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Assessing the impact of blood alcohol concentration on the rate of in-hospital mortality following traumatic motor vehicle crash injury: A matched analysis of the National Trauma Data Bank

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ABSTRACT

Background: The purpose of this study was to compare the outcomes of trauma patients who were injured in a motor vehicle crash and tested positive for alcohol upon hospital arrival versus those who tested negative.
Methods: Study data came from the US National Trauma Data Bank (2007–2010). Any blood alcohol concentration (BAC) found at or above the legal limit ($\geq$0.08 g/dL) was considered "alcohol positive", and if no alcohol was identified through testing, the patient was considered "alcohol negative". Patients' demographics including age > = 14, race, gender, drug test results, systolic blood pressure, heart rate, injury severity score (ISS), and Glasgow Coma Scale (GCS) were included in the study. Propensity score and exact pair matching were performed between the groups using baseline characteristics.
Results: From a total of 88,794 patients, 30.9% tested positive and 69.1% tested negative for alcohol. There were significant differences found between the groups regarding age, gender, race, and GCS (all $p < 0.001$) as well as a significantly higher in-hospital mortality rate (3.5% vs. 2.7%, $p < 0.001$) and median time to patient expiration (4 vs. 3 days, $p < 0.001$) in the alcohol negative group. After running both matching scenarios, there was no evidence of a significant difference seen in the rates of in-hospital mortality or the median time to patient expiration between the alcohol groups in either matched comparison.
Conclusion: Patients who tested positive for alcohol following a traumatic motor vehicle crash showed no significant increase in in-hospital mortality or time to expiration when compared to propensity score and exact matched patients who tested negative for alcohol.

Introduction

The effects of blood alcohol concentration (BAC) on the body and mental ability of motor vehicle drivers are known risk factors for car crashes and fatalities due to associated injuries. In 2015 alone, the National Highway Traffic Safety Administration reported that a total of 10,265 people (approximately 28 every day) died in the United States (US) as a result of a motor vehicle crash where the driver was under the influence of alcohol. This accounted for nearly 30% of all traffic-related deaths that year [1]. For these US drivers with a BAC at or above the legal limit of 0.08 g/dL, the effects of alcohol could have included poor muscle coordination, impaired judgment and self-control, deterioration of reaction time, and loss of balance, which can lead to a lack of concentration, speed control, ability to maintain lane position, and visual and auditory information processing [2]. As evidence, one study found that BAC positive drivers were significantly more likely to be travelling at higher speeds than those that were BAC negative, at the time of testing, when examining the outcomes of seriously injured motor vehicle crash victims [3]. In addition, studies from 1994 and 2012 showed that blood alcohol intoxication can lead to higher impact speeds and injury severity scores (ISS), which in turn can lead to a higher risk of patient mortality [4,5].

Additional studies have investigated the direct correlation between acute alcohol intoxication and mortality in the traumatic injury patient population; however, results vary between conclusions of a higher chance of mortality, lower chance of mortality, and no significant difference in the mortality rates when comparing BAC positive and negative cases [6–9]. When Stübig and colleagues looked at 10 years' worth of road accident data they

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found that more than twice as many patients with a positive BAC died when compared to negative BAC patients (4.6% vs 2.2%) [5]. However, Plurad et. al. showed that severely injured vehicle crash patients with a high BAC ($\geq$ 0.08%) had significantly better survival rates after crashes [10]. One possible reason for the high degree of variability in the mortality rates of acutely intoxicated patients who were involved in motor vehicle crashes could be the relatively small sample sizes or the methodology adopted to analyze the data. Therefore, the goal of this study was to use a national trauma database to compare the in-hospital mortality rates of pair-matched BAC positive and negative patients.

