

Triage of Trauma Patients Injured By Large Animals: Do Urban Doctors Undertriage?

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Introduction

There is a paucity of research in regards to the initial trauma triage designation given to patients presenting to an emergency department after having sustained an injury from a large animal. There is clinical value in the appropriate level of initial trauma response for these patients based on their potential need for expanded hospital resources. Trauma triage levels and their designated responses are inconsistent amongst hospitals in the United States and the American College of Surgeons (ACS) does not have predetermined trauma triage criteria.

Objective

We hypothesize that the severity of injuries is underestimated in patients who are injured by animals larger than themselves. The aim of this study is to investigate the adequacy of the initial triage designation given to these patients presenting to an urban, safety net, academic Emergency Department and Trauma Center (ACS Level 1 Adult, Level 2 Pediatric).

Methods

This retrospective study reviewed patients in the MIHS trauma registry. Patients were included based upon the International Classification of Disease (ICD) code that indicated involvement of an animal in a traumatic injury. Both adult and pediatric patients from January 2006 until September 2015 were included in the study population. Exclusion criteria included patients that left against medical advice prior to complete ED assessment as well as patients injured by animals smaller than the patient. Both the trauma registry and electronic health record were reviewed for pertinent information. Variables assessed were prospectively determined and are outlined in Table 1.

Results:

In total, 213 patients were included in the study. The large majority of patients (81.7%) had surgical services involved in their care either in the initial trauma assessment, consultation or inpatient management. 29/213 patients (13.6%) went to the operating room at some point during their admission. Of the patients that had surgical services involved in their care, a statistically significant 24.1% of them were initially in the lower triage priority subset of patients ($p < 0.0001$). If a patient had the surgical service involved in their triage or hospital management then they were more likely to have an increased overall hospital LOS (OR 4.13). Additionally, a greater time between injury and presentation to the ED correlated with increased likelihood of having the surgical team involved in the care of the patient. 81/213 (38.0%) were initially assigned lower triage level initially and therefore not triaged as trauma patients or were activated as a green trauma (no trauma surgery team involved). The dispositions of these patients are outlined in Figure 1. The remaining 132/213 (62%) were initially assigned higher triage priority. The dispositions of these patients are outlined in Figure 2.

Table 1: Demographics and Clinical Characteristics

Variables	Overall N=213	No Surgical Service Involvement N=39	Surgical Service Involved N=174	P-Value ²
Age, Years (mean, SD)	29.4 (19.3)	28.1 (18.6)	29.7 (19.4)	0.43
Gender				0.48
Female	75 (35.2)	15 (38.5)	60 (34.5)	
Male	138 (64.8)	24 (61.5)	114 (65.5)	
ED LOS, hours (mean, SD)	281.9 (241.3)	295.8 (214.47)	278.8 (247.4)	0.65
Overall LOS, days (mean, SD)	2.63 (3.0)	0.76 (1.7)	3.05 (3.1)	<0.001
CT Count (n, %)				0.12
0	22 (10.3)	3 (7.5)	19 (10.9)	
1-2	51 (23.9)	18 (45.0)	33 (19.1)	
3-4	56 (26.3)	6 (15.0)	50 (28.9)	
≥5	84 (39.4)	13 (32.5)	71 (41.0)	
Method of Arrival				0.55
Air	102 (47.9)	17 (43.6)	85 (48.9)	
Ground	90 (42.3)	18 (46.2)	72 (41.4)	
Private	21 (9.9)	4 (10.3)	17 (9.8)	
ISS Score Category				0.038
<15	181 (84.9)	38 (97.4)	143 (82.2)	
>15	32 (15.1)	1 (2.6)	31 (17.8)	
Injury Type				0.029
Fall	116 (55.2)	26 (70.3)	90 (52.0)	
Trample	16 (7.6)	4 (10.8)	12 (6.9)	
Collision	39 (18.6)	2 (5.4)	37 (21.4)	
Combination	39 (18.6)	5 (13.5)	34 (19.7)	
Time between Injury and Arrival, Minutes (mean, SD)	352.4 (423.7)	104.6 (47.9)	403.2 (448.2)	0.026
Initial Status				<0.001
Green or None	81 (38.0)	39 (100.0)	42 (24.1)	
Yellow/Red/Consult	132 (62.0)	0 (0)	132 (75.9)	

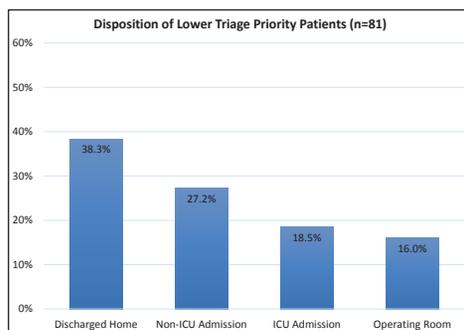


Figure 1: Disposition of Lower Triage Priority Patients

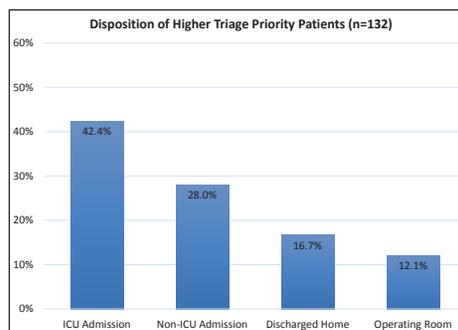


Figure 2: Disposition of Higher Triage Priority Patients

Discussion

While we observed that these patients do, on average, utilize a large amount of hospital resources in their management; our data suggests that this may not be appreciated at the time of initial triage. 51.9% of these 81 patients either went to the operating room or had their triage status upgraded after arriving in the ED. Moreover 44.8% of all the patients who went to the OR were initially a lower triage priority that suggested they were less likely to need immediate interventions. Lastly, 24.1% of all patients that had the MIHS surgery service involved in their management were initially triaged at a lower level of activation. An appropriate triage designation for patients who are injured by large animals may be something that is overlooked in urban emergency departments such as the one in this study. Even hospitals that serve large numbers of equestrians, equine related injuries can be rare. A lack of familiarity due to infrequent encounters represents a potential explanation for the discordance in initial triage status and the level of care required. Our study did not find age or mechanism of injury to be predictive of higher resource utilization.

Conclusions

Patients injured by large animals can require a substantial amount of hospital resources and may be undertriaged in the setting of an urban inner-city emergency department. Increased awareness of these types of resource demanding patients is needed to develop adequate triage guidelines despite their somewhat infrequent presentation in the urban setting. The clinical value of developing adequate triage guidelines lies in the ability to expedite an appropriate response for the management of these patients; a responsibility that largely belongs to an individual hospital.