Evaluating Pediatric Car Safety Compliance in Motor Vehicle Collisions: Identifying High-Risk Groups for Improper Restraint Usage

Claudio B. Ghetti¹, Alexandra S. Rooney³, Víctor de Cos¹, Owen S. Henry³, Alicia G. Sykes³, Andrea Krzyzaniak², Vishal Bansal², Michael Sise², Stephen W. Bickler¹,³, Benjamin Keller¹,³, Romeo C. Ignacio¹,³

¹University of California, San Diego School of Medicine, San Diego, California
²Scripps Mercy Hospital San Diego, San Diego, California
³Rady Children’s Hospital San Diego, San Diego, California

Corresponding Author:
Romeo C. Ignacio
Division of Pediatric Surgery
Rady Children’s Hospital San Diego
3020 Children’s Way MC 5136
San Diego, CA 92123
Telephone: 858-966-7711
E-Mail: r1ignacio@health.ucsd.edu

ABSTRACT

Purpose: To identify patient factors associated with improper restraint usage and worse trauma outcomes for pediatric patients involved in motor vehicle collisions (MVCs).

Methods: Retrospective study performed at a Level I pediatric trauma center for patients (≤18yr) evaluated after MVC between 2008-2018. The Area Deprivation Index (ADI) was used to measure neighborhood socioeconomic disadvantage (NSD) levels based on the patient’s home address. Trauma registry data was correlated to ADI and used to analyze appropriate restraint usage by NSD. Proper restraint practices were defined based on national guidelines and state laws. Demographics and clinical outcomes were also analyzed. Chi-square analysis with Bonferroni corrections was used to assess the association of ADI, race, and ethnicity with proper restraint usage.
Results: Among 1,152 patients included, approximately 50% were male, the median age was 7 years [IQR 4-10], and 53% were of Hispanic ethnicity. Hispanic patients comprised 73% of children in ADI quintile 5 (greatest NSD), yet only 26% of children in ADI quintile 1 (least NSD). No differences were observed across clinical data and outcomes. Hispanic children <8yr were significantly less likely to be in a car seat/booster seat compared to non-Hispanic children (OR 0.69, 95% CI 0.50-0.95, p=0.025). Furthermore, those with greatest NSD (ADI quintile 5) had the largest proportion of unrestrained patients (21%, see Figure 1).

Conclusion: Hispanic children, especially those who require infant or booster seats (<8yr), and children living in areas with greater neighborhood socioeconomic disadvantage demonstrated poorer restraint practices. ADI can successfully identify high-risk groups for targeted injury prevention programs and improved compliance in the most vulnerable neighborhoods.

Keywords: Motor vehicle collisions; Car safety; Pediatric trauma; Seat belts; Area deprivation index

Type of Study: Retrospective Study

INTRODUCTION

Several advances in car safety have led to a reduction in motor vehicle-associated mortality over the last two decades. Most notable among these advances was the widespread adoption of seatbelt usage, which contributed to an observed relative decrease in mortality of 38% between 2007 and 2016 [1]. While this decrease shows a promising trajectory when compared to previous decades, motor vehicle collisions (MVCs) are the leading cause of death among children and adolescents in the United States, accounting for roughly 20% of all pediatric deaths [1]. Rates of morbidity and mortality associated with pediatric MVCs continue to disproportionately affect patients with lower socioeconomic status (SES) and minority
There are several proposed mechanisms for these injury outcome disparities including poorer restraint usage, lower rates of car safety education, and barriers to timely and effective clinical care [2]. Recent studies in the pediatric population report restraint usage rates as low as 50% at the time of MVC, with the lowest rates seen among those of Hispanic ethnic or Native American racial backgrounds (39% and 37%, respectively) [2]. These findings present a pressing public health dilemma among the pediatric population that warrants further exploration and subsequent targeted interventions, such as car safety education for identified high-risk groups.