Methods

Data source

The US National Trauma Data Bank (NTDB) is currently the largest trauma data repository worldwide, housing millions of de-identified patient records that are voluntarily contributed from around 800 facilities located all over the United States. The information collected from injured patients presenting to these facilities is only included in the repository if the injury diagnosis codes meet the following ICD code criteria, as defined by the International Classification of Diseases, Ninth Revision, Clinical Modifier (ICD-9-CM): 800–959.9, excluding the (ICD-9-CM): 905–909.9 (later complications of injury), 910–924.9 (superficial injury), and 930–939.9 (generic foreign body injuries).

Patient characteristics & inclusion criteria

Any injured patient in the NTDB (2007–2010) who was $\geq$ 14 years of age, who sustained a traumatic injury while they were an occupant of a motor vehicle, who had complete systolic blood pressure (SBP) and heart rate (HR) records, was taken to a level 1 or 2 trauma center, and who received a confirmed blood alcohol test at the time of hospital arrival was included in the study. All others were excluded from the analytic data set. Other key patient measures collected for this study included: sex, race, drug test results (prescription and illegal drugs), intent of injury, injury severity score (ISS), and initial Glasgow Coma Scale (GCS). Patients in the final analytic data set were also divided into two groups based on their BAC assessment at the time of trauma center arrival. Patients whose BAC test result was a confirmed negative comprised the "alcohol negative" group, while patients with a positive result at or beyond the US legal limit [0.08 g/dL] comprised the "alcohol positive" group for this study.

Primary and secondary outcomes

The primary outcome of interest was in-hospital mortality, including deaths in the Emergency Department. Secondary outcomes included: the total length of hospital stay (which had a minimum threshold of at least 1 day), the time to patient expiration, and the discharge disposition/status following the traumatic injury event (based on standard claims codes) for alcohol negative versus alcohol positive patients.

Statistical methods

Patient characteristics and outcomes were initially summarized using summary statistics (mean and standard deviation (SD), median with interquartile range (IQR), or frequencies with percentages where appropriate). In order to initially compare patients who tested negative for blood alcohol versus those who tested positive following injury, Chi-Square and Wilcoxon Rank Sum tests were used. However, the two patient populations were not well balanced in their baseline demographics.

Therefore, one to one propensity score matching was performed using "nearest neighbor" matching by selecting out the patients who had a positive alcohol test result and matching them up with a patient who had a negative alcohol test result using the R package, "MatchIt" [11]. When deciding on the patient matching factors for predisposition to having a positive BAC test result, only those factors which were available from the NTDB records and were "present" prior to the patient's injury and arrival to the trauma center were considered. Among the factors available age, race, and gender were selected for the matching algorithm. In addition, exact one to one patient matching was also performed using the same three patient factors and the same R package [11]. After both matching scenarios were performed, both graphical and numerical diagnostics were run to ensure that there was improvement in the group comparability.

Matched patient characteristics were then summarized as before, using summary statistics. The continuous variables were compared between the two groups using the Wilcoxon Signed-rank test and the categorical variables were compared using either

Table 1
Characteristics of Unmatched & Matched Patients by Alcohol Test Results.

