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Uninsured status may be more predictive of outcomes among the severely injured than minority race

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Abstract

Aim—Worse outcomes in trauma in the United States have been reported for both the uninsured and minority race. We sought to determine whether disparities would persist among severely injured patients treated at trauma centres where standard triage trauma protocols limit bias from health systems and providers.

Methods—We performed a retrospective analysis of the 2010 to 2012 National Sample Program from the National Trauma Databank, which is a nationally representative sample of trauma centre performance in the United States. The database was screened for adults ages 18 to 64 who had a known insurance status. Outcomes measured were in-hospital mortality and post-hospital care.

Results—There were 739,149 injured patients included in the analysis. Twenty-eight percent were uninsured, and 34 percent were of minority race. In the adjusted analysis, uninsured status (OR 1.60, 1.29 – 1.98, p<0.001) and black race (OR 1.24, 1.04 – 1.49, p=0.019) were significant predictors of mortality. Only uninsured status was a significant negative predictor of post-hospital care (OR 0.43, 0.36 – 0.51, p<0.001). As injury severity increased, only insurance status was a significant predictor of both increased mortality (OR 1.68, 1.29 – 2.19, p<0.001) and decreased post-hospital care (OR 0.45, 0.32 – 0.63, p<0.001).

Conclusion—Uninsured status is independently associated with higher in-hospital mortality and decreased post-hospital care in patients with severe injuries in a nationally representative sample of trauma centres in the United States. Increased in-hospital mortality is likely due to endogenous

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patient factors while decreased post-hospital care is likely due to economic constraints. Minority race is less of a factor influencing disparate outcomes among the severely injured.

Keywords

Insurance; race; trauma; injury; mortality; skilled nursing facility; disparity

Background

Disparities in outcomes for patients without insurance have been well described for many medical conditions.[1–6] The reasons for disparities are multifactorial and are likely due to challenges in access to care, decreased baseline health, and possibly differences in healthcare treatments administered.[7–10]

Several studies have shown that the uninsured have increased mortality after trauma.[11,12] Increased mortality is observed in the uninsured suffering both blunt and penetrating injury, and for uninsured pediatric trauma patients.[13,14] Access to trauma centre care has been shown to contribute to increased mortality for the uninsured.[15] Additionally, the uninsured have decreased access to post-hospital care, such as skilled nursing facilities and inpatient rehabilitation, but whether or not this increases mortality or morbidity is to be determined.[16]

Minority race is also associated with increased mortality after trauma.[13] Moreover, both minority race and insurance status have been recently shown to lead to increased mortality among the severely injured.[17] Similarly, racial minorities have decreased access to post-hospital care resources.[16,18] The role of minority race and uninsured status with worse outcomes after trauma remains incompletely described.

Since trauma systems are geared to minimize mortality and long-term disability in *all* severely injured patients, once a patient reaches a trauma centre, disparities should not exist. This should be particularly true for those with the most severe of injuries. The aim of this study was to use a large, representative database of level 1 and 2 trauma centre admissions in the United States to explore the relationship between disparities and injury severity among the uninsured and minority races. We hypothesized that disparities based on insurance status and race would be minimal for those patients who are severely injured and who are treated at level 1 and 2 trauma centres as care would be directed by standard triage protocols, thus limiting bias from hospital systems and providers.

Methods

Data Source and Patient Population

The National Sample Program (NSP) of the National Trauma Data Bank (NTDB) was used for this study. The NSP is a nationally representative sample of one hundred level 1 and level 2 trauma centres in the United States. Selected trauma centres are weighted and stratified to adjust for patient volume and geographic differences in trauma centre density. The NSP is derived from the NTDB, which is the largest aggregate US trauma registry ever assembled, and both datasets are maintained by the American College of Surgeons and are compiled annually.

We combined the datasets for the years 2010, 2011, and 2012, to increase the sample size. Patients were included in the study if they were age 18 to 64 and brought to emergency room after suffering a traumatic injury. Observations were excluded if insurance status or disposition from the emergency room was not known. Patients over the age of 64 were excluded as 68 percent of patients over this age receive Medicare and only 1 percent are uninsured in the dataset used.

Eleven percent of patients were excluded because of missing insurance status. We excluded mortality when calculating the outcome of post-hospital care to avoid falsely decreasing rates of post-hospital care in groups that have higher mortality. Further, in the dataset virtually every observation with the post-hospital care outcome was admitted to the hospital, so observations that were not admitted were excluded when considering this outcome to avoid falsely decreasing rates of post-hospital care. These exclusions decreased the weighted sample size by 14 percent when calculating odds ratios for the outcome post-hospital care as compared to mortality.

