Epidemiology of Injury, Morbidity, and Mortality in the Hispanic Population Using the National Trauma Data Bank, 2003 to 2010

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INTRODUCTION

A particular phenomenon of interest in health literature is the well-known "Hispanic Paradox." This refers to Hispanics having similar or lower mortality rates than non-Hispanic Whites, despite having higher risks associated with lower socioeconomic status. This has also been shown within the trauma population and indicates Hispanic patients are different than patients of other race and ethnicity.

The Hispanic population is the largest minority in the United States and is expected to comprise one in three residents by the year 2060. However, very little is known about trauma patients of Hispanic ethnicity.

While specialized studies previously conducted on trauma and mortality among Hispanic subpopulations reveal unique risks and outcomes, they do not address national trends in the host of different injury factors over time. Furthermore, evaluations of trauma mortality are often limited to small regions or involve grouping minorities into a single group as a comparator, thereby assuming minority patients are homogenous.

OBJECTIVES

- The purpose of this study was to define nationwide epidemiological trends in injuries and outcomes among Hispanic trauma patients.
- Additionally, Hispanic trauma patients were compared to non-Hispanic White and African American patients to determine what differences exist in and among race/ethnic groups in trauma, including mortality outcome.
- Lastly, mortality rates were calculated at each trauma center (TC) and by race/ethnicity at each TC.

METHODS

Patients:
We retrospectively analyzed adult (≥18 years of age) trauma patients using the National Trauma Data Bank's National Sample Program (NTDB NSP) from 2003 to 2010. Patients were divided into three groups: Hispanics (n=65,895), non-Hispanic Whites (NHWs, n=356,446), and African Americans (AAs, n=86,148). For our analyses, patients with a race and/or ethnicity classification of "Other" were not included, due to small sample size, and patients with missing data for covariates used in a logistic model to estimate mortality probability (see below) were not included.

Outcome: Injury Incidence and In-hospital Mortality

Statistical Methods:
Demographic and injury characteristics were evaluated by race/ethnicity. A resampling procedure was used to test for among-race differences in relative frequencies (categorical variables) or means (continuous variables) for each of the variables. Results are presented as proportions (categorical variables), or means and standard deviations (SD) (continuous variables).

Logistic regression was used to model mortality odds based on patient covariates for variables including age, gender, hypotension (systolic blood pressure < 90 mmHg), injury severity score (ISS), abbreviated injury score (AIS) for the head region, injury type, and Glasgow coma scale (GCS), which was treated as an ordinal variable. An additional variable was included in the model called the "hospitalization intensity score" (HIS) derived from length of hospital stay (days), number of days in ICU, and number of ventilator days.

RESULTS – DEMOGRAPHICS AND INJURY TRENDS

Table 1. National Trauma Demographic and Injury Characteristics by Race/Ethnicity.

		H	NHW	AA	P
n		65,895	356,446	86,148	
Gender (% Male)		76.5% [c]	63.1% [a]	74.7% [b]	0.001
Age		37.8 ± 16.4 [a]	49.9 ± 20.6 [c]	38.5 ± 16.4 [b]	0.001
ISS *		9.9 ± 9.8 [b]	11.3 ± 9.6 [c]	9.5 ± 9.8 [a]	0.001
AIS1 *		0.70 ± 1.16 [a]	0.76 ± 1.22 [b]	0.78 ± 1.16 [a]	0.001
Hypotension; SBP < 90		3.2% [a]	2.9% [a]	4.4% [b]	0.001
HIS *		1.19 ± 0.41 [a]	1.22 ± 0.44 [c]	1.20 ± 0.43 [b]	0.001
GCS		13.95 ± 3.12 [a]	13.98 ± 3.15 [a]	14.02 ± 2.99 [b]	0.003
Injury Type	Blunt	77.7% [b]	89.1% [c]	64.7% [a]	0.001
	Penetrating	17.4%	6.1%	30.1%	
	Burn	0.6%	1.3%	1.2%	
	Other	4.2%	3.5%	4.1%	
Mortality		2.8% [a]	4.1% [a]	3.7% [b]	0.001