Previous studies have examined the relationship of individual metrics such as income level and race/ethnicity on clinical outcomes following MVC trauma, as well as associations between SES and car safety practices. [3-5]. However, the landscape of pediatric trauma is complex and multifaceted, requiring consideration of several financial, social, and community access metrics to provide a more granular representation of disparities in healthcare. The Area Deprivation Index (ADI) is a validated tool that includes 17 indicators from the American Community Survey (ACS) data within the scope of education, economic, housing, social, and transportation socioeconomic domains [6]. ADI has been utilized to better understand the relationship between community socioeconomic resources and health outcomes, and it may provide a greater degree of granularity in the analysis of neighborhood socioeconomic disadvantage (NSD) than singular metrics such as income or race/ethnicity [7]. The use of ADI in identifying healthcare disparities is well documented and has been used in studies comparing pediatric burn injury severity and access to surgical care [8,9]. ADI, however, has not been used to analyze the influence of NSD on rates of proper restraint usage and clinical outcomes among pediatric trauma patients involved in MVCs.

Our study seeks to use ADI to further evaluate the association of neighborhood socioeconomic disadvantage with proper restraint usage and clinical outcomes in children involved in MVCs. We hypothesize that areas with the greatest neighborhood disadvantage (higher ADI quintiles) correlate with
lower rates of seat belt usage and worse clinical outcomes in pediatric patients with MVC mechanism of injury.

METHODS

After obtaining approval and a waiver of informed consent from the institutional review board, a retrospective study was performed for patients ≤ 18 years old who presented to a level one pediatric trauma center following a MVC between January 1, 2008 and December 31, 2018. Involvement in MVC was determined via either International Classification of Diseases Version 9 Clinical Modification (ICD-9-CM) or an International Classification of Diseases Version 10 (ICD-10) external cause of injury code (E-code) with additional verification via review of cause of injury text. ICD-9-CM E-codes: Motor vehicle traffic accidents (E810-819 (.0-.1), other motor vehicle nontraffic accident involving collision with moving object (E22) (.0-.1), other motor vehicle nontraffic accident involving collision with stationary object (E823 (.0-.1)). ICD-10 E-codes: Car occupant injured in transport accident (V43-V49). Demographic data was obtained via the institution's trauma registry. If patient records were missing demographic data or the 9-digit zip code data, electronic medical records were reviewed for data extraction. Patients were excluded from the study if they had incomplete or unavailable zip code data or if their home address or crash location was outside of the United States. Patients not involved in MVCs were also excluded, including those involved in motorcycle, motorized scooter, golf cart, all-terrain vehicle (ATV), or bus collisions. Patient demographics, injuries sustained, clinical characteristics, and collision safety metrics were analyzed. Demographics included sex, age, race, ethnicity, language preference, insurance status, and ADI, which is based on the 9-digit zip code of the patient home address. ADI rankings were categorized into quintiles based upon national rankings adjusted for the state of California and the scores of our study cohort. Higher ADI scores (quintiles 4 and 5) represented greater
socioeconomic disadvantage while lower ADI scores (quintiles 1 and 2) represented lesser socioeconomic disadvantage.

The primary outcome measure was proper restraint usage by NSD based on ADI. The definition of proper restraint usage was based on national guidelines from the American Association of Pediatrics and state laws set by the California Highway Patrol. Determination of patient restraint usage was determined via the institution’s trauma registry. This data was collected in interviews conducted by social workers with the child’s parents following the MVC. The type of restraint used (car seat, booster seat, or type of seatbelt) and unrestrained status are standardly collected in the trauma registry, and the data is reviewed for accuracy. We conducted a subgroup analysis for proper restraint usage between children ages <8 years old and ≥8 years old, as this is the age cutoff for booster/car seat usage and traditional seatbelt usage in California. Proper restraint usage was defined by the application of both shoulder and lap belts for children ≥8 years old or a booster/car seat for children <8 years old. We also conducted subgroup analyses for Hispanic vs. non-Hispanic patients. Secondary outcome measures included clinical data such as admission Glasgow Coma Score (GCS), Injury Severity Score (ISS), Abbreviated Injury Score (AIS), hospital and Intensive Care Unit (ICU) length of stay (LOS), 30-day readmission rate, and mortality.

