

# Undertriage of Elderly Trauma Patients with Comorbid Conditions

T.Locklear MD, H. Rhodes PhD, N. Mohammad, N. Pascarella, R. Flores, A. Pepe MD  
 Presenter: Taylor Locklear MD | Grand Strand Medical Center

## Introduction

Interfacility transfers are necessary to match health care services with the patients' needs. Under and over triage is an expected occurrence between transferring hospital systems. Under triage is an under-appreciation of the patient's injuries; however, over triage can drain vital resources from the center accepting the transferred inpatient. This study aims at identifying demographics of the under and overtriage patients to improve the quality of care among those transferred into a Level I trauma system

## Methods

A retrospective study on all transfer patients admitted to an ACS verified Level I trauma center in Myrtle Beach, SC, from July 1, 2016, to January 31, 2021. Patients were grouped based on how they were activated and ED disposition, including undertriage, over triage, and OK triage. Comorbidities and demographics of each population were noted. Continuous variables were compared using the Kruskal-Wallis test, whereas categorical variables will be compared using Pearson's Chi-square or Fishers Exact test of proportions, as appropriate.

## Results

- The undertriage group was more likely to be:
  - Older (mean = 64.1 y;  $p < 0.01$ )
  - Partially activated ( $p < 0.01$ ),
  - Blunt injury ( $p < 0.01$ )
  - Fall mechanism ( $p < 0.01$ )
  - Have a higher GCS ( $p = < 0.01$ ), higher ISS ( $p = < 0.01$ )
  - Injuries found to the head/neck ( $p < 0.01$ )
  - Experienced a longer length of stay at the referring facility ( $p < 0.01$ )
  - Higher morbidity outcomes
  - Diagnosed comorbidities to include; dementia ( $p < 0.01$ ) and hypertension ( $p < 0.01$ ).

## Data

**Table 2: Transferred Trauma Patients; Demographics vs Under/Over Triage Based on ED Disposition (N=2802)**

	ED Dispo Under Triage (N=424, 15%)	ED Dispo Over Triage (N=72, 2%)	ED Dispo OK (N=2306, 82%)	P-Value
Age ( $\bar{X}$ ,M[SD]IQR)	64.1,70[19.8]30.2	42.6,37.5[19]28.5	62.3,66[21.5]34	<0.01
Gender				<0.01
Male (N=1465, 52%)	222, 52%	56, 77%	1187, 51%	
Female (N=1337, 47%)	202, 47%	16, 22%	1119, 48%	
Race				<0.01
African American (N=333, 11%)	38, 8%	17, 23%	278, 12%	<0.01
Caucasian (N=2328, 83%)	362, 85%	44, 61%	1922, 83%	<0.01
Other/Unknown (N=141, 5%)	24, 5%	11, 15%	106, 4%	<0.01

