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Ethnic Differences in Do-not-Resuscitate Orders after Intracerebral Hemorrhage

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Abstract

OBJECTIVE—To explore ethnic differences in do-not-resuscitate (DNR) orders after intracerebral hemorrhage (ICH).

DESIGN—Population-based surveillance.

SETTING—Corpus Christi, Texas.

PATIENTS—All cases of ICH in the community of Corpus Christi, Texas were ascertained as part of the Brain Attack Surveillance in Corpus Christi (BASIC) Project.

INTERVENTIONS—None.

MEASUREMENTS—Medical records were reviewed for DNR orders. Unadjusted and multivariable logistic regression were used to test for associations between ethnicity and DNR orders, both overall ("any DNR") and within 24 hours of presentation ("early DNR"), adjusted for age, gender, Glasgow coma scale, ICH volume, intraventricular hemorrhage, infratentorial hemorrhage, modified Charlson index, and admission from a nursing home.

MAIN RESULTS—A total of 270 cases of ICH from 2000–2003 were analyzed. Mexican Americans (MAs) were younger and had a higher Glasgow coma scale than non-Hispanic whites (NHWs). MAs were half as likely as NHWs to have early DNR orders in unadjusted analysis (odds ratio (OR) 0.45, 95% CI 0.27, 0.75), though this association was not significant when adjusted for age (OR 0.61, 95% CI 0.35, 1.06) and in the fully adjusted model (OR 0.75 95%CI 0.39, 1.46). MAs were less likely than NHWs to have DNR orders written at any time point (OR 0.37, 95% CI 0.23, 0.61). Adjustment for age alone attenuated this relationship, though it retained significance (OR 0.49, 95% CI 0.29, 0.82). In the fully adjusted model, MAs were less likely than NHW to use DNR orders at any time point, though the 95% confidence interval included one (OR 0.52, 95% CI 0.27, 1.00).

CONCLUSIONS—MAs were less likely than NHWs to have DNR orders after ICH, though the association was attenuated after adjustment for age and other confounders. The persistent trend toward less frequent use of DNR orders in MAs suggests that further study is warranted.

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Keywords

Cerebral hemorrhage; Mexican Americans; Resuscitation Orders

INTRODUCTION

Do-not-resuscitate (DNR) orders and other forms of care limitations during critical care hospitalizations are associated with an increased risk of death for a variety of disease states independent of disease severity and other poor prognostic factors.(1–4) Hispanic Americans and other minority groups have been shown to be less likely to have care limitations such as DNR orders compared with non-Hispanic whites (NHWs).(5–7) Reasons for these ethnic differences are likely complex,(6) and may be due to social, religious, or cultural factors,(8) or possibly related to differences in underlying disease characteristics.

DNR orders are common after intracerebral hemorrhage (ICH),(1,4) which is more common among Hispanic Americans than NHWs.(9–11) Most prior studies reporting ethnic differences in end-of life care after stroke have focused on African Americans,(12,13) with little existing data on care limitations after stroke in Hispanics. Hispanics are the largest minority population in the United States, with Mexican Americans (MAs) making up the largest subgroup of Hispanics.(14) Given the frequent use of DNR orders after ICH, and the higher incidence of ICH in Hispanic Americans, we explored ethnic differences in use of DNR orders after ICH between MAs and NHWs. Our goals were to describe ethnic differences in DNR orders and other care limitations after ICH in this community, and to explore whether demographics and disease severity explained these differences.