Descriptive statistics and univariate analysis for key variables and outcomes were calculated using Wilcoxon, Kruskal-Wallis, Chi-square, or Fisher’s exact tests, where appropriate. Clinical outcomes were compared across ADI quintiles. Logistic regression modeling was used to assess the relationship between ADI, demographic characteristics, and proper restraint usage. Alpha was set to p<0.05 to represent statistical significance. Data was managed and analyzed using Stata MP version 17.0 (StataCorp LLP, College Station, TX).

RESULTS
A total of 1,354 children were injured in motor vehicle collisions and subsequently evaluated in trauma activations at a level one pediatric trauma center during the 11-year study period. Of these, 1,152 met inclusion criteria and were included in the final analysis. Among the 1,152 patients in this study, approximately 50% were male, median age was 7 years [IQR 4-10], and 53% were of Hispanic ethnicity (Table 1). Children living in neighborhoods with the highest socioeconomic disadvantage (ADI quintiles 4 and 5) represented almost half (49%) of our cohort, while those with the lowest NSD (ADI quintiles 1 and 2) represented less than one-third (29%). Hispanic children comprised a significant proportion of patients living in neighborhoods with the greatest socioeconomic disadvantage (73%, ADI quintile 5) and only one-fourth of Hispanic patients lived in neighborhoods with the least socioeconomic disadvantage (ADI quintile 1) (Table 2). Most Hispanic patients reported their race as other (76%). Meanwhile, 53% of non-Hispanic patients reported their race as White and only 26% reported their race as other. The majority of the patients were insured by a form of government-funded aid, such as Medi-Cal (52%). Only 12% of patients were uninsured.

No differences in clinical outcomes (GCS, ISS, AIS per region, LOS, ICU admission, discharge location, 30-day readmission, and mortality) were observed across ADI quintiles, as shown in Table 3. The overall rate of improper restraint usage was 15%. Patients within ADI quintile 5 (greatest NSD) demonstrated the highest rates of improper restraint usage (21%, Figure 1). Young Hispanic children (<8 years old) were significantly less likely to be properly restrained in a car seat/booster seat, as compared to non-Hispanic children (OR 0.69, 95% CI 0.50-0.95, p=0.025, Table 4).

DISCUSSION

Our study demonstrates that Hispanic patients comprise a significant proportion of patients in the highest socioeconomic disadvantage quintile (ADI quintile 5). We also observed a high overall rate of
improper restraint usage in pediatric patients involved in MVC vs. MVC events, a finding that is most pronounced among those with greater NSD (ADI quintile 5) and young Hispanic children (<8 years old). These findings support previous studies that demonstrate strong correlations between both lower SES and Hispanic ethnicity with higher rates of improper restraint usage in MVCs [2,5,9-12].

One such study by Colgan et al. analyzed the effect of car value, which is strongly associated with SES, on seatbelt usage in over 1,000 rear-seat passengers. The study found a 2.2-fold increase in the odds of wearing a seat belt between owners of the lowest and highest quintiles of car value, a trend that remained after controlling for age and sex [13]. In addition to lower SES, studies have also found racial/ethnic minorities to be associated with lower rates of proper restraint usage [2,11]. Lee et al. analyzed data on over 37,000 pediatric patients involved in MVC vs. MVC events between 2002 and 2006 and found that African American, Hispanic, and Native American patients were properly restrained in less than 40% of MVC incidents, compared to 49% of White children [2]. Cultural differences may play a part in these observed findings. In a study by Stiles et al., Hispanic migrant farmworkers in California held different belief patterns surrounding proper car safety practices, with many reporting that it was unsafe to restrain children older than 4 years of age or if the child was otherwise being held in someone’s arms [14]. In our study, the rates of proper restraint usage in young patients (<8 years old), who should be placed in booster seats, were significantly lower among Hispanic children than their non-Hispanic counterparts. Our study did not find any correlation with Native American or African American patients due to the low number of patients in our study population who reported having these cultural backgrounds.

