

# Changes in Injury Patterns Associated with Elevated Blood Alcohol Level

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## Background

- Falls account for a significant portion of traumatic injuries, with unintentional falls being the grand majority (~90%)<sup>1</sup>
- Different injury patterns based on person's state (sober vs intoxicated). Sober patients experience more lower extremity injuries while intoxicated patients experience more head and spinal cord injuries<sup>2</sup>
- Intoxication involves being under the influence of alcohol as well as prescription medications and illegal drugs

## Objective

The objective of this study is to define common injury patterns due to alcohol-induced falls in different patient populations with the aim to improve public health outreach, education and prevention in high-risk fall population.

## Methods

- Retrospective study of EtOH positive patients
- N = 1141

Study period:  
January 1, 2016  
to March 30, 2021

Study population  
divided into  
EtOH ≥80mg/dL  
and EtOH  
<80mg/dL

Continuous  
variables  
compared using  
Wilcoxon test  
  
Categorical  
variables  
compared using  
Pearson's chi-  
squared test

## Results

Table 1: ETOH+ Fall Trauma Patients; Demographics vs Under/Over Legal Drinking Limit (N=1141)

	ETOH Level ≥80 (N=714, 62%)	ETOH Level ≤79 (N=427, 37%)	P-Value
ETOH (X,M[SD]IQR)	231,229[89,3]125	18,6,7[21,2]22	<0.01
Age (X,M[SD]IQR)	60,1,63[15,7]19	69,8,72[16,1]21	<0.01
Gender			
Male (N=699, 61%)	472, 66%	227, 53%	<0.01
Female (N=442, 38%)	242, 33%	200, 46%	
Race			
Caucasian (N=1026, 89%)	631, 88%	395, 92%	0.03
Other/Unknown (N=115, 10%)	83, 11%	32, 7%	0.03
Mode of Arrival			
Ground Ambulance (N=1013, 88%)	655, 91%	358, 83%	<0.01
Private Vehicle or Walk-In (N=113, 9%)	49, 6%	64, 14%	<0.01
HEMS (N=15, 1%)	10, 2%	5, 1%	0.95
Transfer In			
Yes (N=138, 12%)	78, 10%	60, 14%	0.14
Season			
Spring (N=283, 24%)	187, 26%	96, 22%	0.39
Summer (N=299, 26%)	183, 25%	116, 27%	
Fall (N=280, 24%)	178, 24%	102, 23%	
Winter (N=279, 24%)	166, 23%	113, 26%	
Year			
2017 (N=228, 19%)	137, 19%	91, 21%	0.42
2018 (N=313, 27%)	179, 25%	134, 31%	0.02
2019 (N=314, 27%)	167, 23%	147, 34%	<0.01
2020 (N=234, 20%)	185, 25%	49, 11%	<0.01
2021 (N=52, 4%)	46, 6%	6, 1%	<0.01

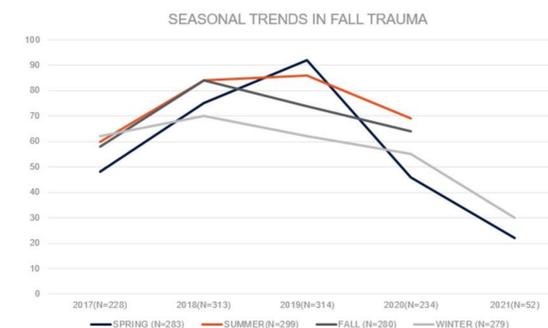
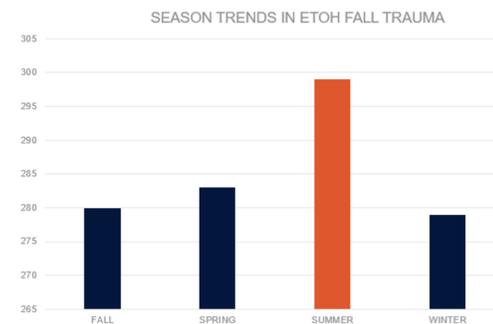


Table 2: ETOH+ Fall Trauma Patients; Injury Patterns vs Under/Over Legal Drinking Limit (N=1141)