* These variables were log-transformed prior to testing top optimally-normalized data.
- *P*-values are shown for the randomization test based on 1,000 random permutations.
- Pairwise comparisons from the same tests are indicated as superscripts next to values; values not sharing a letter are significantly different (*P* < 0.05).
- Letters a-c correspond to ascending order of significantly differentiated values; for categorical variables, only the first category is noted, but letters indicate which distributions differ.

Table 2. Mechanisms of Injury and Insurance Type by Race/Ethnicity.

MOI	H	NHW	AA
Motorcycle	1,163 (2.1%)	7,646 (1.1%)	971 (1.8%)
MVC	25,411 (38.9%)	138,222 (33.7%)	28,738 (38.7%)
Fall	14,052 (34.0%)	120,690 (16.4%)	13,975 (21.4%)
Cut/Pierce	6,868 (3.5%)	125,25 (10.4%)	8,862 (10.5%)
Firearm	4,645 (2.6%)	9,092 (19.3%)	16,432 (7.1%)
other	13,473 (18.9%)	669,88 (19.1%)	16,319 (20.5%)
n	65,612	355,163	85,297

Insurance Type	H	NHW	AA
Private	16,688 (32%)	131,070 (43.7%)	20,230 (27.3%)
Public	9,438 (18.1%)	91,244 (30.5%)	19,222 (25.9%)
Uninsured	19,330 (37.1%)	50,592 (16.9%)	27,859 (37.6%)
Other	6,697 (12.8%)	26,717 (8.9%)	6,879 (9.3%)
n	52,153	299,623	74,190