Injuries were categorized into three groups using injury severity scores (ISS). Injury severity score is calculated from three highest abbreviated injury scale (AIS) scores from different body regions. The three AIS scores are squared and the sum of the squares is the ISS. The maximum survivable ISS is 75.

Outcomes and variables

The primary outcomes were in-hospital mortality and post-hospital care. Post-hospitalization care included home health services, skilled nursing facilities (SNFs), rehabilitation, and intermediate care facilities.

Demographic variables included in the analysis include age, sex, race, number of comorbidities, and insurance status. Age was stratified based on previous reports indicating increased mortality in trauma after the age of 45.[19] Race included white, black, and “other,” which included unspecified other races including non-white and non-black Hispanic, Asian, American Indian, Native Hawaiian, and Pacific Islander.

We decided to not use the Charlson index to quantify comorbidities because the data was not coded in a suitable manner. Also, 75 percent of the sample had no recorded comorbidities or a single comorbidity, so we used a much simpler categorical designation. Centre characteristics included level 1 trauma centre designation, either by the American College of Surgeons or state governments, and hospital size by total number of beds. Injury characteristics included blunt versus penetrating mechanism, injury severity by the injury severity score (ISS), Glasgow coma scale (GCS), and first heart rate and blood pressure recorded in the emergency department. Hospital characteristics included total hospital length of stay, intensive care unit (ICU) length of stay, days on the ventilator, and ventilator-free days.

Comorbidities included alcoholism, ascites within 30 days of injury, esophageal varices, cirrhosis, bleeding disorder, chemotherapy within 30 days of injury, metastatic cancer, congenital anomalies, prematurity, congestive heart failure, smoking, renal failure, diabetes mellitus, “do not resuscitate” status, advanced directive limiting care, dementia, illicit drug use, hypertension, peripheral vascular disease, angina, history of myocardial infarction, history of stroke, impaired sensorium, psychiatric illness, obesity, cardiac arrest prior to arrival, respiratory disease, and steroid use.

Procedure codes were grouped into several categories. “Critical care” included intubation and mechanical ventilation, arterial and central venous lines, urinary catheter placement, chest tube, peritoneal lavage, pericardiocentesis, transfusion of blood products, and cardiopulmonary resuscitation. “Diagnostic imaging” included any imaging procedure. “Trauma surgery” included exploratory laparotomy, exploratory thoracotomy, cardiac massage, pericardiotomy, limb amputation, splenectomy, and operations involving the alimentary tract, liver, and pancreas. “Vascular surgery” included incision or excision of vessels, anastomosis or replacement of vessels, repair of vessel, surgical occlusion of vessels, and endovascular repair of vessels. “Orthopedic surgery” included open or closed reduction of dislocations or fractures, arthrocentesis, and application of ex-fixator. “Neurosurgery” included placement of intracerebral catheter, intracranial pressure monitoring, craniotomy, elevation of skull fracture, and spine fusion.

Statistical Analysis

Patient characteristics were compared using the Pearson χ^2 test for categorical variables. A multivariable logistic regression was adjusted for age, sex, total number of comorbidities, race, injury severity score (only for “All ISS”), Glasgow coma scale, systolic blood pressure less than 90, normal heart rate, penetrating mechanism, requiring mechanical ventilation, and insurance status. Therefore, the adjusted analysis included the standard covariates previously advocated as necessary for reliable interpretation of the NTDB with the addition of insurance status and race.[20,21]

Analysis was performed with STATA version 12 (StataCorp LP, College Station, TX). Multiple strata containing a single primary sampling unit were combined into a single, larger stratum as previously described.[22] Significance was determined to be a p value less than 0.05. All reported numbers represent weighted values. Per the Stanford Institutional Review Board (IRB), this study does not qualify as requiring IRB approval as it involves only de-identified data.

Results

A total of 739,149 weighted observations were included. Severe injuries (ISS 16 to 24) comprised 12.2 percent of the studied population, and extremely severe injuries (ISS over 24) comprised 8.3 percent. Roughly one quarter of the total sample was uninsured, and this proportion remained constant at all levels of injury severity. Thirty-four percent was of minority race. The uninsured were younger, more frequently male, had similar numbers of comorbidities to the insured, and more commonly black or other minority race (Table 1).