	Unmatched Data		Propensity Score Matched Data		Exact Matched Data	
	Alcohol Negative n = 61,330	Alcohol Positive n = 27,464	Alcohol Negative n = 27,464	Alcohol Positive n = 27,464	Alcohol Negative n = 26,304	Alcohol Positive n = 26,304
	Frequency (%)		**Frequency (%)**		**Frequency (%)**	
Male*	32901 (53.6)	20244 (73.7)	20244 (73.7)	20244 (73.7)	19084 (72.6)	19084 (72.6)
White*	44757 (73.0)	18413 (67.0)	18975 (69.1)	18413 (67.0)	18031 (68.5)	18031 (68.5)
Drug Positive	17725 (28.9)	9621 (35.0)	9096 (33.1)	9621 (35.0)	8833 (33.6)	9201 (35.0)
Systolic BP						
>=90	59474 (97.0)	26396 (96.1)	26771 (97.5)	26396 (96.1)	25622 (97.4)	25275 (96.1)
<90	1856 (3.0)	1068 (3.9)	693 (2.5)	1068 (3.9)	682 (2.6)	1029 (3.9)
ACS Trauma Level						
I	43393 (70.8)	19333 (70.4)	19629 (71.5)	19333 (70.4)	18716 (71.2)	18477 (70.2)
II	17937 (29.2)	8131 (29.6)	7835 (28.5)	8131 (29.6)	7588 (28.8)	7827 (29.8)
	Mean (SD)		**Mean (SD)**		**Mean (SD)**	
Age*	41.0 (20.1)	33.7 (13.0)	33.9 (13.1)	33.7 (13.0)	34.0 (13.2)	34.0 (13.2)
Heart Rate	92.8 (20.6)	98.0 (19.3)	93.6 (20.7)	98.0 (19.3)	93.7 (20.6)	97.9 (19.4)
ISS	13.1 (10.8)	13.1 (10.7)	13.0 (10.8)	13.1 (10.7)	13.0 (10.8)	13.1 (10.7)
GCS	13.7 (3.4)	12.8 (4.1)	13.6 (3.5)	12.8 (4.1)	13.6 (3.5)	12.8 (4.1)

* Indicates that the variable was used for Propensity Score and Exact Matching.

a McNemar test (for unordered binary measures) or a Stuart-Maxwell test (for unordered variables with more than 2 possible outcomes) [12]. All p-values reported were 2-sided and a p-value < 0.05 was considered statistically significant. Given the sample size, clinically significant differences were considered to have occurred if there was at least a 1 unit difference between the groups. Statistical summaries and analyses were performed using both "R: A language and environment for statistical computing" [13] and STATA13 [14].

Results

Unmatched data analyses

A total of 88,794 patients met the inclusion criteria for the study. Of those, approximately one-third (n = 27,464) of the patients tested positive for alcohol with a BAC at or above the legal limit (≥ 0.08 g/dL); all remaining patients tested negative. There were clear demographic differences found between the initial alcohol negative and alcohol positive groups regarding age [Mean (SD): 41.0 (20.1) vs. 33.7 (13.0)], gender (53.6% male vs. 73.7% male), and race (73.0% white vs. 67.0% white), respectively. Other patient injury characteristics including Glasgow coma score (GCS), initial systolic blood pressure (SBP), and heart rate (HR) were also noticeably different between the two BAC groups. See Table 1 for a complete summary of the unmatched patients' demographics.

Propensity matched data analyses

Propensity score matching using a 1:1 ratio was then used to better balance the alcohol positive and alcohol negative groups. After matching, each group contained 27,464 patients, and the mean differences between the groups in age, gender, and race, reduced from 7.3 to 0.2 years, from 20.1% to 0.0%, and from 6% to 2% respectively. While there was marked improvement within several other patient characteristics after matching, there were still some statistically significant differences seen. For the alcohol negative group versus the alcohol positive group these included: SBP < 90 (2.5% vs. 3.9%), ISS [Mean (SD): 13.0 (10.8) vs. 13.1 (10.7)], and GCS [Mean (SD): 13.6 (3.5) vs. 12.8 (4.1)]; however, these differences were not considered to be truly clinically significant. See Table 1 for a full demographic summary of the matched patient groups.

