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Frequency of alcohol use among injured adult patients presenting to a Ghanaian emergency department

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Abstract

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Authorship

AG, PKF, GO, and RFM designed the study, managed data collection, analyzed results, and made substantial contributions to writing the manuscript and subsequent revisions. JB, EAB, CO, and EM managed data collection, participated in data analysis, and made substantial contributions to writing the manuscript and subsequent revisions.

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Objective—Injuries are the cause of almost six million deaths annually worldwide, with 15–20% alcohol-associated. The frequency of alcohol-associated injury varies among countries, and is unknown in Ghana. We determined the frequency of positive alcohol tests among injured adults in a Ghanaian Emergency Department (ED).

Methods—This is a cross-sectional chart review of consecutive injured patients 18 years or older presenting to the Komfo Anokye Teaching Hospital ED for care within eight hours of injury. Patients were tested for alcohol using a breathalyzer or a saliva alcohol test. Patients were excluded if they had minor injuries resulting in referral to a separate outpatient clinic, or death prior to admission. Alcohol test results, subject, and injury characteristics were collected. Proportions with 95% confidence intervals (95% CIs) were calculated.

Results—2,488 injured adult patients presented to the ED from November 2014 to April 2015 with 1,085 subjects (43%) included in this study. Three hundred eighty-two subjects (35%; 95% CI 32–38) tested alcohol positive. Forty-two percent of males (320/756), 40% of subjects 25–44 years (253/626), 42% of drivers (66/156), 42% of pedestrians (85/204), 49% of assaults (82/166), 40% of the seriously injured (124/311), and 53% of subjects who died in the ED (8/15) were positive for alcohol.

Conclusions—The frequency of alcohol-associated injury was 35% among tested subjects in this Ghanaian tertiary hospital ED. These findings have implications for health policy, ED and legislative-based interventions, and acute care.

Introduction

Background

Injury and associated alcohol use pose a global health concern. Worldwide, injuries account for 10% of the global disease burden and almost 6 million deaths annually, with more than 90% of this mortality occurring in low and middle income countries (LMICs).^{1–3} Alcohol is associated with 15–20% of these fatal and nonfatal injuries as both volume and pattern of consumption increase risk.^{4–6}

Injury is responsible for eight percent of all mortality in Ghana, with road traffic injuries the most frequent cause of injury presenting to the emergency department (ED).^{7,8} The World Health Organization (WHO) alcohol and health status report for the general Ghanaian population describes below average per capita alcohol consumption compared to the WHO Africa Region, as almost 77% of Ghanaians report having abstained for at least the past 12 months.⁴ Yet one study, using roadside testing in Accra, Ghana, found 21% of all drivers testing positive for alcohol.⁹ A preliminary study at the Komfo Anokye Teaching Hospital (KATH) ED in Kumasi, Ghana showed a prevalence of 29% among the injured.¹⁰ We are aware of no other studies that describe the frequency of alcohol-associated injury in Ghana.

Importance

Identifying alcohol use among injured patients in the ED is important because such information can be used to inform policies and interventions to reduce the burden of alcohol-associated injury.¹¹ Clinical management is also impacted as alcohol is associated with greater injury severity, a negative impact on clinical evaluation, more invasive procedures,

and increased risk for ED recidivism with new injuries.^{12–15} Yet, the level of alcohol-associated injury in many LMIC settings remains uncertain; known rates in the African region range from 16% in Mozambique to 46% in South Africa.^{6,16} Therefore, without direct investigation, it is difficult for individual LMICs to confidently specify their rate of alcohol-associated injury.

Goals of This Investigation

Anecdotal evidence from clinicians in the KATH ED, as well as preliminary study, suggest that injured patients have a higher rate of alcohol positivity than might be expected from the WHO data or the roadside evaluation mentioned above. We implemented a study to determine the frequency and characteristics of alcohol-associated injuries presenting to the KATH ED.