Centre-specific effects are likely to be mitigated by the survey design of the NSP (see Methods section). Both the frequency of level 1 trauma centre designation and the hospital volume by bed size were not significantly different for the uninsured compared to the insured.

ISS was similar when comparing the insured and uninsured. The uninsured had a 25 percent relative increase in catastrophic brain injury (GCS 3 to 8). The uninsured had a slightly lower frequency of normal heart rate on presentation, but rates of hypotension were similar among the insured and uninsured. The uninsured had more penetrating injuries.

Length of stay, ICU length of stay, and number of days on the ventilator, were decreased for the uninsured. The total number of interventions performed on the uninsured was similar to the insured. The uninsured had similar rates of critical care procedures, diagnostic imaging, and vascular surgery. The uninsured had more trauma surgery procedures, likely related to increased penetrating trauma, but fewer orthopedic procedures, and fewer neurosurgical procedures. Finally, the uninsured had increased in-hospital mortality and decreased utilization of post-hospital care.

The unadjusted analysis shows that both uninsured status and black race are significant predictors of in-hospital mortality (Table 2). Moreover, previously validated predictors of mortality with the NTDB are also associated with increased in-hospital mortality in our analysis.

The previously validated predictors of mortality in the NTDB are also significant predictors of post-hospital care among survivors requiring hospital admission in unadjusted analysis (Table 3). Uninsured status and minority race are associated with decreased post-hospital care. Correspondingly, uninsured status and minority race were associated with increased discharges home without services (data not shown).

When divided into injury severity categories for the adjusted analysis, uninsured status was a significant predictor of in-hospital mortality, even among the severely injured (Table 4). Black race was not a significant predictor of mortality as injury severity increased. Other minority race was not a predictor of mortality at any level of injury severity.

Conversely, uninsured status was a significant negative predictor of post-hospital care at all levels of injury severity in the adjusted analysis (Table 5). Black race and other minority race were not significant predictors of decreased post-hospital care at any level of injury severity.

Goodness of fit testing demonstrated the addition of insurance status improved the regression models to predict in-hospital mortality under most levels of injury severity (data not shown).

Discussion

This retrospective analysis of a large, representative database of trauma centres in the US demonstrates a persistent disparity in outcomes for the uninsured, even in those suffering from severe injuries. We found this observation to be robust as it persisted even after controlling for confounding variables.

One of the most difficult challenges in trying to eliminate disparities is to determine which factors contribute to the observed differences. In this study we have measured two outcomes after injury – in-hospital mortality and utilization of post-hospital care. While we report clear differences in both outcomes based on insurance status, the underlying factors leading to the differences in each outcome may not be the same. Our suspicion is that factors leading to increased in-hospital mortality for the uninsured are more complex than factors leading to decreased post-hospital care.

Regarding the increased in-hospital mortality for the uninsured, we suspect that access to care, endogenous patient factors, and quality of care received, may all play significant roles. We focused on severely injured patients who were cared for at highly functional level 1 or level 2 trauma centres in the effort to control for variability in provider and hospital factors. Because the treatment of the severely injured relies heavily on treatment algorithms, we believe that any differences in outcome among the severely injured are less likely due to provider bias. Further, in this cohort, access to care is unlikely to be a significant factor influencing outcomes, again, because all patients were treated the most capable trauma centres in the US. In our study, the uninsured were as likely as the insured to be treated at a level 1 centre versus a level 2 centre. Also, the uninsured were treated at similarly sized centres. Furthermore, by evaluating patients within different categories of injury severity, we are able to cluster patients who are likely to receive similarly intensive interventions. Therefore, the finding of increased mortality among the uninsured with increasing injury severity in this nationally representative sample suggests that the disparity in mortality seen among the uninsured is likely not due to underlying differences in provider bias, hospital performance, access to care, and quality of care receive. Rather, future study should focus on patient factors such as injury characteristics, patients' physiologic responses to injury, and outcomes following interventions, in order to discern which is driving this poor outcome among the uninsured.