With regards to patient outcomes, the overall in-hospital mortality rates observed were 2.7% (95% CI: 2.5%, 2.9%) versus 2.5% (95% CI: 2.3%, 2.7%) between the alcohol positive and alcohol negative groups respectively (P = 0.22). The absolute risk difference (ARD) in in-hospital mortality between the two groups was 0.2% (95% CI: -0.1%, 0.4%) with an odds ratio of 1.07 (95% CI: 0.96, 1.19) as seen in Table 2. There was a statistical, but not clinically significant difference observed in the total hospital length of stay (Median [IQR]: 3 [2,7] days vs. 4 [2,8] days) between the alcohol positive and negative groups. Additionally, there was a lack of evidence of a significant difference in the time to patient expiration (Median [95% CI]: 3 [3,4] days vs. 4 [4,4] days, P = 0.19). Patient discharge disposition for those patient pairs where both parties survived to discharge was also not statistically different between the BAC negative and positive groups (P = 0.41). A full summary is shown in Table 3. Further, to ensure that the severity of the patients' specific body region injuries, as measured by the abbreviated injury score (AIS), was not a potential confounder for the patient outcomes, the rate of moderate to severe injury scores (AIS ≥ 3) for 6 body regions (head, face, chest, abdomen, spine, and extremities) were compared between the alcohol groups. The only clinically and statistically significant evidence of a difference was in the rate of extremity injuries, where a higher proportion of patients in the alcohol negative group had an extremity AIS ≥ 3 (12.8% vs 9.9%, P < 0.001). Additionally, a statistically higher proportion of patients who were alcohol positive had a head AIS ≥ 3 (11.1% vs 10.4%, P = 0.008); however, with less than a 1% absolute difference between the groups there is no clinical evidence of a difference. Table 4 summarizes the AIS rates and follow-up in-hospital mortality outcomes for all 6 body regions.

Exact matched data analyses

Exact matching on patient age, gender, and race using a 1:1 ratio was also used to investigate the study data. Under this methodology, each group contained 26,304 patients, and the mean differences between the groups in age, gender, and race, reduced from 7.3 to 0.0 years, from 20.1% to 0.0%, and from 6% to 0% respectively. While there was marked improvement within several other patient characteristics after matching, there were still some statistically significant differences seen. For the alcohol negative group versus the alcohol positive group these included: SBP < 90 (2.6% vs. 3.9%), ISS [Mean (SD): 13.0 (10.8) vs. 13.1 (10.7)], and GCS [Mean (SD): 13.6 (3.5) vs. 12.8 (4.1)]; however, these differences were not considered to be truly clinically significant. See Table 1 for a full demographic summary of the matched patient groups.

In this analysis, the overall in-hospital mortality rates observed were 2.7% (95% CI: 2.5%, 2.9%) versus 2.5% (95% CI: 2.3%, 2.7%) between the alcohol positive and alcohol negative groups respectively (P = 0.23). The absolute risk difference (ARD) in the in-hospital mortality between the two groups was 0.2% (95% CI: -0.1%, 0.4%) with an odds ratio of 1.07 (95% CI: 0.96, 1.19) as seen in Table 2. There was a statistical, but not clinically significant difference observed in the total hospital length of stay (Median [IQR]: 3 [2,7] days vs. 4 [2,8] days) between the alcohol positive and negative groups. Additionally, there was a lack of evidence of a significant difference in the time to patient expiration (Median [95% CI]: 3 [3,4] days vs. 4 [4,4] days, P = 0.17). Patient discharge disposition for those patient pairs where both parties survived to discharge was also not statistically different between the BAC negative and positive groups (P = 1.0). A full summary is shown in Table 3. Again, to ensure that the abbreviated injury score (AIS) was not a potential confounder for the patient outcomes, the rate of moderate to severe injury scores (AIS ≥ 3) for 6 body regions (head, face, chest, abdomen, spine, and extremities) were compared between the alcohol groups. The only clinically and statistically significant evidence of a difference was in the rate of extremity

Table 2
Association Between Alcohol Test Result and Patient In-hospital Mortality Outcomes.