Additional studies have also attempted to elucidate the effects of SES on proper restraint usage while minimizing the confounding nature of race and ethnicity. Mock et al. examined differences in car safety practices in over 1,100 Hispanic parents of different SES levels in Mexico and found that families of higher SES restrained children 47% of the time while families of lower SES restrained children only 15% of the time [15]. This difference may be attributed to a combination of factors, including reduced
ability to afford car seats as well as limited access to educational resources regarding proper car safety practices [15].

The issue of poor car restraint practices is complex and multifactorial, with contributing factors such as SES, race/ethnicity, and cultural beliefs. The resulting disparities in proper restraint usage have been strongly correlated with an increased risk of serious injury following MVCs in previous studies. Durbin et al. analyzed 11,506 MVCs involving over 17,000 children across 15 states and found that inappropriately restrained and unrestrained children had two times and three times greater risk of injury, respectively, compared with appropriately restrained children [16]. Our study did not find any significant differences in the severity of injury or other clinical outcomes. Despite collecting data over an eleven-year period, this finding is likely due to the low patient numbers in our study and the generally low overall complication rate seen in MVCs. The mortality rate in our study was 1%, which is similar to the rate previously reported in the literature [16,19,20].

Interestingly, while our study observed the highest rates of improper restraint usage in neighborhoods with the greatest socioeconomic disadvantage (ADI quintile 5), children living in neighborhoods with the least socioeconomic disadvantage (ADI quintile 1) demonstrated the second highest rate of improper restraint usage. One possible explanation might be that children from less disadvantaged backgrounds are exposed to a higher overall number of motor vehicle trips, and that this exposure creates more opportunities for improper restraint usage. Subsequent investigation of both teenage drivers and age differences within ADI quintile 1 revealed no differences when compared to other ADI quintiles. Of note, ADI quintile 1 comprised the smallest fraction of all patients in this study at only 11%, which may have contributed in part to our observed findings.

In the context of our findings and future studies within trauma research, we believe that the use of the ADI may serve as a more representative indicator of neighborhood SES when compared to other existing metrics. Compared to the Social Vulnerability Index (SVI), a metric that uses census tract data to
rank areas on their ability to respond to a disaster, ADI incorporates 17 discrete factors of income, education, employment, transportation, and housing quality to create a more granular representation of socioeconomic status [6]. The use of ADI in trauma research is well documented, including studies that have used it to correlate the level of disadvantage to the incidence of firearm-related injuries and burn severity [8,17]. More recently, Sykes et al. used ADI to correlate differences in socioeconomic status with specific injury mechanisms among pediatric trauma patients within the California-Mexico border region [18]. However, this is the first study to utilize ADI to systematically identify pediatric populations at higher risk of improper restraint use during MVCs.

Finally, while we believe our initial results provide promising opportunities for targeted car safety education and injury prevention in high-risk groups, our study is not without its limitations. A larger study population may be necessary to observe significant differences in clinical outcomes based on ADI and race/ethnicity. Furthermore, our finding that patients in ADI quintile 1 (lowest NSD) had the second highest rates of improper restraint usage may in part be due to a smaller overall sample size associated with this quintile, which comprised only 11% of our total study population. It is possible that with a larger sample size, our trends of proper restraint usage may have more closely resembled what has been previously described in the literature, with decreasing SES correlating with increased rates of improper restraint usage. Notwithstanding, this trend was observed for ADI quintiles 2-5. Additionally, proper installation of booster seats and seatbelts was recorded from trauma registry information, which was determined via interviews conducted by social workers with a child’s parents following MVC. It is possible that some patients were restrained in poorly installed or ill-fitting car seats, booster seats, or seatbelts. Unfortunately, we are unable to assess whether the restraint fit appropriately for each patient and in each vehicle. Furthermore, our high rate of “other” race (50%) responses in this study underscores the limitations of singular identification metrics and the utility of multivariate metrics such as ADI. Finally, the results of our study may differ from other areas of the country due to regional differences in both racial/ethnic demographics and socioeconomic composition. However, the application of ADI as a
healthcare disparity tool to identify vulnerable populations can greatly aid targeted prevention programs to improve the outcomes of children who suffer injuries from MVCs.