Previous work has shown that endogenous patient factors may play a role in poor outcomes for the uninsured.[23] We found the uninsured had similar numbers of comorbidities compared to the insured, however, the uninsured may have more *undiagnosed* comorbidities that are not accounted for in our data. While the total number of comorbidities was not associated with mortality in our adjusted analysis, this says nothing about the potentially mortal physiological burden of undiagnosed comorbidities among the uninsured. Interestingly, the unadjusted analysis we report shows decreased odds of mortality among those with one or more comorbidities compared to those with no comorbidities. This may be due to potentially lethal effects of undiagnosed comorbidities reported as "none" in the database. Future prospective studies could screen uninsured trauma patients for undiagnosed comorbidities to see if addressing these in the acute setting after admission for traumatic injury decreases in-hospital mortality.

We also sought to determine if quality of care differences could explain the higher mortality among the uninsured. We suspected that lower rates of necessary interventions could lead to increased mortality for the uninsured. Uninsured ICU patients treated in the US may have increased mortality associated with decreased numbers of certain interventions.[24–26] However, we did not find evidence to clearly demonstrate decreased quality of care for the uninsured based on similar numbers of critical care procedures and diagnostic imaging. Furthermore, there was no difference in length of stay among the severely injured (data not shown). However, the uninsured had fewer orthopedic and neurosurgical procedures across the injury severity spectrum. This is difficult to explain, but may reflect the fact that these patients were doing poorly and were deemed to not be candidates for the operating room.

We found a definitive decrease in rates of post-hospital care in the uninsured, but there were no differences based on race in contrast to previous work.[18] Therefore, the financial barriers for the uninsured seem to play a critical role in access to post-hospital care resources in the US.[27] Based on the author's discussion with case managers on the wards of a US level I trauma centre, obtaining approval for post-hospital care for the uninsured requires either that the trauma centre pay the cost of post-hospital care on the patient's behalf or that the case manager obtain insurance for the patient during the trauma centre admission. Unlike US trauma centres, which care for patients regardless of insurance status, US post-hospital care facilities typically require proof of payment, i.e. insurance, prior to admission. The effects of decreased post-hospital care on long-term mortality and morbidity are not known and should be addressed in future study in the effort to increase access to these services for the uninsured.

Our finding of increased in-hospital mortality in the uninsured with severe injuries validates another recently published study which demonstrated increased mortality in the uninsured for the severely injured using the National Trauma Data Bank (NTDB).[17] However, this work is older (from 2003 to 2008). Furthermore, the NTDB is not a nationally representative sample like the NSP, which may have introduced bias, particularly centre-specific bias. Our findings are also consistent other studies that show a clear disparity in trauma outcomes based socioeconomic factors, including insurance status.[11–18,24] Education level, household income, race, and employment level have all been shown to be associated with increased mortality in trauma.[12,14,17,28–31] However, in contrast to these studies, we found that minority race itself was not as strong predictor once we controlled for insurance status and injury severity. Black race, relative to white race, was associated with increased mortality in the adjusted analysis among all-comers, but this association was lost among the most severely injured. Other non-white race was not associated with increased mortality.

There are several other limitations to our study. While some physiologic data is available, we do not have detailed anatomic or physiologic information to know how these variables might contribute to worse outcomes. As mentioned previously, comorbidities may not be diagnosed or well-coded, which may impact our results. The NSP is retrospective in nature, and as a result, it is not possible to derive causality from the current study. It is possible uninsured status is a mere proxy for measuring other endogenous patient factors not addressed in the NSP dataset.

Conclusion

We report that outcomes disparities for uninsured trauma patients exist among those with severe injuries. Minority race is less influential in disparate outcomes among the severely injured. It appears that patient factors likely play a large role when it comes to increased mortality, but economic constraints likely impede post-hospital care for the uninsured. It is also possible that insurance alone is not the only determinant and that the quality of care provided to patients with different types of health insurance will also determine whether disparities will persist in the US after enactment of the Patient Protection and Affordable Care Act, which has the goal of providing insurance to the previously uninsured.[32,33] Future work is needed to uncover the specific causes that could account for worse outcomes among the uninsured, and the implementation of universal health insurance in the US offers the possibility of future comparison to determine if recent legislation ultimately improves outcomes for the newly insured.