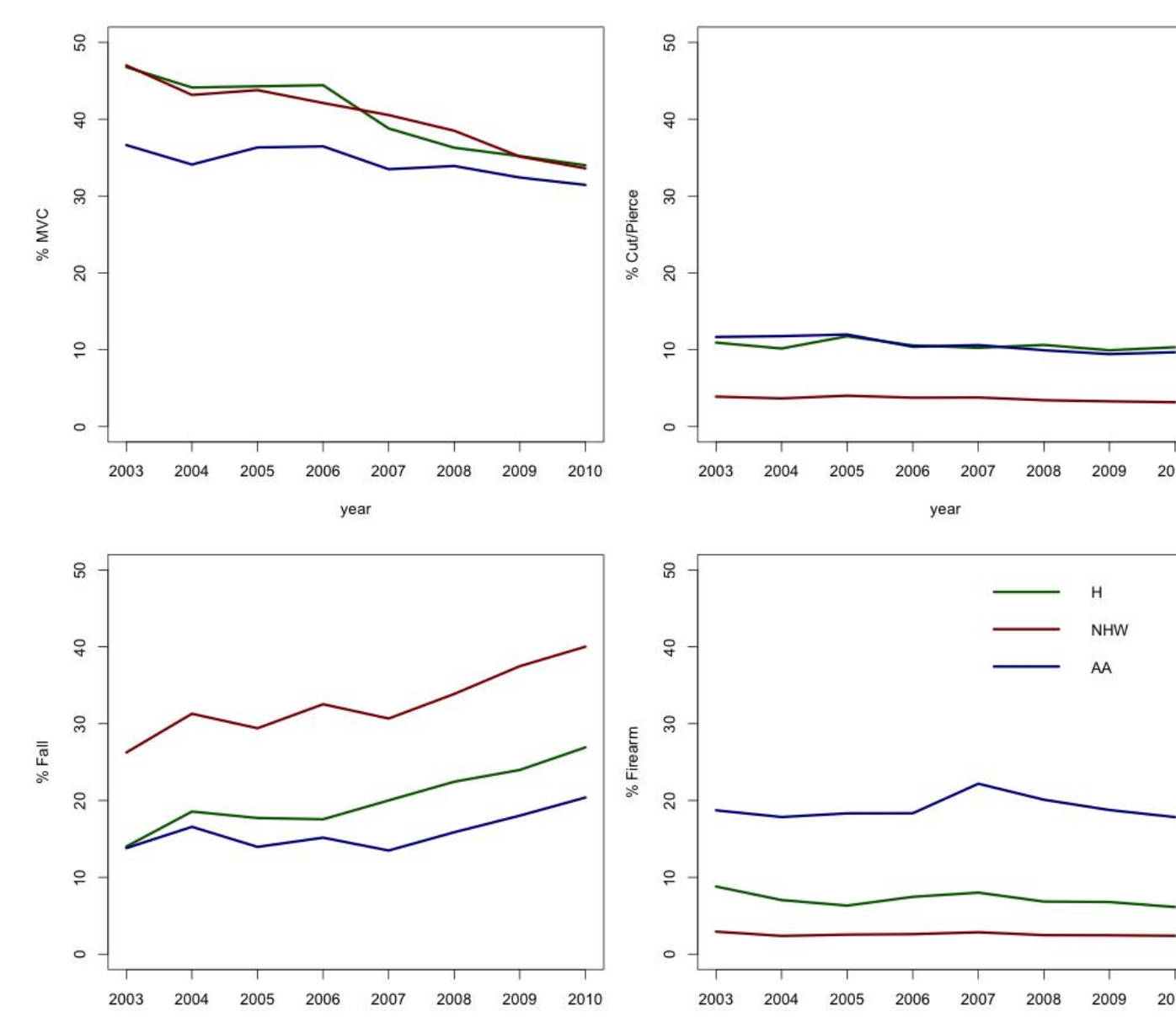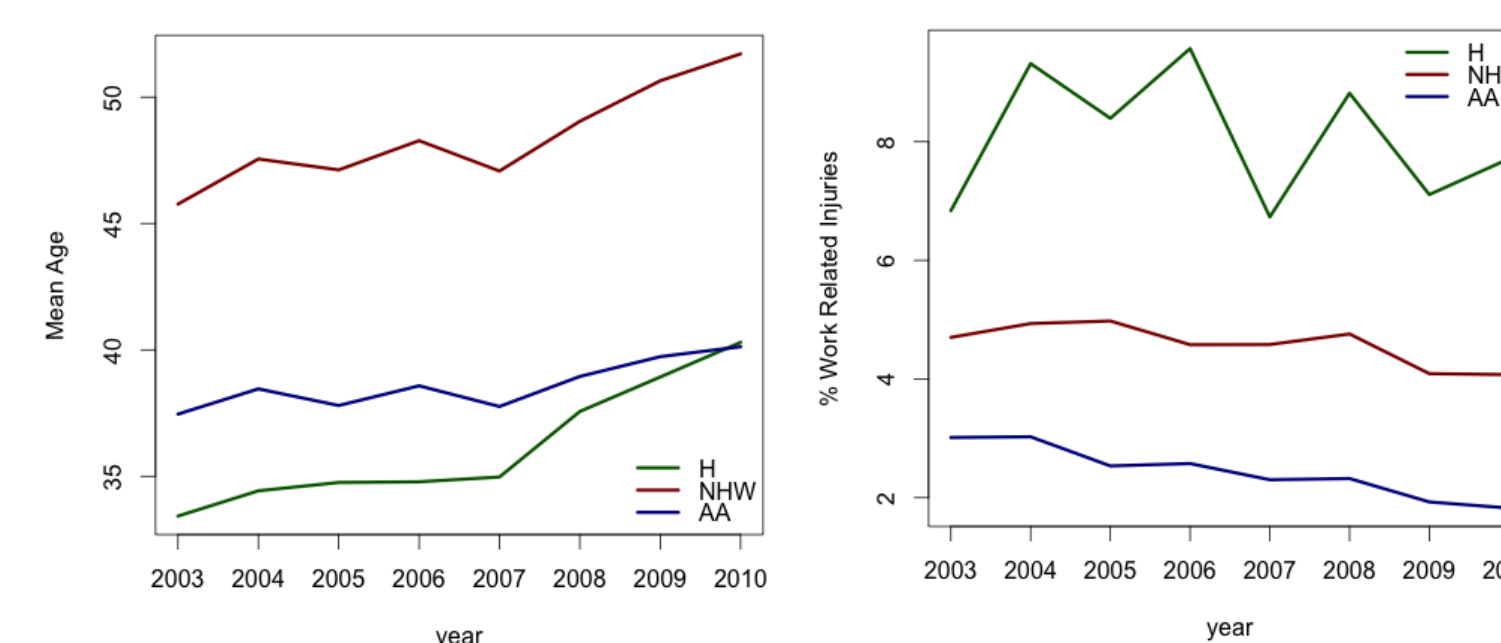**Figure 1. Mechanisms of Injury within Race/Ethnicity by year.**

