Race is a Predictor of Withdrawal of Life Support in Patients with Intracerebral Hemorrhage

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Introduction: Medical and socioeconomic factors may impact decisions to change the goals of care for patients with intracerebral hemorrhage (ICH) to comfort measures only. Methods: We reviewed prospectively collected data on patients with ICH, including baseline patient demographics, Glasgow Coma Scale (GCS), National Institute of Health Stroke Scale (NIHSS), and ICH score. We conducted multivariable logistic regression analysis to identify predictors of change to comfort measures only status. Results: Of 198 patients included in the analysis, 39 (19.7%) were made comfort measures only. Age, gender, insurance status, substance use, and medical comorbidities were similar between groups. Race was significantly different between the comfort measures only (black 15.4%, white 51.3%, other 33.3%) and noncomfort measures only groups (black 39.6%, white 45.9%, other 14.5%; $P = .003$). Patients changed to comfort measures only had higher mean income based on zip code ($59,264 versus $49,916; $P = .021$), higher median NIHSS (23 versus 16; $P = .0001$), higher ICH score (2.7 versus 1.5; $P < .0001$), lower median GCS (7 versus 13; $P < .0001$). Following multivariable analysis, factors associated with comfort measures only were GCS odds ratio (OR) 0.77, 95% confidence interval (CI) 0.68-0.86, $P < .0001$), intraventricular hemorrhage (IVH) volume (OR 1.03, 95% CI 1.01-1.06, $P = .002$), and black race (OR 0.24, 95% CI 0.07-0.82, $P = .022$). Mortality, poor outcome, and hospital length of stay were not significantly different between black and white patients. Conclusions: Lower GCS score, higher IVH volume, and race were independent predictors of comfort measures only. Black patients were 76% less likely to withdraw life support than white patients. There were no significant differences in mortality between black and white patients. Providers should be aware of potential racial disparities.

Key Words: Stroke—ICH—Intracerebral hemorrhage—Goals of care—Race—Socioeconomic status—Hemorrhage

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Introduction

Intracerebral hemorrhage (ICH) is a leading cause of death and disability in the United States.[1,2] Case mortality of ICH is estimated to range from 30% to 50%.[3,4] There has been little change in the mortality rate of ICH in the past 20 years despite advances in neurocritical care.[5-7] ICH also carries a high morbidity, with only 30% of ICH patients being functionally independent 3 months after presentation.[8] As there are few effective therapies, many patients will die in hospital.

Prognostication in ICH is complex. Many patients admitted with ICH will be neurologically injured but have stable cardiovascular and respiratory function. Consequently, many die after the decision is made to withdraw life sustaining treatment by changing the patient's goals of care (GOC) to Comfort Measures Only (CMO).

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Of patients admitted to the Neuroscience Intensive Care Unit (NSICU) with ICH, anywhere from 5% to 70% will change their code status Do Not Resuscitate (DNR) or CMO after admission, depending to a large extent on treatment center.[9]

Much work has been done on the associations between pre-morbid medical factors and admission characteristics on patient outcome from ICH.[10] The relationship between socioeconomic and cultural factors with GOC decisions in ICH, however, is a complex area of ongoing research. There is evidence that socioeconomic factors and race affect decisions to withdraw care in NSICU patients, including patients with ICH, though the effect on mortality is less clear.[11-13] We sought to examine how socioeconomic and racial disparities impact GOC decisions in ICH.

Methods

Patient Selection

We reviewed prospectively collected data for patients admitted to the Memorial Hermann Hospital in Houston, Texas between 2010 and 2015. Patients were included if they had an admission diagnosis of ICH and were 18 years of age or older. Patients were excluded if ICH was secondary to other underlying etiology such as vascular malformation/aneurysm, vasculopathy, tumor or trauma. Patients with a known disorder of coagulation or thrombocytopenia were also excluded. This study was approved by the University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects.

Patients were enrolled as part of an ongoing, prospective research repository. Patients were considered for enrollment if they presented within 24 hours of symptom onset. Informed consent was obtained from all participants or their legally authorized representative within 24 hours of admission. Patients with delayed presentation (>24 hours) and those unable to consent within 24 hours of admission were therefore excluded.

Patients were all admitted to the same NSICU under the care of both the Neurocritical Care and Stroke teams. Patients were managed according to institutional ICH protocols. There was not a standardized approach to family meetings; they may have been led by the Neurocritical Care team, Stroke team, or both. Meetings included but were not limited to: the patient's family, nurse, Neurocritical Care attending, Stroke attending, social worker, and the Supportive Medicine service. All decisions regarding goals of care, including DNR and CMO, were made with the family's input and according to their wishes.

Study Design

Baseline demographics were collected including age, gender, race, body mass index (BMI), zip code, marital status, insurance type, religion, and employment status. Race was subdivided into 3 categories; black, white, and other. Asian, Hawaiian/Pacific Islander, and Native American/Alaskan Native were included in the other category. BMI was analyzed both by assessing medians and by dividing into obese (BMI $\geq$30) and nonobese categories. As income data was not available, we used average income by zip code obtained from the US census data as a proxy.[14] Past medical history, baseline vital signs, and laboratory data were reviewed. The age-adjusted Charlson comorbidity index was calculated using the patient's medical history from the electronic medical record. Estimated 10-year survival prior to admission was calculated using the Charlson comorbidity index.[15,16] National Institute of Health Stroke Scale (NIHSS) and Glasgow Coma Scale (GCS) were obtained at the time of presentation. Imaging was reviewed by an attending neurointensivist for hematoma volume, location, as well as the presence of intraventricular hemorrhage (IVH). ICH and IVH scores were calculated using this data.[17, 18]

Primary outcome was defined as a change in GOC to CMO. Additional outcome data examined included DNR code status, hospital mortality, intensive care unit (ICU) and hospital length of stay, and modified Rankin Scale (mRS) at discharge. Poor outcome was defined as mRS 4-6.

Statistical Analysis

Continuous variables with normal distributions were summarized by mean $\pm$ standard deviation, and variables with skewed distributions were summarized by median and interquartile range. Categorical variables were reported with frequency and percentages. The comparison of demographics, socioeconomic data, past medical history, and baseline clinical data between the CMO and non-CMO groups were conducted using t test (or Wilcoxon rank sum test) for continuous variables and chi-square test (or Fisher exact test) for categorical variables as appropriate. Stepwise selection method (with a significance level of 0.20 for a variable to enter into the model and a significance level of 0.05 for a variable to stay in the model) was used to identify independent factors associated with the change in GOC to CMO. The adjusted odds ratios of changing in GOC to CMO as well as their 95% confidence intervals were calculated. All statistical analyses were conducted using SAS 9.4 (SAS Institute, Cary, NC). A P value <.05 was considered significant.

Results

A total of 198 patients with ICH were included in the analysis. Overall, 93 (47%) were white, 69 (34.8%) were black, and 36 (18.2%) were categorized as other. The other group contained: 0 American Indian/Alaskan, 8 Asian, 1 Native Hawaiian/Pacific Islander, and 27 other/unknown patients. Code status was changed to DNR in 52 (26.2%)

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