	ETOH Level ≥80 (N=714, 62%)	ETOH Level ≤79 (N=427, 37%)	P-Value
Trauma Activation			
Fall (N=248, 21%)	174, 24%	74, 17%	<0.01
Partial (N=811, 71%)	475, 66%	336, 78%	<0.01
Consult (N=51, 4%)	41, 5%	10, 2%	0.01
None (N=31, 2%)	24, 3%	7, 1%	0.12
ISS (X,M[SD]IQR)	5,51,4[6,10]8	6,25,4[7,85]8	0.74
GCS (X,M[SD]IQR)	14,0,15[2,58]1	14,1,15[2,73]0	<0.01
Mode of Injury			
Fall From Stairs (N=120, 10%)	86, 12%	34, 7%	0.03
Ground Level Fall (N=633, 55%)	383, 53%	250, 58%	0.12
Fall From Object (chair/bed/etc.) (N=87, 7%)	48, 6%	39, 9%	0.17
Fall From Tree/Building Structure (roof/balcony,etc.) (N=44, 3%)	29, 4%	15, 3%	0.75
Fall From Ladder/Scaffolding (N=31, 2%)	11, 1%	20, 4%	<0.01
Fall Other/Unknown (N=226, 19%)	157, 21%	69, 11%	0.02
Mechanism of Injury			
Blunt (N=1138, 99%)	714, 100%	424, 99%	0.09
Penetrating (N=3, 0.2%)	0, 0%	3, 0.7%	0.09
ISS Region			
Head/Neck (X,M[SD]IQR)	2,28,2[1,13]2	2,63,2[1,34]2	0.01
Face (X,M[SD]IQR)	1,61,2[0,49]1	1,43,1[0,55]1	0.05
Chest (X,M[SD]IQR)	2,21,2[0,8]1	2,45,1[0,87]1	0.32
Abdominal/Pelvic (X,M[SD]IQR)	2,07,2[0,47]0	2,41,2[0,79]1	0.20
Lower Extremity or Pelvis (X,M[SD]IQR)	2,23,2[0,55]1	2,16,2[0,51]0	0.34

Gross Diagnosis	ETOH Level ≥80 (N=714, 62%)	ETOH Level ≤79 (N=427, 37%)	P-Value
Amputation/Burns (N=2, 0.01%)	2, 0.0%	0, 0%	0.71
Neuro			
Concussion (N=225, 19%)	166, 22%	60, 14%	<0.01
Intracranial Injury (N=213, 18%)	129, 18%	84, 19%	0.55
Nerve or Spinal Cord (N=23, 2%)	11, 1%	12, 2%	0.21
Skull Fracture (N=37, 3%)	27, 3%	10, 2%	0.24
Head NFS (N=3, 0.02%)	1, 0.1%	2, 0.4%	0.65
Spinal Fracture (N=75, 6%)	42, 5%	33, 7%	0.27
Facial Fractures (N=133, 9%)	80, 11%	53, 12%	0.07
Abdominal/Retroperitoneal (N=13, 1%)	7, 0.9%	6, 1%	0.71
Orthopedic			
Shoulder Girdle Fracture (N=39, 3%)	21, 2%	18, 4%	0.32
Upper Extremity Fracture (N=73, 6%)	42, 5%	31, 7%	0.42
Lower Extremity Fracture/Hip (N=81, 7%)	45, 6%	36, 8%	0.21
Dislocation/Sprain/Subluxation (N=22, 1%)	13, 1%	9, 2%	0.91
Pelvic Fracture (N=21, 1%)	9, 1%	12, 2%	0.09
Soft Tissue (N=962, 84%)	609, 85%	353, 82%	0.27
Thoracic Trauma			
Rib Fractures (N=68, 5%)	45, 6%	23, 5%	0.61
Sternum Fracture (N=44, 3%)	25, 3%	19, 4%	0.51
Hemo/Pneumo/Mediastinal (N=33, 2%)	18, 2%	15, 3%	0.43
Vascular (N=5, 0.04%)	5, 0.7%	0, 0%	0.20

## Discussion and Conclusions

- Consuming alcohol in preceding 6 hours has 8x increased risk of injury
- Dose-response effect: higher risk with ≥4 drinks compared to ≤3 drinks<sup>3</sup>
- Intoxicated patients have higher tendency to fall from stairs or ladders and suffer blunt injuries to head, neck or face, and pelvic fractures
- This study shows an 18% association between falls with alcohol over legal limit and intracranial injuries. Very high morbidity and mortality for the patient
- Greater incidence of alcohol-related falls seen in the summertime, which is expected in Myrtle Beach
- Knowing these injury patterns is important to increase awareness and improve prevention in high-risk populations

## References

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