	Unmatched Data		Propensity Score Matched Data		Exact Matched Data	
	Alcohol Negative n = 61,330	Alcohol Positive n = 27,464	Alcohol Negative n = 27,464	Alcohol Positive n = 27,464	Alcohol Negative n = 26,304	Alcohol Positive n = 26,304
In-hospital Mortality Rate	2167 (3.5%)	730 (2.7%)	684 (2.5%)	730 (2.7%)	660 (2.5%)	705 (2.7%)
Unadjusted Odds Ratio [95% CI]	0.75 [0.68, 0.81], p < 0.001		1.07 [0.96, 1.19], p = 0.22		1.07 [0.96, 1.19], p = 0.23	

Table 3
Discharge Disposition for Propensity Score and Exact Matched Pairs of Patients Who Both Survived to Discharge by Alcohol Status.

	Propensity Score Matched Patients by Alcohol Test Results, Frequency (%)		Exact Matched Patients by Alcohol Test Results, Frequency (%)	
	Alcohol Negative n = 26077	Alcohol Positive n = 26077	Alcohol Negative n = 24960	Alcohol Positive n = 24960
Discharge Disposition				
Another Hospital	404 (1.5)	315 (1.2)	346 (1.4)	298 (1.2)
Home: Health Care	1043 (4.0)	843 (3.2)	964 (3.9)	810 (3.2)
Home: No Services	20294 (77.8)	20951 (80.3)	19444 (77.9)	20030 (80.2)
Hospice Care	7 (0.1)	11 (0.1)	10 (< 0.1)	12 (0.1)
Intermediate Care	706 (2.7)	534 (2.1)	691 (2.8)	516 (2.1)
Left Against Advice	275 (1.1)	319 (1.2)	269 (1.1)	307 (1.2)
Long Term Care	2542 (9.7)	2461 (9.4)	2483 (9.9)	2371 (9.5)
Skilled Nursing Care	806 (3.1)	643 (2.5)	753 (3.0)	616 (2.5)

Table 4
Comparing Severe Trauma Injuries (AIS ≥ 3) in Various Body Regions by Blood Alcohol Status in the Propensity Score Matched Sample (n = 27,464 per group).

	Head Injury		Face Injury		Chest Injury		Abdomen Injury		Spine Injury		Extremity Injury*	
	n	%	n	%	n	%	n	%	n	%	n	%
Negative (-) BAC Result	2866	10.4	3	0.01	6168	22.5	1316	4.8	377	1.4	3514	12.8
Positive (+) BAC Result	3058	11.1	1	0.004	6273	22.8	1247	4.5	368	1.3	2712	9.9
Injury Odds Ratio [95% CI]	1.08 [1.02, 1.14]		0.33 [0.00, 3.98]		1.02 [0.98, 1.07]		0.94 [0.87, 1.02]		0.98 [0.84, 1.13]		0.75 [0.71, 0.79]	
Injury McNemar P -Value	0.01		0.62		0.28		0.17		0.77		<0.001	
Mortality Odds Ratio [95% CI]†	1.07 [0.91, 1.27]		NA		1.12 [0.96, 1.29]		1.03 [0.78, 1.36]		1.10 [0.65, 1.87]		0.97 [0.74, 1.26]	
Mortality Chi-Square P -Value†	0.42		NA		0.14		0.84		0.71		0.81	

* Extremity injuries in this context do not include pelvic injuries.
† The calculated odds ratio and p-value for in-hospital mortality is comparing the outcome for only those who had the severe trauma injury in question and is unmatched.

injuries, where a higher proportion of patients in the alcohol negative group had an extremity AIS ≥ 3 (12.8% vs 9.8%, P < 0.001). Additionally, a statistically higher proportion of patients who were alcohol positive had a head AIS ≥ 3 (11.1% vs 10.2%, P = 0.01); however, with less than a 1% absolute difference between the groups there is no clinical evidence of a difference. Table 5 summarizes the AIS rates and follow-up in-hospital mortality outcomes for all 6 body regions.