MATERIALS AND METHODS

Case Identification and Data Collection

All cases of non-traumatic ICH in Nueces County, Texas were identified from January 1, 2000 through December 31, 2003 as a part of the population-based Brain Attack Surveillance in Corpus Christi (BASIC) Project. This urban community on the Texas Gulf Coast consists of approximately equal numbers of MAs and NHWs, and there are no academic medical centers among the seven hospitals in the county. Details of the study methods have been previously reported.(10,15) Briefly, trained abstractors used active surveillance to screen for possible stroke cases >44 years old among patients presenting with stroke symptoms or diagnosis in hospital emergency department or admissions logs. Passive surveillance, based on International Classification of Diseases, 9th revision (ICD-9) discharge diagnosis codes, was also used to supplement the active surveillance (codes 430–438, excluding codes 433.×0 and 434.×0 (× = 1–9), 437.0, 437.2, 437.3, 437.4, 437.5, 437.7, 437.8, and 438). Ethnicity was determined from the medical record, as we have previously identified 97% agreement (kappa =0.94) between medical record and patient self-reported ethnicity in this community.(10) Board-certified neurologists validated all stroke cases using source documentation including emergency department and hospitalization records blinded to the subject's age and ethnicity. If an individual had multiple ICH hospitalizations during the study period, only the first hospitalization was included in this analysis. Initial Glasgow Coma Scale (GCS) was collected from the medical record or abstracted from the chart if not explicitly coded. All initial CT scans were reviewed by one of four study neurologists using a standardized protocol blinded to ethnicity and clinical data as previously described.(15,16) ICH volume was assessed with the previously described A×B×C/2 method.(17) Intraclass correlation coefficients for pairwise comparisons between reviewers on a 10% sample ranged from 0.86 to 0.97 for ICH volume, suggesting high inter-rater reliability.(15) Presence of intraventricular hemorrhage was noted,

and hemorrhage location was recorded as infratentorial (brainstem or cerebellum), lobar, deep cerebral (including thalamus and basal ganglia combined), or multifocal.

The modified Charlson comorbidity index(18) was determined for each case on the basis of discharge ICD-9 codes using the algorithm described by Quan.(19) The modified Charlson index, described for use in stroke patients, eliminates co-morbidity categories of "cerebrovascular disease" and "hemiplegia or paraplegia" in the calculation of the total Charlson index. The modified Charlson index was dichotomized as low (0–1) or high (≥2) for analysis.(18)

Limitations in Overall Aggressiveness of Care

Medical records from the original ICH hospitalization were reviewed by a single investigator (DZ) to assess for physician orders or documentation in the progress notes of limitations in the overall aggressiveness of care provided to the patients as previously described.(4) The decision to discuss care limitations was at the discretion of the treating physicians. Limitations in overall aggressiveness of care were coded for the following categories: DNR, withdrawal of support, and deferral of other life sustaining interventions. DNR orders were defined as any plan to limit cardiopulmonary resuscitation or mechanical ventilation in the event of a cardiac or respiratory arrest. DNR status which pre-dated the hospitalization was noted and classified as a preexisting DNR order. Withdrawal of support was defined as evidence in the hospital chart or physician orders to withdraw mechanical ventilation, fluid or nutritional support, vasopressors, or antibiotics after they had been initiated. If these treatments were discontinued because they were no longer necessary, this was not coded as a withdrawal of support. Deferral of other life sustaining interventions was defined as the decision to defer treatment with fluid or nutritional support, vasopressors, or antibiotics before such treatment had begun. Patients who were declared brain dead based on American Academy of Neurology criteria(20) or who had at least one clinical examination consistent with brain death (but no formal declaration of brain death) were not coded as DNR, withdrawal, or deferral unless the care limitation order clearly preceded the clinical examination consistent with brain death. Care limitations which occurred within 24 hours of presentation (including pre-existing DNR orders) were classified as "early" to be consistent with prior studies.(1,5,13) No data were available on the language of the DNR order discussion, use of interpreters, or which family members were involved in the discussion.

Statistical Analysis

Demographics, baseline characteristics, limitations of care, and CT findings were compared by ethnicity using chi-square tests, Fisher's exact test, or Wilcoxon rank-sum tests. Detailed ICH imaging characteristics and stroke risk factors by ethnicity for this population have been previously reported.(15) DNR, withdrawal, and deferral orders at the various time points (any, pre-existing, or early) were compared by ethnicity using chi-square tests. Lobar location and side of hemorrhage was compared by DNR status using chi-square tests. Demographic and clinical characteristics of individuals with withdrawal of care were compared with chi-square tests or Wilcoxon rank-sum tests.