Methods

Study design and setting

This is a cross-sectional chart review of consecutive injured patients aged 18 years and older treated in the KATH ED from November 3, 2014 through April 11, 2015. KATH is a 1,200 bed academic medical center located in Kumasi, the second largest city in Ghana with a population of two million people.¹⁷ The ED cares for roughly 35,000 patients of all ages per year.¹⁸ It is estimated that 40% of these patients have injuries, coming directly from the scene of the injury and lower-level hospitals.⁷ The ED is staffed by attending faculty and resident physicians training in Emergency Medicine. Personal medical records are documented in paper format that accompany the patient throughout their hospital admission.

All patients are triaged using the South African Triage Scale (SATS) to assign urgency of care needed. SATS is a validated 5-level triage scale that assigns each patient a color-coded acuity tier: i) Red – emergency; ii) Orange - very urgent; iii) Yellow - urgent; iv) Green - not urgent; and v) Blue - dead on arrival.¹⁹ Patients triaged to the Green category are not managed by the ED and are referred to a separate clinic. Triage activities include testing for the presence of alcohol by trained nurses among all injured patients 18 years and older who are triaged SATS Yellow through Red and present within eight hours of injury. Triage nurses identify patients eligible for testing by identifying chief complaint and mechanism of injury either from the patient or persons accompanying the patient, in accordance with a simplified United States Centers for Disease Control (CDC) promulgated ICD-10 injury matrix.²⁰ Then nurses ascertain time from injury to admission to the ED in order to test patients injured within eight hours of presentation.

Selection of participants

This study included patients aged 18 years or older with an injury defined by the CDC promulgated ICD-10 injury matrix presenting within eight hours to the KATH ED.²⁰ This included patients presenting directly to the ED and those transferred from another facility. The promulgated matrix standardized cause and intent of injury categories for both the triage nurse screening process and data collection during the study.²⁰ Patients were excluded if there was copious blood in the mouth that interfered with alcohol testing, if they were

triaged to SATS Green (minor injuries not managed by the ED), or triaged to SATS Blue (deceased and no care provided).

Methods of data collection

Full-time trained research assistants collected all measures from paper medical record data of consecutive patients using Epi Info 7 software (Georgia, USA) on ASUS T100 tablets (Taipei, Taiwan), and data were uploaded to a central computer weekly. Research assistants were proficient in both English and Twi, the local language. A study investigator monitored data entry daily during a two week pilot for completeness of data collection. No inter-rater reliability analysis was performed. Subsequent monitoring was performed bi-weekly over the duration of the study. A study investigator was always available to field questions from research assistants.

Research assistants identified consecutive eligible patients daily by reading the chief complaint and alcohol-related notations in the paper triage admission book. Triage nurses wrote the alcohol test result next to injured patients who were tested, used a check mark to designate injured patients presenting greater than eight hours, and placed a cross next to excluded patients (i.e. patients triaged SATS Green or significant blood in the mouth). Injured patients without any notation missed the alcohol screening process, and the research assistants identified these patients as missed potential subjects.

Care providers recorded patient data on triage sheets and physician sheets. These sheets were standardized and prompted triage nurses and physicians to consistently record certain information in the medical records. All chart review variables were part of the standardized sheets. Research assistants collected the following variables directly from the triage sheet: alcohol result; date of admission; time of admission; pre-hospital time; sex; age; respiratory rate; systolic blood pressure; AVPU neurologic status (Alert, reacts to Voice, reacts to Pain, Unresponsive); and SATS color. The alcohol level was measured by the triage nurse with either a SureScreen Alcometer Breathalyzer (Derby, England) or an ALCO-Screen saliva alcohol test strip (Indiana, USA). The breathalyzer provides a numeric breath alcohol concentration in mg/L units, and the ALCO-Screen strips provide a semi-quantitative color-coded result ranging from 0.00, 0.02, 0.04, and 0.08 g/dL blood alcohol concentration (%BAC). Breathalyzers are regularly calibrated in accordance with manufacturer standards. AVPU is a simplified Glasgow Coma Score that has been validated as an injury severity measure, and triage nurses determined this measure.²¹

