



Are there racial disparities in the use of restraints and outcomes in children after motor vehicle crashes?

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Abstract

Background: This study determines whether racial/ethnic disparities exist with respect to restraint use and outcomes in pediatric motor vehicle crash passengers.

Methods: A review of passengers (<16 years old) involved in motor vehicle crashes from the National Trauma Database from 2002 to 2006 was performed. Outcome measures were emergency surgery, morbidity, mortality, and length of stay (LOS).

Results: A total of 37,375 patients were identified (mean age, 9.3 years; 95% confidence interval, 9.2–9.4 years; 59% male). Of the patients, 45.7% were restrained with the lowest use among African Americans, Hispanics, and Native Americans; 12.6% required emergency surgery; morbidity was 6.7%, and mortality, 5.8%. On multivariable analysis, race/ethnicity did not affect mortality or LOS. Higher Injury Severity Score (ISS) was associated with increased need for emergency operation, higher morbidity and mortality, and longer LOS. The use of restraints was associated with a lower ISS and a decreased risk for emergency surgery. The interaction between restraint use and ISS increased the need for emergency surgery, morbidity, and LOS.

Conclusions: Less than half of pediatric passengers in this study were restrained. The use of restraints was associated with a lower ISS, whereas a higher ISS was associated with increased need for emergency surgery, morbidity, mortality, and LOS. These data emphasize the need for increased education in preventive measures to minimize the risk of death and injury.

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Motor vehicle crashes (MVCs) continue to be one of the leading causes of death in the United States. Seat belts are the most effective way to reduce accident-related deaths [1]. Although seat belt usage has increased since the first laws were passed 1984, many motorists continue to travel

unrestrained. Previous reports have demonstrated lower seat belt usage among younger age groups, males, those with decreased socioeconomic status and educational achievement, and rural residents [1–4].

Currently, racial/ethnic and socioeconomic disparities exist within health care. Earlier studies have identified racial disparities in survival and outcome after traumatic injury but have tended to focus on only 2 ethnic groups [5–9]. With the cultural diversity present within the United States, we felt that we were in a unique position to evaluate the impact of race/ethnicity on MVC outcomes. Thus, the purpose of this

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study was to determine if any racial/ethnic differences existed in pediatric MVC victims.

1. Methods

The study was approved by the Human Subjects Committee of the Los Angeles Biomedical Research Institute at Harbor-UCLA Medical Center. A review of all pediatric passengers (<16 years) involved in MVC from the National Trauma Database from 2002 to 2006 was performed. The main outcome measures were need for emergency surgery, morbidity, mortality, and length of stay (LOS). The independent variables included race/ethnicity, age, sex, Injury Severity Score (ISS), Glasgow Coma Scale (GCS), and use of restraints.

Patient data were transferred from the National Trauma Database into an Excel database (Microsoft Excel; Microsoft Corp, Redmond, WA) and translated into a native SAS format using DBMS/Copy (Dataflux Corp, Cary, NC). Descriptive statistics were calculated for all variables. Numerical, continuous variables (age, GCS, ISS, and LOS) were compared among the different racial/ethnicity categories using the nonparametric Kruskal-Wallis test and are reported as medians. Because of the large database, statistical significance with respect to differences in medians is apparent, despite similarities in median values. Thus, means and the associated 95% confidence intervals (CI) are also provided to help the reader discern the statistical differences demonstrated between the groups. Categorical or nominal variables (sex, use of restraints, ISS ≥ 15 , and mortality) were compared using the Mantel-Haenszel χ^2 test. The National Trauma Data Bank (NTDB) lists 22 categories of complications, from acute respiratory distress syndrome to urinary tract infections, and if a patient had any of these complications, they were classified as having sustained a morbidity or complication. Finally, multivariable analyses were performed to determine predictors of mortality, morbidity, and need for emergency operation. The predictor variables that were assessed included age, sex, GCS, ISS, and use of restraints. Because of a priori knowledge that there may be effect modification between ISS and restraint use, we determined that an interaction term between the 2 should be included and assessed in the multivariable model. Model fit was assessed using the Hosmer and Lemeshow goodness-of-fit statistics.

2. Results

A total of 37,375 patients were identified for this study. The median age was 10 years (interquartile range, 5-14 years) with a mean age of 9.3 years (95% CI, 9.2-9.4), and 59% were male. The mean ISS was 12.5 (95% CI, 12.4-12.6), and the mean GCS was 13.1 (95% CI, 13.0-13.1).

Overall, 45.7% of patients were restrained, and 12.6% required an emergency operation. The overall morbidity was 6.7%, and mortality was 5.8% (see Table 1 for the list of 22 complications).

Demographic data and results of race/ethnicity comparisons are summarized in the Table 2. Hispanic and African American (AA) patients were younger. A higher ratio of male patients was also of Hispanic and AA race/ethnicity. Use of restraints was lowest in Native Americans followed by Hispanics and AAs. A higher proportion of whites and Hispanics were more severely injured as demonstrated by an ISS of 15 or more. Whites and Hispanics also had a higher likelihood of requiring and emergency operation. Morbidity was highest in Asians followed by Native Americans, whereas mortality was highest in whites and Hispanics.

On multivariable analysis, AA (odds ratio [OR], 0.77; CI, 0.69-0.87; $P = .002$), Hispanics (OR, 0.88; CI, 0.78-0.99; $P < .0001$), and Native Americans (OR, 0.19; CI, 0.08-0.45; $P = .003$) were less likely to need an emergency operation, and Asians (OR, 3.6; CI, 2.5-5.1; $P < .0001$) were more likely to have a complication compared with whites. However, race/ethnicity did not affect mortality or LOS. Higher ISS was associated with increased need for emergency operation (OR, 1.98; CI, 1.82-2.15; $P < .0001$), higher morbidity (OR, 5.3; CI, 4.5-6.3; $P < .0001$), higher mortality (OR, 33.54; CI, 26.12-43.07; $P < .0001$), and longer LOS. The use of restraints was associated with a lower ISS and decreased the risk for emergency surgery. The interaction between restraint use and ISS increased the need for emergency surgery, morbidity, and LOS.

Table 1 Complications by category

Acute respiratory distress syndrome	123 (4.9%)
Aspiration pneumonia	82 (3.3%)
Bacteremia	24 (1%)
Cardiac arrest	103 (4.1%)
Coagulopathy	266 (10.6%)
Compartment syndrome	107 (4.3%)
DVT	42 (1.7%)
Dehiscence/evisceration	12 (0.5%)
Disseminated fungal infection	2 (0.1%)
Empyema	4 (0.2%)
Esophageal intubation	5 (0.2%)
Hypothermia	152 (6.1%)
Intra-abdominal abscess	23 (0.9%)
Loss of operative reduction/fixation	9 (0.4%)
Pneumonia	553 (22%)
Pneumothorax	53 (2.1%)
Progression of original neurologic insult	134 (5.3%)
Pulmonary embolism	66 (2.6%)
Renal failure	60 (2.4%)
Skin breakdown	161 (6.4%)
Urinary tract infection	366 (14.6%)
Wound infection	167 (6.6%)
OVERALL	2514 (6.7%)

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