Figure 2. Summary of mean age and percentage of work-related injuries, by year

- The proportion of Hispanic patients injured remained stable, accounting for 10-13% of the population from 2003 to 2010.
- Median age increased for all race/ethnicity groups.
- Rates of public insurance are increasing for all race/ethnicity groups.

RESULTS – EVALUATING MORTALITY WITHIN RACE/ETHNICTY IN TRAUMA CENTERS

Figure 3. Trends for Trauma Center Mortality Odds versus Proportion of Race/Ethnicity
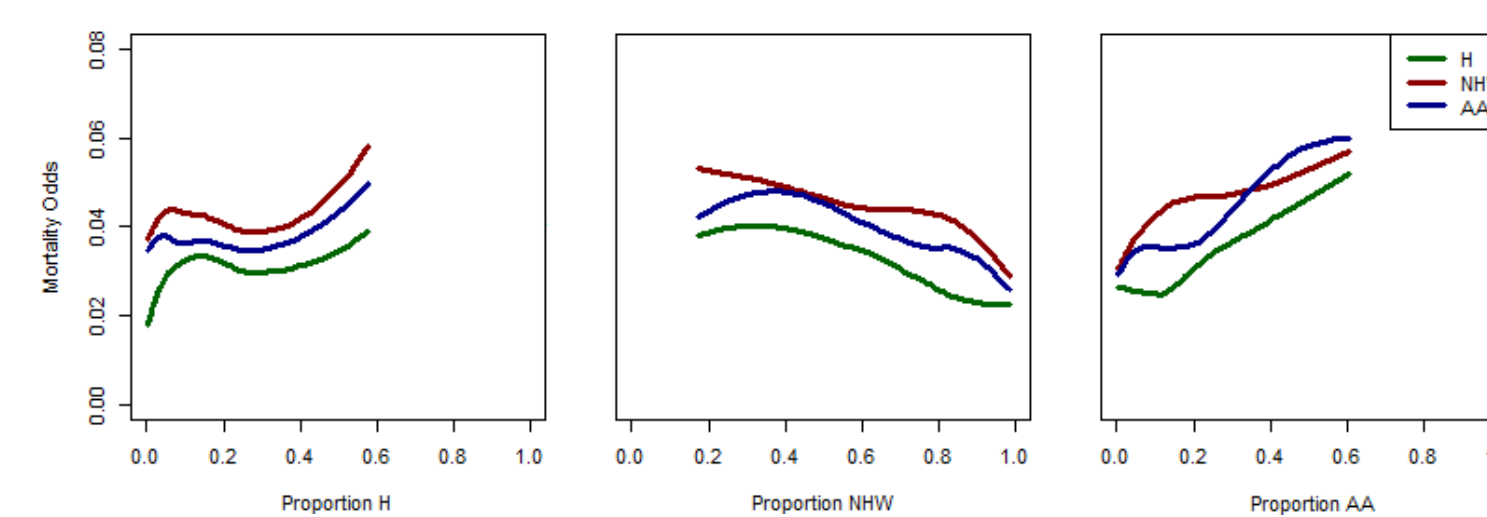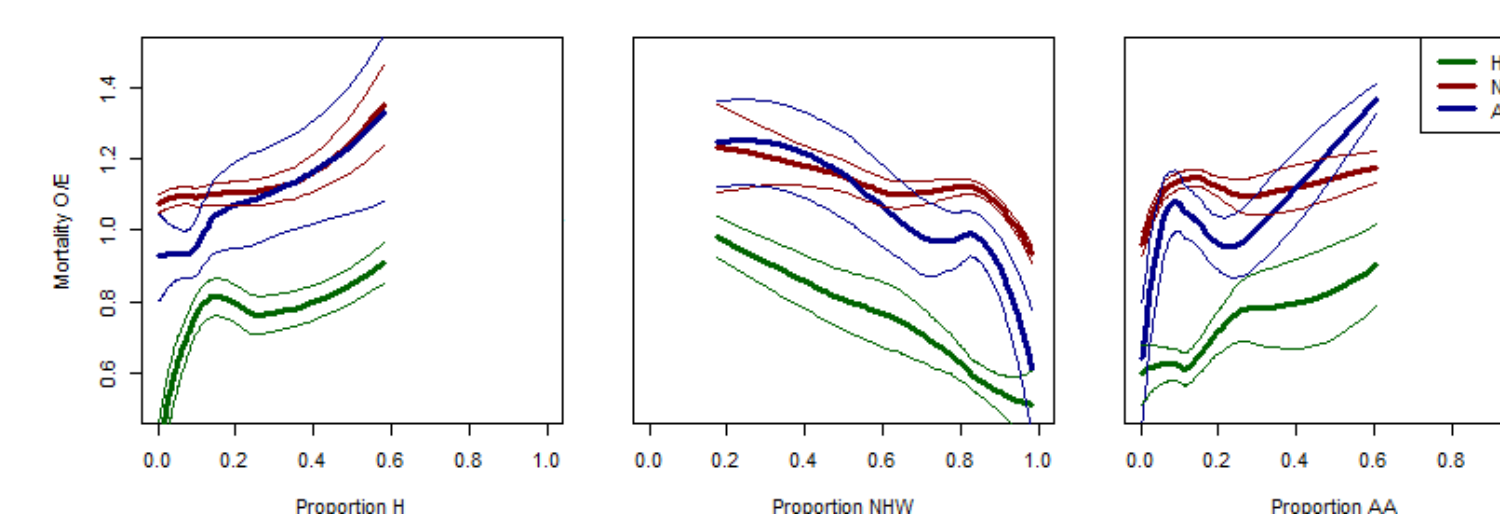

Figure 4. Trends for Trauma Center Observed-vs-Expected Mortality versus Proportion of Race/Ethnicity

CONCLUSIONS

- Hispanic patients are following national trends in injury incidence, with rates of falls increasing and rates of MVCs decreasing.
- Work-related injuries are significantly higher and remain higher over time among Hispanics.
- Epidemiology of Injury and Mortality among Hispanic patients differs from that of both NHWs and AAs.
- Hispanics had lower mortality odds and significantly lower O/E ratios compared to NHWs and AAs across the entire spectrum of racial compositions, confirming the Hispanic Paradox is sustained over time in trauma, irrespective of TC mortality odds.

Future Considerations:
- Injury prevention is necessary to decrease the high rates of work-related injuries and falls observed among Hispanics.
- Hispanic trauma patients have consistently better-than-expected mortality outcomes, which suggests the need to understand what underlying mechanisms lead to favorable outcomes in this subpopulation to improve outcomes in other race and/or ethnic groups.

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