The research assistants used decision rules to determine the following variables from the physician sheets: cause of injury; intent of injury; and type(s) of injury. They used two drop-down menus based upon the promulgated CDC ICD-10 injury matrix to determine and record cause and intent of injury.²⁰ They additionally used a series of abridged Abbreviated Injury Scale (AIS)-based drop-down menus in accordance with decision rules to determine type(s) of injury for each body region. We constructed these drop-down menus by condensing types of injury from the validated AIS 2005 Update 2008 Manual into non-serious (AIS 2) and serious (AIS 3) injuries (Appendix 1).²² We then calculated the Maximum AIS (MAIS) score from the type(s) of injury to each body region in order to determine if the subject had a serious injury (MAIS 3).²² We also calculated the Kampala

Trauma Score (KTS), a validated predictor of outcome from the ED, from the triage sheet measures and AIS severity of injury.²¹ KTS ranges from 5–16 with lower scores associated with greater injury and lower chance for survival. Finally, research assistants directly collected subject disposition from the ED admission and discharge book. They left any variable blank if the data was missing from the medical records.

Regarding excluded patients, a research assistant and study investigator tabulated all adult injury patients not included in the study by category (i.e. patients arriving greater than eight hours from injury, SATS Green category, copious blood in mouth, or missed the screening process) on a daily basis. Tabulation did not include those dead upon admission because cause of death was not recorded in the triage admission book. Discrepancies in tabulation between research assistant and study investigator led to a recount. The study investigator then collected data on these patients using Epi Info 7, allowing the study to examine potential selection bias during analysis. Data collection was limited to review of the triage admission book as this data source remained in the ED, rather than patient triage and physician sheets which eventually left the ED. The study investigator directly collected date and time of admission, sex, age, and SATS color from the triage admission book. Cause of injury was also determined from chief complaint in accordance with decision rules, and was limited to road traffic injury, fall, or other. Triage nurses routinely designated road traffic injuries and falls in the chief complaint. However, other mechanisms of injury were occasionally abbreviated as ‘trauma’ in chief complaint. Therefore, the study investigator selected ‘other’ when cause of injury was not due to road traffic or fall. Of note, cause of injury among excluded patients was only collected from January 1 to April 11, 2015.

Analysis

Data was analyzed using Stata v13 (College Station, Texas). We removed eligible subjects from data analysis if they were missing any of the follow variables: alcohol result; time of admission; pre-hospital time; sex; age; cause and intent of injury; and disposition. We converted the continuous variables time of admission, pre-hospital time, and age into categories in order to calculate proportions with their 95% confidence intervals (CIs). Time of admission was divided into 6 hour intervals (12:00–5:59am; 6:00–11:59am; 12:00–5:59pm; 6:00–11:59pm), pre-hospital time was divided into 2 hour intervals (0–2 hours; 2.1–4 hours; 4.1–6 hours; 6.1–8 hours), and age was divided in accordance with similar literature (18–24 years, 25–34 years, 45–54 years, 55–64 years, and 65 years or greater).²³ Medians and interquartile ranges were calculated for continuous variables prior to categorization. The prevalence of a positive alcohol result among all injured subjects was the primary measure of interest, with secondary analysis pertaining to the alcohol prevalence among specific subject and injury sub-groups. For this study, any positive alcohol result from the breathalyzer or saliva test strip was considered a positive test in order to account for lengthy pre-hospital time observed in this setting.²⁴ We determined proportion of alcohol positive subjects with 95% CIs for the study population overall and by time of admission, pre-hospital time, sex, age, cause of injury, intent of injury, injury acuity, serious injury, and ED disposition. Injury acuity was defined using SATS. A dichotomous MAIS score (i.e. $\text{MAIS} < 3$ or $\text{MAIS} \geq 3$) and KTS score ($\text{KTS} \leq 14$ or $\text{KTS} > 14$) were calculated for each patient

in order to measure serious injury defined by MAIS score of three or more and KTS score of 14 or less.^{21,22}

To examine potential selection bias, we compared time of admission, sex, age, SATS color, and cause of injury for included subjects and excluded patients.