Discussion

Our study showed that approximately 30% of motor vehicle occupants who suffered traumatic injuries and were brought to a level 1 or 2 trauma facility tested positive for alcohol at or above the legal limit (0.08 g/dL). However, there was no evidence of a significant difference in the rate of in-hospital mortality, the time to patient expiration, or the discharge disposition among those who survived to discharge regardless of whether patients had a positive or negative BAC at the time of admission.

Alcohol consumption in 20th century western society has become very common, and more than 50% of the adult population in these countries can be classified as "alcohol consumers". For the majority of these people, consuming alcohol is safe and involves little worry of serious health consequences [15]. But, as reported by the American College of Surgeons (ACS), one common mistake that people make is believing that bottles of beer and glasses of wine are less dangerous than shots of hard liquor. Consuming 5 or more alcoholic drinks, where a standard drink is defined as 1.5 oz of hard liquor, 5 oz of wine, or 12 oz of beer, over a short period of time leads to alcohol intoxication above the legal limit, impaired driving [16], and lower compliance with the seat belt rule [17], resulting in numerous fatal accidents. Therefore, avoidance of drinking and driving is the first protective step to avoiding a car accident and accident related deaths.

Moreover, there is evidence from a prior study where Cunningham and colleagues showed that motor vehicle crash (MVC) patients with acute alcohol intoxication are over two times as likely to have higher severity head injuries as those who were

Table 5
Comparing Severe Trauma Injuries (AIS ≥ 3) in Various Body Regions by Blood Alcohol Status in the Exact Matched Sample (n = 26,304 per group).

	Head Injury AIS ≥ 3		Face Injury AIS ≥ 3		Chest Injury AIS ≥ 3		Abdomen Injury AIS ≥ 3		Spine Injury AIS ≥ 3		Extremity Injury* AIS ≥ 3	
	n	%	n	%	n	%	n	%	n	%	n	%
Negative (-) BAC Result	2684	10.2	3	0.01	5902	22.4	1269	4.8	376	1.4	3367	12.8
Positive (+) BAC Result	2928	11.1	1	0.004	5999	22.8	1193	4.5	352	1.3	2586	9.8
Injury Odds Ratio [95% CI]	1.10 [1.04, 1.17]		0.33 [0.00, 3.98]		1.02 [0.98, 1.07]		0.94 [0.86, 1.02]		0.94 [0.81, 1.09]		0.74 [0.70, 0.78]	
Injury McNemar P -Value	0.01		0.62		0.31		0.12		0.39		< 0.001	
Mortality Odds Ratio [95% CI]†	1.10 [0.92, 1.30]		NA		1.13 [0.97, 1.32]		1.02 [0.77, 1.35]		1.37 [0.78, 2.39]		0.90 [0.69, 1.17]	
Mortality Chi-Square P -Value†	0.31		NA		0.11		0.94		0.32		0.43	

* Extremity injuries in this context do not include pelvic injuries.
† The calculated odds ratio and p-value for in-hospital mortality is comparing the outcome for only those who had the severe trauma injury in question and is unmatched.

sober [18]. Stübig and colleagues also tried to find whether a correlation between acute alcohol intoxication and the resulting ISS and patient mortality rate exists using over 10 years' worth of data from the German In-Depth Accident Study. In this study they defined alcohol positive cases as those with a BAC > 0.01 g%. They found that 46.5% patients tested positive for alcohol and those patients who were positive had significantly higher injury severity scores and a higher risk of mortality than the BAC negative group [5]. On the other hand, some studies suggest that BAC may not impact the overall ISS or hospital outcomes at all [19]. Shih and colleagues prospectively evaluated the relationship between motor vehicle drivers' level of alcohol intoxication and their ISS, morbidity, and mortality from resulting car accidents. Records from nearly 1000 patients were analyzed, and the patients' BAC was considered positive if the concentration was ≥50 mg/dL and negative if the concentration was <50 mg/dL. Their findings showed that the positive BAC group did not have a significantly higher ISS or mortality rate [20]. Further still, Plurad and colleagues analyzed data from over 3000 patients who were an occupant during MVC events. They used multivariate analysis to control for their patients' base line characteristics and their analysis showed that having a BAC ≥ 0.08 g/dL was associated with better survival outcomes [10]. Mann and colleagues evaluated three years of data from the British Columbia Trauma Registry (BCTR) in British Columbia, Canada. They classified the patients into 3 groups: no alcohol (0 g/dL), low alcohol (<0.08 g/dL), and high alcohol (≥0.08 g/dL) consumers. More than 2000 patients who were above 10 years of age and who were tested for blood alcohol concentration were included in the study. Again multivariate analysis was performed to overcome the patients' baseline confounding factors, but their analysis showed no significant differences in the average ISS, hospital length of stay, or mortality rate [21].