Univariable and multivariable logistic regression was used to determine the association between ethnicity and early DNR orders and any DNR orders. All covariates for the models were pre-selected based on biological plausibility or prior association with mortality after ICH (21) or with DNR orders(22) and included age, gender, initial GCS, ICH volume, intraventricular hemorrhage, infratentorial hemorrhage, modified Charlson index, and admission from nursing home. Age, GCS, and ICH volume were modeled as continuous variables, while other covariates were treated dichotomously. Admission from nursing home was used as a marker of poor pre-ICH functional status

Prior analysis of this population showed that MAs were younger and more likely to have small hemorrhages than NHWs.(15) Since age and hemorrhage volume are also associated with DNR orders,(4) we suspected that age and hemorrhage volume could be particularly important confounders of the ethnicity-DNR relationship. To explore the degree of confounding explained by age and ICH volume, models were run unadjusted, adjusted for age alone and then adjusted for age and ICH volume, in addition to a fully adjusted model. Logistic regression models were not performed for the withdrawal or deferral categories due to low numbers and substantial overlap with DNR orders.(4) Statistical analysis was performed using S-plus 7.0 for Windows (Insightful Corp., 2002) and SAS version 9.1 (SAS Institute, 2002). This study was approved by the institutional review boards of the University of Michigan and the individual Corpus Christi hospital systems.

RESULTS

A total of 297 cases of validated ICH were identified during the study period. Three cases were excluded because of non-MA or NHW status, and seven cases were excluded as recurrent ICH during the study period. Seventeen cases were excluded based on alternative diagnoses discovered during CT scan or DNR record review, leaving a total of 270 cases of ICH for analysis with CT data available on 253. Demographic and baseline characteristics are presented in Table 1. MAs were younger and more often male than NHWs. MAs also had a higher GCS at initial presentation, indicating less severe neurological injury.

Unadjusted analysis of care limitations by ethnicity is presented in Table 2. MAs were less likely than NHWs to have DNR orders at all time points (pre-existing, early, and any). MAs were also less likely than NHWs to have deferral of other life sustaining interventions. There was no association between lobar location of hemorrhage and DNR orders (early or any). There was no association between side of hemorrhage and DNR orders (early or any, see Table, Supplemental Digital Content 1). There was no ethnic difference in withdrawal of support. Individuals who had withdrawal of support at any time had higher hemorrhage volumes, lower GCS, were more likely to have intraventricular hemorrhage, though were not different in age or gender compared with all other cases (see Table, Supplemental Digital Content 2).

Results of the multivariable logistic regression models predicting DNR orders are shown in Table 3. MAs were about half as likely as NHWs to have early DNR orders in unadjusted analysis (odds ratio (OR) 0.45, 95% confidence interval (CI) 0.27, 0.75). However, after adjustment for age, the association was less strong and no longer significant (OR 0.61, 95% CI 0.35, 1.06). Additional adjustment for ICH volume further attenuated the ethnicity-early DNR relationship, as did adjustment for other baseline characteristics (Table 3). In the fully adjusted model, only age (OR 1.06, 95% CI 1.03, 1.10) and GCS (OR 0.85, 95%CI 0.78, 0.92) were significantly associated with early DNR.

MAs were also less likely than NHWs to have DNR orders at any time (OR 0.37 95% CI 0.23, 0.61, Table 3). In contrast to early DNR orders, the association between ethnicity and any DNR order remained significant when adjusting for age alone, and for age and ICH volume (Table 3). However, age was an important confounder of the ethnicity-any DNR relationship as this OR changed by about 30% with adjustment for age (see Model 2, Table 3). In the fully adjusted model, MAs were just over half as likely as NHWs to have any DNR order, though the 95% confidence interval for the OR included one (OR 0.52, 95% CI 0.27, 1.00). Other factors significantly associated with DNR orders at any time in the fully adjusted model included age (OR 1.06 95% CI 1.03, 1.09), GCS (OR 0.88, 95% CI 0.81, 0.96), intraventricular hemorrhage (OR 2.78, 95% CI 1.41, 5.46), admission from a nursing home (OR 4.43, 95% CI 1.03, 19.00), and high modified Charlson index (OR 2.74, 95% CI 1.32, 5.68).