Our study design called for a sample size that was sufficient to produce a margin of error of at most 0.05 (5%) for the percentage of positive alcohol tests (95% confidence level). We took a conservative approach to estimating this sample size by assuming the true prevalence was 50% (the point at which the margin of error would be maximized); our estimate came out to approximately 500 patients. We wanted to have this same precision both for patients involved in road traffic injuries, an important sub category of patients, and those with other mechanisms of injury. We estimated that about 50% of our patients would be road traffic injuries.¹⁸ This required a total sample size of 1000 (i.e. 500 road traffic injury and 500 non-road traffic injury).

Ethics

Both Kwame Nkrumah University of Science and Technology and University of Michigan Medical School institutional review board committees approved this study.

Results

Enrollment details and characteristics of study subjects

A total of 2,488 injured adult patients presented to the KATH ED from November 3, 2014 through April 11, 2015 with 1,085 subjects (43% of all patients) included in data analysis (Figure 1). One hundred forty-one patients missed the screening process (6% of all patients), and we removed 16 eligible subjects from data analysis due to incomplete data (1% of all patients). Of subjects included for analysis, a breathalyzer was used to test 853 (79%) for alcohol while an alcohol saliva strip was used to test 232 (21%). Excluded patients were similar to those included with respect to time of admission, sex, age, and SATS color (Table 1). Regarding cause of injury, there were less road traffic injuries among excluded patients.

The entire study population is described by subject and injury sub-groups in Tables 2 and 3. The majority of subjects were male and between ages 25–44 years. The median pre-hospital time was 2 hours (interquartile range 1–4 hours). Road traffic injuries were the most frequent cause of injury, and most injuries were unintentional. The majority of subjects were triaged SATS Yellow, with most subjects discharged home from the ED.

Main results

Overall, 382 (35%; 95%CI 32–38) of the eligible subjects tested positive for alcohol. Breathalyzer identified 274 of these subjects with a median breath alcohol concentration of 0.35 mg/L (interquartile range 0.15 mg/L to 1.2 mg/L). The remaining 108 alcohol positive subjects were tested by saliva test strip. Of these, 36 subjects' blood alcohol concentration measured 0.02 g/dL, 39 measured 0.04 g/dL, and 33 measured 0.08 g/dL. Positive alcohol tests were found among 159 (40%; 95%CI 35–45) subjects presenting between 6:00–11:59pm; 320 (42%; 95%CI 39–46) male subjects; 62 (19%; 95%CI 15–23) female

subjects; and 253 (40%; 95%CI 36–44) of those aged 25–44 years. One hundred ninety-eight (36%; 95%CI 32–40) of all road traffic injuries tested positive for alcohol. Among the road traffic injury subjects, 66 (42%; 95%CI 34–50) drivers and 85 (42%; 95%CI 35–48) pedestrians were alcohol positive. Eighty-two (49%; 95%CI 42–57) subjects involved in assaults tested positive. Thirty-seven (53%; 95%CI 41–65) subjects triaged to SATS Red; 124 (40%; 95%CI 34–46) subjects with MAIS scores greater than or equal to three; and eight (53%; 95%CI 25–82) subjects who died in the ED were also positive for alcohol. In regard to other patient dispositions, alcohol was detected in 63 (35%; 95%CI 28–42) subjects taken to the operating theater; 75 (34%; 95%CI 28–42) subjects admitted to a hospital ward; and 236 (35%; 95%CI 32–39) subjects released home from the ED.

Description of the alcohol positive and negative populations by subject and injury sub-groups is shown in Tables 2 and 3. Compared to alcohol negative subjects, a higher percentage of alcohol positive subjects presented between 6:00–11:59pm (9% difference; 95%CI 3.0–15.0), were male (22% difference; 95%CI 16.8–27.1), aged 25–34 years (8% difference; 95%CI 2.0–14.0), and involved in assaults (9% difference; 95%CI 4.2–13.7). Among subjects involved in road traffic injuries, a higher percent of alcohol positive subjects were drivers (9% difference; 95%CI 1.0–17.0) and pedestrians (10% difference; 95%CI 1.6–18.4) than alcohol negative subjects. A higher percent of positive alcohol subjects were also triaged SATS Red (5% difference; 95%CI 1.6–8.4) when compared to their alcohol negative counterparts.