CONCLUSION

Within the California-Mexico border region, children living in neighborhoods with the greatest socioeconomic disadvantage (ADI quintile 5) and younger children (< 8 years old) with Hispanic ethnicity were found to be less likely to use appropriate car safety restraints. Additionally, our data also demonstrate that children with Hispanic ethnicity comprise the greatest demographic in neighborhoods of greatest socioeconomic disadvantage within this region. These key findings support the implementation of targeted car safety education and outreach initiatives within neighborhoods identified as having a greater socioeconomic disadvantage. Future studies can utilize the Area Deprivation Index to identify populations facing the greatest risk for injury due to unsafe car safety practices.

REFERENCES

[1] Cunningham RM, Walton MA, Carter PM. The Major Causes of Death in Children and Adolescents in the United States. N Engl J Med. 2018;379(25):2468-2475. doi: 10.1056/NEJMr1804754.

[2] Lee SL, Yaghoubian A, Stark R, et al. Are there racial disparities in the use of restraints and outcomes in children after motor vehicle crashes? J Pediatr Surg. 2012 Jun;47(6):1192-5. doi: 10.1016/j.jpedsurg.2012.03.022.
[3] Edwards P, Roberts I, Green J, et al. Deaths from injury in children and employment status in family: analysis of trends in class specific death rates. BMJ. 2006;333(7559):119. doi: 10.1136/bmj.38875.757488.4F.

[4] Marcin JP, Schembri MS, He J, et al. A population-based analysis of socioeconomic status and insurance status and their relationship with pediatric trauma hospitalization and mortality rates. Am J Public Health. 2003;93(3):461-466. doi:10.2105/ajph.93.3.461

[5] Birken CS, Macarthur C. Socioeconomic status and injury risk in children. Paediatr Child Health. 2004 May;9(5):323-5. doi: 10.1093/pch/9.5.323.

[6] Kind AJH, Buckingham WR. Making Neighborhood Disadvantage Metrics Accessible: The Neighborhood Atlas. N Engl J Med. 2018;378(26):2456-2458. doi: 10.1056/NEJMp1802313.

[7] Singh GK. Area deprivation and widening inequalities in US mortality, 1969-1998. Am J Public Health. 2003;93(7):1137-1143. doi: 10.2105/ajph.93.7.1137.

[8] Purcell LN, Bartley C, Purcell ME, et al. The effect of neighborhood Area Deprivation Index on residential burn injury severity. Burns. 2021;47(2):447-454. doi: 10.1016/j.burns.2020.07.014.

[9] Power R. Neighborhood Socioeconomic Disparities Impact Pediatric Access to Surgical Care. Presented at the: 16th Annual Academic Surgical Congress; February 4, 2021; Virtual.

[10] Dougherty G, Pless IB, Wilkins R. Social class and the occurrence of traffic injuries and deaths in urban children. Can J Public Health. 1990;81:204–9. PMID: 2361207.

[11] Lee LK, Farrell CA, Mannix R. Restraint use in motor vehicle crash fatalities in children 0 year to 9 years old. J Trauma Acute Care Surg. 2015 Sep;79(3 Suppl 1):S55-60. doi: 10.1097/TA.0000000000000673.
[12] Schrodt A, Huynh T, Fitzgerald TN. Factors Associated With Poor Child Motor Vehicle Restraint on the USA-Mexico Border. J Trauma Nurs. 2018 Mar/Apr;25(2):75-82. doi: 10.1097/JTN.0000000000000347.

[13] Colgan F, Gospel A, Petrie J, et al. Does rear seat belt use vary according to socioeconomic status? J Epidemiol Community Health. 2004;58:929–930. doi: 10.1136/jech.2003.016972.

[14] Stiles MC, Grieshop JI. Impacts of culture on driver knowledge and safety device usage among Hispanic farm workers. Accid Anal Prev. 1999 May;31(3):235-41. doi: 10.1016/s0001-4575(98)00072-4.