DISCUSSION

We found that MAs with ICH were less likely than NHWs to have DNR orders or deferral of other life sustaining interventions during their ICH hospitalization compared with NHWs. However, MAs' younger age and less severe hemorrhages confounded these observed associations. Nonetheless, there was a lower use of DNR at any time point and a trend toward a lower use of early DNR in MAs after adjustment for these and other factors. These results suggest that further study in larger populations is warranted

Other studies reporting on ethnic differences in end-of-life care have been performed in a variety of settings, including general hospitalized populations,(5,12,13,23) surveys of older adults(6,7), and focus groups.(24) Heterogeneity in populations studied and disease states complicates comparisons among studies, and it is difficult to know if findings from surveys and interviews of well adults can be applied to our study. In general, prior studies have shown Hispanic Americans to be less likely than NHWs to use DNR orders and other forms of care limitations. It is possible that the less frequent use of DNR orders observed in MAs compared with NHWs is due to a combination of clinical, demographic, and possibly cultural factors(8) that require more detailed assessment to appreciate fully the complex factors surrounding this crucial decision making.

Religion and cultural values may play a role in the differential use of DNR orders in MAs, though one must use caution when attempting to apply the tendencies of a particular ethnic group to individuals. We were unable to assess directly which specific aspects of religious or cultural beliefs, if any, may have influenced DNR decisions in this population, though prior reports suggest several aspects of MA culture which may be contributing to the observed trends. MAs are typically Catholic, and may therefore be against withholding interventions which may lead to death.(8) MAs are more likely to endorse an emphasis on a family-centered model of decision making,(25) and may value the well-being of the family over that of the individual.(8) Finally, MAs may be reluctant to disagree with a physician as it could be considered disrespectful,(8) and may tend to rely on the doctor's judgment to make decisions.(6) These hypotheses would need to be addressed in future studies. However, physician specialty and hospital factors have been associated with use of DNR orders,(1,26) and clinicians may wish to exercise caution to avoid inadvertently applying their own values and beliefs when counseling MAs on life support decisions. Further study of the relationship between individual physician and patient factors is warranted, with particular attention to issues of cultural sensitivity.

Our study has several limitations. Our relatively small sample size limited our ability to detect smaller ethnic differences in DNR use. We did not have data on other potentially important confounding factors such as religiosity, socioeconomic status, use of interpreters, or acculturation, which should be addressed in future studies. Due to the retrospective nature of our study, we did not have data from direct physician or patient interviews as to reasons or attitudes toward DNR orders and other limitations in care. We were not able to adjust for physician or hospital factors in our models due to small numbers of patients treated at several of the hospitals, and the fact that individual physicians cover multiple hospitals in this community. Our data on neurological status was limited to the time of presentation, and thus we could not control for any neurological deterioration which may have occurred after initial presentation. We did not have sufficient numbers of patients with withdrawal of support for a separate multivariable analysis of this group, though there was no ethnic difference seen on unadjusted analysis. It is possible that withdrawal of support was seen infrequently due to the relatively frequent use of early DNR orders in this population (91/270, 34%), as individuals who were comfort care only from the time of admission would not have been coded as withdrawal of support. Based on our data, we can draw no conclusions about the

appropriateness of DNR orders and other care limitations in the individual patients in the study. Since our study was based on observational data, it is difficult to define what is ethically appropriate given the variability in individual preferences regarding end-of-life care.

CONCLUSIONS

This study suggests a possible association between MA ethnicity and DNR orders in patients with ICH. The confidence interval for the odds ratio of the association between ethnicity and any DNR order included one; however, the persistent trend toward less frequent use of DNR orders in MAs suggests that further study in larger populations is warranted to assess the role of cultural, physician, and hospital factors on decision making in critical illness such as ICH.