Limitations

This study has several limitations. First, alcohol use is associated with greater injury severity.⁶ Our estimate of positive alcohol tests may be too high or low, given that we excluded patients with minor injuries as well as those who died prior to ED admission. Second, the two hour median time from injury to KATH ED admission may result in the study presenting a low estimate of alcohol-associated injury as some patients had greater time to metabolize alcohol prior to testing. In order to compensate for this pre-hospital time, any positive result was considered alcohol positive. Third, the total number of adults presenting with injury during the study's sampling frame was lower than might be expected based on previous studies estimating 35,000 annual ED admissions with 40% representing injuries.^{7,18} Thus, it may appear that our study did not identify all potential subjects presenting to the ED. However, the earlier studies did not provide specifics on sampling methodology, and our study design did not include pediatric patients, as did the other studies. As previously described, we had a specific procedure to account for all injured patients during for our sampling frame. Therefore, we think our calculation of all injured adults presenting to the ED during the study is accurate, rather than reflecting a large portion of unaccounted adult patients with injuries. Fourth, the frequency of alcohol use among the injured may not be reflective of injuries among the general population as the study was conducted in the ED setting. Variation may also occur across the other regions of Ghana, limiting the appropriateness of extrapolating the results of this study to other areas in Ghana. However, the KATH ED receives referrals from a broad catchment area, which likely increases the generalizability though to an uncertain extent. Finally, there is potential for bias with estimation of injury severity as these estimations were often based on physician

judgement rather than more objective evidence such as CT scans. This may result in inflation of injury severity.

Discussion

To our knowledge, this is the largest study on alcohol-associated injuries presenting to a West African ED. A significant portion of patients meeting eligibility for our study (35%) were positive for alcohol. High rates of alcohol positivity were found among all subjects who were male (42%), 25–44 years (40%), drivers (42%), pedestrians (42%), assaulted (49%), seriously injured (40%); and died in the ED (53%). Compared to alcohol negative subjects, alcohol positive subjects were more likely to be male, young adults, and involved in assaults. However, all subject and injury sub-groups demonstrated a substantial frequency of alcohol positivity. Our findings underscore the importance of considering acute alcohol use among injured ED patients in this setting.

Our study population largely resembles the global population of injured patients: roughly twice as many males than females were injured, young adults comprised the largest age demographic, and road traffic injuries represented the most common mechanism of injury.^{2,25} Again mirroring data from other regions of the world, our alcohol positive population was more often male, younger, involved in assault, and seriously injured than the alcohol negative population.^{4,26}

Importantly, our results differ from available literature in that the frequency of positive alcohol tests is higher than might be expected based on the WHO alcohol and health status report for Ghana or average global estimates of alcohol-associated injury.^{4,6} Our findings could be due to differences in methodology or may reflect true differences in alcohol use among injured patients in Ghana compared with other African countries. Regardless, many LMICs do not have specific data on the frequency of alcohol-associated injury. It may be tempting to draw conclusions based upon general population alcohol use estimates or available regional or global rates of alcohol-associated injury. This can be problematic for two reasons. First, to our knowledge, there is no literature demonstrating correlation between general population alcohol use with the rate of alcohol-associated injury. Second, the rates of alcohol-associated injury can vary significantly across regions of the world.^{6,16} Thus, the unanticipated deviation in this study's results from previous literature may have broader significance. It suggests the need for LMICs to conduct their own research rather than relying on general population alcohol use estimates or heterogeneous global alcohol-associated injury data.