[15] Mock C, Arreola Rissa C, Trevino Perez R, et al. Childhood injury prevention practices by parents in Mexico. Inj Prev. 2002 Dec;8(4):303-5. doi: 10.1136/ip.8.4.303.

[16] Durbin DR, Chen I, Smith R, et al. Effects of seating position and appropriate restraint use on the risk of injury to children in motor vehicle crashes. Pediatrics. 2005 Mar;115(3):e305-9.

[17] Abaza R, Lukens-Bull K, Bayouth L, et al. Gunshot wound incidence as a persistent, tragic symptom of area deprivation. Surgery. 2020 Oct;168(4):671-675. doi: 10.1016/j.surg.2020.05.016.

[18] Sykes AG, Rooney AS, Smith K, et al. Pediatric trauma in the California-Mexico border region: injury disparities by Area Deprivation Index. J Trauma Acute Care Surg. January 2022.

[19] Gedeborg R, Thiblin I, Byberg L, et al. Population density and mortality among individuals in motor vehicle crashes. Inj Prev. 2010 Oct;16(5):302-8. doi: 10.1136/ip.2009.024414. Epub 2010 Jun 30. PMID: 20595139.

[20] Waxman K, Izfar S, Grotts J. The mortality risk from motor vehicle injuries in California has increased during the last decade. J Trauma Acute Care Surg. 2012 Sep;73(3):716-20. doi: 10.1097/TA.0b013e31825c14e2. PMID: 22929500.
Legends

Figure 1. Motor Vehicle Collisions Involving Unrestrained Pediatric Patients

Table 1. Patient demographics

| Variables                | Total (N=1,152) |
|--------------------------|-----------------|
| **Sex**                  |                 |
| Female                   | 578 (50%)       |
| Male                     | 574 (50%)       |
| **Age, median [IQR]**    |                 |
| Age <5                   | 349 (30%)       |
| Age 5-9                  | 449 (39%)       |
| Age 10-14                | 310 (27%)       |
| Age 15-18                | 44 (4%)         |
| **ADI Level**            |                 |
| Quintile 1               | 128 (11%)       |
| Quintile 2               | 208 (18%)       |
| Quintile 3               | 256 (22%)       |
| Quintile 4               | 297 (26%)       |
# Table 2. ADI by patient ethnicity

| ADI Quintile, n (%) | Total (N=1,144) | Hispanic (n=602) | Non-Hispanic (n=542) | Unknown (n=8) |
|---------------------|----------------|------------------|----------------------|--------------|
| Quintile 1          | 128 (11%)      | 33 (26%)         | 93 (73%)             | 2 (>1%)      |
| Quintile 2          | 208 (18%)      | 93 (45%)         | 113 (54%)            | 2 (>1%)      |
| Quintile 3          | 256 (22%)      | 127 (50%)        | 128 (50%)            | 1 (>1%)      |
| Quintile 4          | 297 (26%)      | 159 (54%)        | 138 (46%)            | 0            |
Table 3. Injury and clinical characteristics of MVC patients by ADI (Area Deprivation Index)