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Table 1

Demographic and Clinical Characteristics

Characteristic	MA N (%) or Median (IQR) N= 151	NHW N (%) or Median (IQR) N=119	p
Age	71 (59, 79)	79 (71, 86)	<0.001
Female gender	66 (44)	70 (59)	0.02
Hypertension[a]	115 (76)	81 (68)	0.11
Diabetes mellitus[a]	57 (38)	20 (17)	<0.001
Coronary artery disease	33 (22)	39 (33)	0.07
Admission from nursing home	6 (4)	15 (13)	0.02
High modified Charlson index	44 (29)	22 (19)	0.06
Glasgow coma scale	14 (7,15)	12 (5,15)	0.04
ICH volume	10 (3,27)	4 (4,48)	0.09
Infratentorial hemorrhage[b]	17 (12)	13 (12)	0.87
Intraventricular hemorrhage[b]	70 (49)	62 (57)	0.24
Craniotomy for hematoma evacuation	5 (3)	4 (3)	0.75
External ventricular drainage	6 (4)	6 (5)	0.90

MA: Mexican American, NHW: non-Hispanic white, IQR: interquartile range.

[a] Two MAs with missing data for these items.

[b] Seven MAs and ten NHWs missing data for these items.

Table 2

Limitations in Care by Ethnicity, Unadjusted.

Characteristic	MA N (%) N=151	NHW N (%) N=119	p
Pre-existing DNR order	6 (4)	14 (12)	0.03
Early DNR order	39 (25)	52 (43)	<0.01
Any DNR order	51 (34)	69 (57)	<0.001
Early Withdrawal of Support	8 (5)	5 (4)	0.86
Any Withdrawal of Support	18 (12)	15 (13)	0.99
Early deferral of other life sustaining interventions	15 (10)	24 (20)	0.03
Any deferral of other life sustaining interventions	24 (16)	37 (31)	<0.01

DNR: Do-not-resuscitate, MA: Mexican American, NHW: non-Hispanic white. All p-values by chi-square.

Table 3

Multivariable Models for DNR Orders by Ethnicity

	Model 1 Unadjusted OR (95%CI)	Model 2 Adjusted for Age OR (95%CI)	Model 3 Adjusted for Age, ICH volume OR (95%CI)	Model 4 Fully Adjusted[a] OR (95% CI)
Early DNR order				
Ethnicity[b]	0.45 (0.27, 0.75)	0.61 (0.35, 1.06)	0.75 (0.41, 1.36)	0.75 (0.39, 1.46)
Age		1.05 (1.03, 1.08)	1.06 (1.03, 1.09)	1.06 (1.03, 1.10)
ICH Volume (per cc)			1.02 (1.01, 1.03)	1.01 (1.00, 1.02)
Any DNR order				
Ethnicity[b]	0.37 (0.23, 0.61)	0.49 (0.29, 0.82)	0.56 (0.32, 0.99)	0.52 (0.27, 1.00)
Age		1.05 (1.03, 1.08)	1.05 (1.03, 1.08)	1.06 (1.03, 1.09)
ICH Volume[b]			1.02 (1.01 1.03)	1.01 (1.00, 1.02)

DNR: Do-not-resuscitate.

[a] Model 4 included ethnicity, age, gender, admission from a nursing home, Glasgow coma scale, hemorrhage volume, infratentorial hemorrhage, and intraventricular hemorrhage as covariates.

[b] Reference category for Mexican American is non-Hispanic white.

Supplemental Digital Content 1

Table of hemorrhage location and side by DNR status

	Early DNR	Not Early DNR	p	Any DNR	Not Any DNR	p
Lobar location[a]	34/88 (39%)	50/163 (31%)	0.26	40/116 (34%)	44/135 (33%)	0.86
Left sided[b]	42/79 (53%)	84/156 (54%)	0.97	56/106 (53%)	70/129 (54%)	0.93

[a] Exlcuded multifocal hemorhages, total n=251

[b] Excluded bilateral hemorrhages, total n=235

Supplemental Digital Content 2

Characteristics of individuals with withdrawal of care at any time point.

Characteristic	Withdrawal of care N (%) or Median (IQR) N= 33	No withdrawal of care N (%) or Median (IQR) N=237	p
Age	74.8 (68.6, 84.0)	73.8 (63.1, 81.6)	0.48
Female gender	21 (64%)	115 (49%)	0.15
ICH volume	28 (14, 57)	9.5 (3, 30)	<0.001
Glasgow coma scale	7 (4,10)	14 (7,15)	<0.001
High modified Charlson index	10 (31%)	56 (24%)	0.36
Intraventricular hemorrhage	27(82%)	105 (48%)	<0.001