This study's results may additionally inform Ghanaian efforts regarding health policies, secondary prevention through interventions in the ED setting, and the acute care of injured patients. Road traffic injuries represent the single greatest contributor to injury in Ghana, as well as globally.^{7,25} Ghana has a national maximum BAC of 0.08% while driving.⁸ However, there is no written national policy or action plan, and no national legal minimum age for sale of alcohol.⁴ Successful health policy strategies used in the United States and Europe to reduce alcohol-associated injuries include regulations for alcohol use and driving,

the enforcement of those regulations, public education, and provision of services to treat alcohol abuse and risky drinking.⁶

The presence of a positive alcohol test in an injured patient can indicate increased risk of injury recidivism as a result of persistent risky drinking.^{15,27} In response, interventions have been developed to reduce harmful alcohol use and subsequent injury.²⁸ The United States and Europe have widely, though variably, implemented screening and intervention for harmful alcohol use among injured patients.^{11,27–29} Screening and intervention in our Ghanaian ED may be a reasonable public health strategy. However, such interventions have not been broadly utilized in LMICs despite recommendation as a cost-effective countermeasure.¹¹ We think investigation is needed to establish the feasibility of instituting such proven interventions in the context of LMIC EDs.

Finally, these results may have clinical implications. The presence of alcohol can alter the patient's sensorium in a manner that effects the reliability of the clinical evaluation, and may even lead to overestimation of brain injury severity in head-injured patients.^{13,30} This may result in a clinician ordering more invasive diagnostic and therapeutic procedures.¹³ In low resource settings, where advanced diagnostic imaging may not be readily available, relying on clinical evaluation in the alcohol positive patient with traumatic brain injury may lead to overestimation of injury severity. This could result in inappropriate prognostic and transport decisions. Knowing the patient's alcohol status may help to mitigate inappropriate decisions for diagnostic and therapeutic intervention. Additionally, acute alcohol positivity may also be a marker of alcohol dependence which can lead to alcohol withdrawal syndrome or other complications during the inpatient phase of care.^{23,31,32} Thus, alcohol positive patients require greater vigilance throughout the care process.

In summary, 35% of study eligible adult patients presenting to an urban tertiary hospital ED with moderate-to-severe injuries tested positive for alcohol in this study. These findings have implications for health policy, interventions to prevent future alcohol-related injury, and acute care. These findings also support the practice of routine alcohol testing among injured patients in the KATH ED.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Flow diagram of injured patients admitted to the emergency department during the study sampling frame.

SATS: South African Triage Scale

Table 1

Characteristics of study population and excluded patients

	<u>Study population; n=1,085</u>		<u>Excluded Patients; n=1,246</u>	
	n	%	n	%
Time of Admission; median (IQR)	3:45pm	(11:10am–7:50pm)	2:20pm	(10:20am–6:05pm)
Age; median years (IQR)	33	(26–42)	35	(26–48)
Sex				
Male	756	70%	852	68%
Female	329	30%	393	32%
SATS Triage Color				
Yellow	671	62%	545	64%
Orange	344	32%	226	26%
Red	70	6%	87	10%
Cause of Injury				
RTI	557	51%	354	44%
Fall	172	16%	151	19%
Other	356	33%	294	37%

IQR: interquartile range; SATS: South African Triage Scale; RTI: road traffic injury

Table 2

Proportions of total study, alcohol positive, and alcohol negative populations by time points, demographics, and injury characteristics