Our study evaluated more than 50,000 patients from all over the United States who were admitted to level 1 and level 2 trauma centers between 2007 and 2010. Both propensity score and exact matching methods, using the same three patient factors, were utilized to remove potential selection bias and the matched BAC positive and BAC negative patients were directly compared in both scenarios. Our results showed that overall, around one-third of these patients tested positive for alcohol using BAC testing, which is consistent with the rates that others have reported in their analyses [5,22,23,24]. The average age of the patients was around 33 years old and we found no clinical evidence of a difference with regards to ISS. We also found no evidence of a difference in for in-hospital mortality, median time to expiration, or discharge disposition between the BAC negative and positive groups across both matching methodologies, which echoes similar results from studies described previously [20,21].

Limitations

While the use of a large retrospective database can provide access to far more patient records for inclusion and review, there are inherent limitations to such a data source. In this study a large number of patients had missing values regarding their baseline demography and some of the injury related information of interest. There is also no information available from the NTDB that discloses how many deaths occurred at the scene of the accident, or any corresponding forensic information about the BAC level of those deceased individuals, given that it only captures records from patients who were admitted to a trauma center or hospital. Additionally, information about the patients' BAC is only provided in a categorical format rather than as a continuous variable, and not all patients brought to the participating facilities were BAC tested upon arrival. Clearly, some of these limitations could have impacted our results. However, randomized prospective study regarding BAC and motor vehicle crashes would be extremely unethical and prospective observational studies may not be fully generalizable if data is only coming from a small number of institutions. Therefore, the best possible way to perform the analysis for this study was to use propensity score and exact matching methods with pair-matched analyses to help remove the potential patient selection bias from the NTDB. However, we recognize that the use of these methodologies alone cannot correct for any unmeasured variables and in this study, the analyses were limited by the lack of pre-clinical patient information that was available from the NTDB.

Conclusion

Among patients who were occupants of a motor vehicle at the time of an accident, around 30% tested positive for alcohol at or above the legal limit of 0.08 g/dL. No clinical evidence of significant differences were seen regarding injury severity scores, the in-hospital mortality rate, time to patient expiration, or the discharge disposition among the surviving patients when comparing propensity score and exact matched patients who tested positive for alcohol versus those who tested negative.

Conflict(s) of interest

The authors declare that they have no conflicts of interest.

The authors; Nasim Ahmed and Patricia Greenberg declare that they have no conflict s of interest.

Contributions

Nasim Ahmed (NA) conceived and designed the study, and pulled the data from the NTDB. Patricia Greenberg (PG) was responsible for all data manipulation and statistical analyses. Both NA and PG contributed to the manuscript creation and revisions.

Compliance with ethical standards

All procedures followed were in accordance with the ethical standards of the Institutional Review Board of Meridian Health and with the Helsinki Declaration of 1975, as revised in 2008. Since the study was done using a de-identified National database from the American College of Surgeons that is available to all researchers, this study was exempted from IRB review as per policy.

Informed consent

Given that this study was done using a de-identified National database from the American College of Surgeons that is available to all researchers, this study was exempted from IRB review as per policy and no informed consent was required.

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