| Variable, n (%) or median [IQR] | Area Deprivation Index Quintile |
|---------------------------------|---------------------------------|
|                                 | Total (N=1,152) | Quintile 1 (n=128) | Quintile 2 (n=208) | Quintile 3 (n=256) | Quintile 4 (n=297) | Quintile 5 (n=263) | p-value |
| Demographics                    |                  |                    |                    |                    |                    |                    |         |
| Age                             | 4 [7-10]         | 9 [4.5-12]         | 7 [4-10]           | 7 [3-10]           | 7 [4-10]           | 7 [3-10]           | 0.13     |
| Spanish Language Preference     | 166 (14%)        | 4 (3%)             | 30 (14%)           | 33 (13%)           | 47 (16%)           | 52 (20%)           | <0.01    |
| Uninsured                       | 141 (12%)        | 12 (9%)            | 28 (13%)           | 30 (12%)           | 37 (12%)           | 34 (13%)           | 0.84     |
| Clinical                        |                  |                    |                    |                    |                    |                    |         |
| Admit GCS                       | 15 [15-15]       | 15 [15-15]         | 15 [15-15]         | 15 [15-15]         | 15 [15-15]         | 15 [15-15]         | 0.71     |
| Injury Severity Score           | 1 [1-5]          | 1 [1-5]            | 1 [1-5]            | 1 [1-5]            | 1 [1-5]            | 1 [2-6]            | 0.34     |
| AIS Region                      |                  |                    |                    |                    |                    |                    |         |
| Head/Neck                       | 2 [1-3]          | 2 [1-3]            | 2 [1-3]            | 2 [1-3]            | 2 [1-3]            | 2 [1-3]            | 0.63     |
| Face                            | 1 [1-2]          | 2 [1-2]            | 1 [1-2]            | 1 [1-2]            | 1 [1-2]            | 1 [1-2]            | 0.53     |
| Chest/Thoracic                  | 3 [2-3]          | 3 [2-3]            | 3 [1.5-3]          | 3 [2-3]            | 3 [2-3]            | 2 [2-3]            | 0.65     |
| Abdominal                       | 2 [2-3]          | 2 [1-3]            | 2 [2-3]            | 2 [2-3]            | 2 [2-3]            | 2 [2-3]            | 0.81     |
| Extremity                       | 2 [2-3]          | 2 [2-2]            | 2 [2-3]            | 2 [2-3]            | 2 [2-3]            | 2 [2-3]            | 0.31     |
| Skin                            | 1 [1-1]          | 1 [1-1]            | 1 [1-1]            | 1 [1-1]            | 1 [1-1]            | 1 [1-1]            | 0.21     |
| Required Operation              | 114 (10%)        | 8 (6%)             | 22 (11%)           | 25 (10%)           | 28 (9%)            | 31 (12%)           | 0.53     |
| Hospital LOS (days)             | 1 [1-1]          | 1 [1-1]            | 1 [1-1]            | 1 [1-1]            | 1 [1-1]            | 1 [1-1]            | 0.54     |
| ICU admission                   | 143 (12%)        | 13 (10%)           | 26 (13%)           | 30 (12%)           | 38 (13%)           | 36 (14%)           | 0.89     |
| ICU LOS (days)                  | 3 [2-6]          | 3 [2-9]            | 2.5 [2-3]          | 2 [2-7]            | 3 [2-9]            | 2 [1.5-4.5]        | 0.65     |
| Discharge Location              |                  |                    |                    |                    |                    |                    | 0.35     |
| Died                            | 11 (1%)          | 1 (0.8%)           | 2 (1%)             | 2 (0.8%)           | 3 (1%)             | 3 (1%)             |         |
| Home                            | 1,086 (95%)      | 122 (96%)          | 199 (97%)          | 237 (93%)          | 277 (94%)          | 251 (97%)          |         |
| Other                           | 55 (5%)          | 5 (4%)             | 7 (3%)             | 17 (7%)            | 17 (6%)            | 9 (3%)             |         |
| 30-Day readmission              | 7 (0.6%)         | 0                  | 3 (1%)             | 3 (1%)             | 0                  | 1 (0.4%)           | 0.14     |
Table 4. Seatbelt and car seat usage among MVC patients by ethnicity with logistic regression.

| Variable, n (%)                                      | Hispanic (n=602) | Non-Hispanic (n=542) | p-value | Odds ratio (95% CI) |
|------------------------------------------------------|------------------|----------------------|---------|--------------------|
| Seatbelt/car seat usage                              |                  |                      |         |                    |
| <8 yrs unrestrained (no booster seat)                | 53 (9%)          | 31 (6%)              | 0.02    | 0.69 (0.50-0.95)   |
| ≥8 yrs unrestrained (no seatbelt)                    | 47 (8%)          | 37 (7%)              | 0.57    | -                  |
| Restrained                                           |                  |                      |         |                    |
| Yes (any type)                                       | 502 (83%)        | 474 (87%)            | 0.05    | -                  |
| Unrestrained/improper                                | 100 (17%)        | 68 (13%)             | -       | -                  |

MVC, motor vehicle collision