Variable	Total study population			Alcohol positive subjects			Alcohol negative patients		
	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)
All injured subjects	1,085	n/a	n/a	382	n/a	n/a	703	n/a	n/a
Time of admission									
12:00–5:59am	105	10%	(8–12)	45	12%	(9–15)	60	9%	(7–11)
6:00–11:59am	215	20%	(18–22)	70	18%	(15–23)	145	21%	(18–24)
12:00–5:59pm	371	34%	(31–37)	108	28%	(24–33)	263	37%	(34–41)
6:00–11:59pm	394	36%	(33–39)	159	42%	(37–47)	235	33%	(30–37)
Pre-hospital time^a in hours									
0–2 hours	621	57%	(54–60)	223	58%	(53–63)	398	57%	(53–60)
2.1–4 hours	245	23%	(20–25)	84	22%	(18–26)	161	23%	(20–26)
4.1–6 hours	140	13%	(11–15)	50	13%	(10–17)	90	13%	(11–15)
6.1–8 hours	79	7%	(6–9)	25	7%	(4–10)	54	8%	(6–10)
Sex									
Male	756	70%	(67–72)	320	84%	(80–87)	436	62%	(58–66)
Female	329	30%	(28–33)	62	16%	(13–20)	267	38%	(34–42)
Age									
18–24 years	209	19%	(17–22)	55	14%	(11–18)	154	22%	(19–25)
25–34 years	384	35%	(33–38)	155	41%	(36–46)	229	33%	(29–36)
35–44 years	242	22%	(20–25)	98	26%	(22–30)	144	20%	(18–24)
45–54 years	127	12%	(10–14)	39	10%	(8–14)	88	12%	(10–15)
55–64 years	54	5%	(4–6)	19	5%	(3–8)	35	5%	(4–7)
65 years	69	6%	(5–8)	16	4%	(3–7)	53	8%	(6–10)
Cause of Injury									
RTI ^b	557	51%	(48–54)	198	52%	(47–57)	359	51%	(47–55)
Driver	156	28%	(25–32)	66	34%	(27–40)	90	25%	(21–30)

Variable	Total study population			Alcohol positive subjects			Alcohol negative patients		
	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)
Passenger	195	35%	(31–39)	45	23%	(18–29)	150	42%	(37–47)
Pedestrian	204	37%	(33–41)	85	43%	(37–50)	119	33%	(28–38)
Fall	172	16%	(14–18)	35	9%	(7–13)	137	19%	(17–23)
Penetrating	158	15%	(13–17)	69	16%	(13–20)	93	13%	(11–16)
Other blunt	154	14%	(12–16)	61	18%	(15–22)	89	13%	(10–15)
Other ^c	44	4%	(3–5)	19	5%	(3–8)	25	4%	(2–5)
Intent of Injury									
Unintentional	897	83%	(80–85)	295	77%	(73–81)	602	86%	(83–88)
Assault	166	15%	(13–18)	82	21%	(18–26)	84	12%	(10–15)
Other (self-inflicted, legal, undetermined)	22	2%	(1–3)	5	1%	(1–3)	17	2%	(1–4)

CI: confidence interval; n/a: not applicable;

^a time from injury to arrival in emergency department; RTI: road traffic injury;

^b two values are missing for type of RTI;

^c injuries defined by International Classification of Diseases-10 not otherwise listed

Table 3

Proportions of total study, alcohol positive, and alcohol negative populations by injury severity and disposition from the emergency department

Variable	Total study population		Alcohol positive subjects		Alcohol negative subjects	
	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)
SATS triage color						
Yellow	671	62% (59–65)	227	59% (54–64)	449	63% (60–67)
Orange	344	32% (29–35)	118	31% (26–36)	228	32% (29–36)
Red	70	6% (5–8)	37	10% (7–13)	33	5% (3–7)
MAIS score^a						
MAIS 2	774	71% (69–74)	258	68% (63–72)	516	73% (70–77)
MAIS 3	311	29% (26–31)	124	32% (28–37)	187	27% (23–30)
KTS^{b,c}						
KTS 15	945	88% (85–89)	320	84% (80–88)	625	89% (87–91)
KTS 14	134	12% (11–15)	60	16% (12–20)	74	11% (9–13)
Disposition from ED						
Discharged Home	670	62% (59–65)	236	62% (57–67)	434	62% (58–65)
Admitted to Hospital Ward	222	20% (18–23)	75	20% (16–24)	147	21% (18–24)
Operating theatre	178	16% (14–19)	63	16% (13–21)	115	17% (14–19)
Died	15	1% (1–2)	8	2% (1–4)	7	1% (1–2)

CI: confidence interval; SATS: South African Triage Score; MAIS: Maximum Abbreviated Injury Scale;

^a a score 3 indicates serious injury;

^b a score 14 indicates serious injury;

^c six values are missing; ED: emergency department