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TABLE 1

Comparison of demographics, centre characteristics, injury characteristics, hospitalization characteristics, interventions, and outcomes between insured and uninsured trauma patients

	Insured		Uninsured		
	N	%	N	%	p value
n=739,149	532,990	72%	206,159	28%	
Demographics					
Age					<0.001
18 to 44	298,247	56%	30,520	73%	
45 to 64	234,754	44%	56,027	27%	
Male (n=739,066)	359,482	67%	167,768	81%	<0.001
Comorbidities					0.17
None	170,152	32%	73,767	36%	
1	240,815	45%	90,915	44%	
2 or more	122,034	23%	41,540	20%	
Race (n=717,813)					
White	368,525	71%	105,949	53%	<0.001
Black	78,601	15%	54,410	27%	
Other	69,987	14%	40,341	20%	
Centre Characteristics					
Level 1 trauma centre	332,765	62%	136,373	66%	0.52
Hospital size (bed number)					0.33
Over 400	383,988	72%	136,890	66%	
400 and fewer	148,939	28%	69,258	34%	
Injury Characteristics					
ISS (n=718,161)					0.062
15 or less	403,750	78%	162,017	81%	
16 to 24	67,507	13%	23,053	11%	
Over 24	45,819	9%	16,087	8%	
GCS (n=537,968)					<0.001
14 to 15	329,129	85%	129,540	82%	
9 to 13	26,199	7%	11,405	8%	

	Insured		Uninsured		
	N	%	N	%	p value
3 to 8	31,310	8%	15,386	10%	
HR 61 to 99 bpm (n=548,869)	248,199	46%	86,831	42%	<0.001
SBP < 90 mmHg (n=542,845)	12.268	2.3%	4,940	2.4%	0.80
Penetrating mechanism	54,697	10%	54,401	26%	<0.001
Hospitalization Characteristics					
LOS (days) (n=737,688)					<0.001
1 to 5	378,139	71%	158,603	77%	
6 to 10	84,687	16%	27,737	13%	
Over 10	69,121	13%	19,401	9%	
ICU admission	145,908	27%	52,775	25%	0.17
ICU LOS (days) (n=198,647)					<0.001
1 to 5	105,521	72%	41,676	79%	
6 to 10	18,335	13%	5,185	10%	
Over 10	22,030	15%	5,920	11%	
Mechanical ventilator	60,980	11%	27,053	13%	0.056
Mean days on ventilator (n=88,013)					<0.001
1 to 5	38,796	64%	20,692	77%	
6 to 10	8,572	14%	2,764	8%	
Over 10	13,607	22%	3,582	13%	
Mean ventilator free days (n=70,217)					<0.001
1 to 5	18,081	36%	9,620	47%	
6 to 10	14,043	28%	5,119	25%	
Over 10	17,435	18%	5,919	29%	
Interventions					
Number of interventions					0.54
None	156,773	29%	61,423	30%	
1 to 10	359,005	67%	139,330	68%	
Over 10	17,148	3%	5,396	3%	
Diagnostic imaging	270,676	51%	105,772	51%	0.87
Critical care	110,798	20%	44,645	22%	0.18

	Insured		Uninsured		
	N	**%**	**N**	**%**	**p value**
Trauma surgery	33,853	6%	17,666	9%	<0.001
Vascular surgery	7,983	1.5%	4,065	2.0%	0.10
Orthopedic surgery	136,151	26%	40,653	20%	<0.001
Neurosurgery	20,104	3.8%	4,952	2.4%	<0.001
Outcomes					
In-hospital mortality	16,483	3.1%	10,274	5.0%	<0.001
Post-hospital care (n=634,044)*	107,316	23%	16,455	10%	<0.001

ISS, injury severity score; GCS, Glasgow coma scale; HR, heart rate; bpm, beats per minute; SBP, systolic blood pressure; LOS, length of stay; sample sizes in parenthesis indicate missing data;

* indicates excluded data (see Methods)

Table 2

Unadjusted analysis for predictors of in-hospital mortality

	OR	95% CI	p value
Age			
18 to 44	Reference		
45 to 64	1.14	1.02 – 1.28	0.017
Sex (n=739,066)			
Female	Reference		
Male	1.58	1.37 – 1.82	< 0.001
Comorbidities			
None	Reference		
1	0.50	0.35 – 0.72	< 0.001
2 or more	0.45	0.31 – 065	< 0.001
Race (n=717,813)			
White	Reference		
Black	1.46	1.19 – 1.79	< 0.001
Other	0.95	0.75 – 1.15	0.47
ISS (n=718,161)			
15 or less	Reference		
16 to 24	5.46	3.71 – 8.04	< 0.001
Over 24	43.25	27.03 – 69.20	< 0.001
GCS (n=537,968)			
14 to 15	Reference		
9 to 13	7.04	4.54 – 10.90	< 0.001
3 to 8	76.61	50.30 – 116.67	< 0.001
HR 61 to 99 bpm (n=548,869)	0.26	0.23 – 0.30	<0.001
SBP < 90 (n=542,845)	5.67	4.63 – 6.94	< 0.001
Ventilator use	13.26	9.21 – 19.08	< 0.001
Mechanism			
Blunt	Reference		
Penetrating	3.11	2.48 – 3.89	< 0.001
Insurance status			
Insured	Reference		
Uninsured	1.65	1.41 – 1.92	< 0.001