**Table 3: Transferred Trauma Patients; Injury Patterns vs Under/Over Triage Based on ED Disposition (N=2802)**

	ED Dispo Under Triage (N=424, 15%)	ED Dispo Over Triage (N=72, 2%)	ED Dispo OK (N=2306, 82%)	P-Value
Trauma Activation				<0.01
Level I (N=467, 16%)	0, 0%	72, 100%	395, 17%	<0.01
Level II (N=1038, 37%)	37, 8%	0, 0%	1001, 43%	<0.01
Partial (N=705, 25%)	340, 80%	0, 0%	365, 15%	<0.01
Consult/Walk-In (N=592, 21%)	47, 11%	0, 0%	545, 23%	<0.01
ISS ( $\bar{X}$ ,M[SD]IQR)	10.5,9[6.47]9	3.88,3[3.35]4	9.47,9[7.19]7	<0.01
GCS				<0.01
Referring Facility ( $\bar{X}$ ,M[SD]IQR)	14.8, 15 [0.79] 0	14.6, 15 [1.95] 0	14.5, 15 [2.09] 0	<0.01
GSMC ( $\bar{X}$ ,M[SD]IQR)	14.7, 15 [1.49] 0	14.4, 15 [2.33] 0	13.9, 15 [3.10] 0	<0.01
Mode of Injury				<0.01
Fall (N=1778, 63%)	287, 67%	19, 26%	1472, 63%	<0.01
Firearm (N=111, 3%)	2, 0.04%	14, 19%	95, 4%	<0.01
Motorcyclist/Pedal Cyclist (N=95, 3%)	12, 2%	2, 2%	81, 3%	0.85
MVT (N=327, 11%)	50, 11%	16, 22%	261, 11%	0.02
Other Land Transport (N=126, 4%)	19, 4%	3, 4%	104, 4%	0.99
Struck by or Against (N=142, 5%)	18, 4%	2, 2%	122, 5%	0.54
Other/Unknown (N=334, 11%)	36, 8%	16, 22%	171, 7%	<0.01
Mechanism of Injury				<0.01
Blunt (N=2567, 91%)	401, 94%	44, 61%	2122, 92%	
Penetrating/Other (N=235, 8%)	23, 5%	28, 38%	184, 7%	
ISS Region				<0.01
Head/Neck ( $\bar{X}$ ,M[SD]IQR)	3.05,3[1.04]2	1.87,2[0.74]1	2.99,3[1.20]2	<0.01
Face ( $\bar{X}$ ,M[SD]IQR)	1.55,2[0.56]1	1.57,2[0.53]1	1.69,2[0.51]1	0.25
Chest ( $\bar{X}$ ,M[SD]IQR)	2.56,3[0.76]1	2.33,2[0.51]0.75	2.52,3[0.79]1	0.54
Abdominal/Pelvic ( $\bar{X}$ ,M[SD]IQR)	2.45,2[0.68]1	2.33,2[0.57]0.5	2.48,2[0.76]1	0.97
Lower Extremity or Pelvis ( $\bar{X}$ ,M[SD]IQR)	2.10,2[0.62]0	2.08,2[0.79]1.25	2.33,2[0.59]1	<0.01
External ( $\bar{X}$ ,M[SD]IQR)	1.05,1[0.21]0	1.13,1[0.33]0	1.04,1[0.24]0	<0.01
Surgical Procedure at GSMC				<0.01
Yes (N=1069, 38%)	168, 39%	4, 5%	897, 38%	<0.01
CPR Given				
Pre-Hospital				
Yes (N=26, 0.9%)	3, 0.07%	0, 0%	23, 0.09%	0.18
GSMC ED				
Yes (N=15, 0.5%)	3, 0.07%	0, 0%	12, 0.05%	0.80
Shock Index Ratio				
Referring Facility ( $\bar{X}$ ,M[SD]IQR)	0.58, 0.55 [0.17] 0.22	0.69, 0.66 [0.20] 0.27	0.60, 0.57 [0.20] 0.23	0.34
GSMC ( $\bar{X}$ ,M[SD]IQR)	0.57, 0.55 [0.16] 0.19	0.63, 0.61 [0.15] 0.21	0.60, 0.57 [0.18] 0.20	0.69
Massive Transfusion Protocol Initiated				
Yes (N=17, 0.6%)	2, 0.04%	0, 0%	15, 0.06%	0.81

## Discussion

- The goal of developing a high-functioning trauma system is to identify life-threatening injuries to reduce morbidity and mortality in trauma patients
- Our under-triage population is at risk for increased morbidity and mortality irrespective of anticoagulant utilization.
- Our under-triaged individuals were held twice as long at the referring facility compared to the over-triage group.
- Careful consideration is paramount considering the percentage of older adults who fall increases with age. (1)
- Currently, individuals over 65 account for 25% of all trauma admissions.(2) Geriatric patients suffering from traumatic injuries have an associated increase in morbidity and mortality compared to younger patients with identical ISS scores.(3-4)
- Higher morbidity and mortality outcomes were identified in our under-triage patient population; coinciding with previously mentioned studies. A population that was disproportionately elderly.
- Our study highlights these outcomes with a resultant increased length of stay in the ICU, increased proportion required surgical intervention, and increased utilization of post-acute care services compared to their respective appropriately and over-triaged cohorts.

## Conclusion

- The risk of under triaged is significant for elderly patients who present without the utilization of anticoagulants.
- Our elderly population is particularly susceptible to the inefficiencies in triage, considering the traumatic mechanisms associated with which this population often presents.

## References

- Nevitt M, Cummings S, Hudes E. Risk factors for injurious falls: A prospective study. J Gerontol. 1991;46(5):M164-M170. doi:10.1093/geronj/46.5.M164
- Bonne S, Schuerer D. Trauma in the older adult: Epidemiology and evolving geriatric trauma principles. Clin Geriatr Med. 2013;29(1):137-5. doi:10.1016/j.cger.2012.10.008
- Bradburn E, Rogers F, Krasne M, et al. High-risk geriatric protocol: improving mortality in the elderly. J Trauma Acute Care Surg. 2012;73(2):435-440. doi:10.1097/TA.0b013e31825c7cf4
- Voskens F, van Rein E, van der Sluijs R, et al. Accuracy of prehospital triage in selecting severely injured trauma patients. JAMA Surg. 2018;153(4):322-7. doi:10.1001/jamasurg.2017.4472.