	0.7	1.1	0.161	18%	0.6	0.4	0.9	0.022
ICU (26% overall)										
White	23%					65%				
Hispanic	27%	1.2	1.0	1.4	0.014	84%	3.2	1.5	6.5	0.002
Black	28%	1.3	1.1	1.5	0.001	80%	2.3	1.5	3.5	<0.0001
MV (15% overall)										
White	12%					48%				
Hispanic	17%	1.5	1.2	1.8	<0.0001	75%	3.9	2.0	7.6	<0.0001
Black	16%	1.4	1.2	1.6	<0.0001	66%	2.4	1.6	3.6	<0.0001
DNR (17% overall)										
White	13%					69%				
Hispanic	8%	0.6	0.5	0.8	<0.0001	68%	0.9	0.5	1.8	0.861
Black	7%	0.5	0.4	0.6	<0.0001	50%	0.4	0.3	0.6	<0.0001

We follow biostatistics recommendations to treat the subgroup with the largest sample size as the "reference standard." This reference standard should not be interpreted to mean that the characteristics and outcomes of Whites are superior to those in racialized minority groups

Rates of DNR orders are lower among Black hospitalized patients across multiple conditions.[34–37] COVID-19 is no exception; in our sample overall, risk-adjusted DNR rates were lower among Black and Hispanic patients; however, among decedents, Black but not Hispanic patients had lower risk-adjusted DNR rates. While such differences may represent true preferences for more aggressive medical care, it is also possible that this is the outcome of conversations by hospitalists who carry explicit and implicit biases and beliefs about Black patients' treatment preferences.[38,39] Indeed, conditional on palliative care consultation with skilled goals of care discussions, race-based differences in code status tend to disappear.[40,41]

We used DNR orders as a crude proxy for broader life-sustaining treatment preferences. There are limitations to this approach, since DNR orders only govern advance cardiac life support and cardiopulmonary resuscitation in the event of pulselessness. A DNR order should not inform intubation



* Difference compared to white category is statistically significant

Fig. 2 Adjusted mode of death by race/ethnic group. Mixed effect regression models adjusted for age category, sex, comorbidity, month of hospitalization, and clustering within hospital. The "other" category includes patients who died shortly after admission, with or without attempted cardiopulmonary resuscitation.

and MV preferences in the event of hypoxemic respiratory failure, which is the most common antecedent of death in COVID-19 patients. DNR orders may proxy illness severity rather than preferences since they are commonly written when a patient is actively dying to avoid burdensome CPR at the time of death.[10] Nevertheless, we used the combination of DNR status and receipt of MV to infer the mode of a patient's death from COVID-19. Even after adjusting for age, comorbidity, and hospital, we found that White patients were more likely to die with a DNR order and no MV, suggesting that life-supporting treatment was never started. In contrast, Hispanic patients were more likely to die with a DNR order and MV, suggesting that life-supporting treatment was started but, at the very least, CPR was withheld; MV may have been withdrawn. Finally, Black patients were more likely to die without a DNR order and with MV, suggesting that life-supporting treatment was not limited and they died on full support. While these are speculative conclusions regarding care patterns, if accurate, they raise concerns regarding race-based differences in burdensomeness of end-of-life care for COVID-19 patients. Such patterns would be consistent with our knowledge of non-COVID end-of-life care for Black patients.[20,42–44]

Our study has many strengths, including a large sample size drawn from hospitals across the USA. Our analyses adjust for hospital random effects, which is key given our knowledge of the influence of hospital practice patterns on racial differences in end-of-life care.[45] However, our study is also subject to several limitations. Our findings may not be generalizable, given that these hospitalizations were managed by a national medical group that has focused on improving the frequency of ACP among inpatients since 2017. However, this universal focus on ACP may have mitigated disparities in broaching these conversations. We relied on retrospective chart review, and race and ethnicity may not be reliably documented in the EHR and all datapoints are subject to the accuracy and completion of electronic documentation by the care team. We did not collect information regarding COVID-19 illness severity, such as admission vital signs, laboratory values, or organ failures. We also did not have data regarding language barriers to communication, area-level measures of socioeconomic status, or insurance status. We did not have information about the quality or timing of ACP conversations, nor did we abstract information about palliative care consultation. We do not know whether DNR orders were pre-existing or new. We did not abstract other orders governing life-sustaining treatment, such as "do not intubate" or "do not transfer to the ICU." Finally, our categories of "mode" of death are imperfect approximations of complex care patterns and may be subject to misspecification. Finally, we do not know if treatment was goal concordant. Future research could explore these issues via in-depth review of clinical chart documentation. Additional approaches to studying racial bias in communication and medical decision-making include ethnography and case-based simulation.[46] Addressing disparities in goal-concordant medical decision-making requires specialized knowledge of intercultural communication theory and preference construction.[47]

CONCLUSION

In this national sample from early in the COVID-19 pandemic, hospitalized Black and Hispanic COVID-19 patients received greater treatment intensity than White patients. This may have simultaneously mitigated disparities in in-hospital mortality while increasing burdensome treatment near death. White patients were most likely to die with treatment limitations, Hispanic patients were most likely to die after a trial of life-supporting treatment, and Black patients were most likely to die on maximal life-supporting treatment. These observations highlight profound differences in the experiences of hospitalized COVID-19 patients from different racial and ethnic groups.

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Authors Contribution: *NJB, AEB, JSS, and JDB developed the research question and analysis plan. JSS obtained research funding and JDB obtained the data. NJB conducted data analysis with oversight by AJO. AEB and NJB co-wrote the manuscript and JSS, JDB, GRJ, and AJO provided critical feedback on the manuscript.*

Declarations:

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