ISS, injury severity score; GCS, Glasgow coma scale; HR, heart rate; bpm, beats per minute; SBP, systolic blood pressure, sample sizes in parenthesis indicate missing data

Table 3

Unadjusted analysis for predictors of post-hospital care

	OR	95% CI	p value
Age (n=634,044)			
18 to 44	Reference		
45 to 64	2.31	2.13 – 2.53	< 0.001
Sex (n=633,967)			
Female	Reference		
Male	0.67	0.61 – 0.74	< 0.001
Comorbidities (n=643,044)			
None	Reference		
1	1.11	0.92 – 1.34	0.26
2 or more	1.82	1.43 – 2.32	< 0.001
Race (n=618,218)			
White	Reference		
Black	0.68	0.59 – 0.79	< 0.001
Other	0.68	0.53 – 0.88	0.004
ISS (n=615,927)			
Less than 16	Reference		
16 to 24	2.40	2.10 – 2.73	< 0.001
Over 24	6.64	5.89 – 7.48	< 0.001
GCS (n=457,003)			
14 to 15	Reference		
9 to 13	1.65	1.41 – 1.94	< 0.001
3 to 8	4.02	3.52 – 4.59	< 0.001
HR 61 to 99 bpm (n=467,705)	0.91	0.79 – 1.04	0.15
SBP < 90 (n=463,701)	2.52	2.26 – 2.81	< 0.001
Ventilator use (n=634,044)	4.15	3.57 – 4.83	< 0.001
Mechanism (n=634,044)			
Blunt	Reference		
Penetrating	0.50	0.42 – 0.60	< 0.001
Insurance Status (n=634,044)			
Insured	Reference		
Uninsured	0.35	0.29 – 0.43	< 0.001

ISS, injury severity score; GCS, Glasgow coma scale; HR, heart rate; bpm, beats per minute; SBP, systolic blood pressure, sample sizes in parenthesis account for missing or excluded data (see Methods)

TABLE 4

Adjusted analysis of in-hospital mortality comparing insurance status and minority race based on injury severity score

	Uninsured vs. Insured			Black vs. White Race			Other vs. White Race		
ISS	**OR**	**CI 95%**	**p value**	**OR**	**CI 95%**	**p value**	**OR**	**CI 95%**	**p value**
All (n=486,792)	1.60	1.29 – 1.98	<0.001	1.24	1.04 – 1.49	0.019	1.04	0.86 – 1.26	0.68
16 to 24 (n=64,163)	1.64	1.30 – 2.06	<0.001	1.61	1.18 – 2.21	0.003	0.93	0.60 – 1.43	0.74
> 24 (n=44,549)	1.68	1.29 – 2.19	<0.001	1.08	0.87 – 1.34	0.48	1.05	0.80 – 1.36	0.74

Regression model includes age, sex, comorbidities, race, ISS (for All only), GCS, injury mechanism, blood pressure, heart rate, ventilator support, and insurance status.

TABLE 5

Adjusted analysis of post-hospital care comparing insurance status and minority race based on injury severity score

	Uninsured vs. Insured			Black vs. White Race			Other vs. White Race		
ISS	OR	CI 95%	p value	OR	CI 95%	p value	OR	CI 95%	p value
All (n=415,763)	0.43	0.36 – 0.51	<0.001	0.93	0.77 – 1.12	0.44	0.89	0.64 – 1.24	0.50
16 to 24 (n=60,331)	0.44	0.33 – 0.58	<0.001	1.21	0.93 – 1.59	0.15	0.89	0.61 – 1.31	0.55
> 24 (n=32,279)	0.45	0.32 – 0.63	<0.001	1.09	0.84 – 1.42	0.49	0.86	0.57 – 1.27	0.44

Regression model includes age, sex, comorbidities, race, ISS (for All only), GCS, injury mechanism, blood pressure, heart rate, ventilator support, and insurance status.