

Objective

The purpose of this study is to analyze the accuracy of prehospital trauma scoring by EMS providers based on Oklahoma's Prehospital Triage and Transport Guidelines (OPTTG).

Abstract

The ultimate goal of trauma systems is to match the needs of the injured patient to the closest hospital with the capability of providing definitive care in the most appropriate timeframe. The purpose of this study is to analyze the accuracy of prehospital trauma scoring by EMS providers based on Oklahoma's Prehospital Triage and Transport Guide (OPTTG) in order to identify inaccuracies and improve patient care. Our hypothesis is that EMS inaccurately triages trauma patients when compared to state guidelines.

A retrospective chart review compared Comanche County Memorial Hospital (CCMH) EMS run reports to OPTTG. Data was extracted from EMS reports January 1, 2017 through December 31, 2019 to determine level of trauma triage. Two physicians performed chart review and data entry to decrease uncertainty and bias.⁴ Data was analyzed using Spearman correlation. Kappa scoring was used to decreased chance and increase validity.

Preliminary data review consisted of 1,111 trauma charts, of which 1,095 patients had a prehospital trauma score reported by EMS. The most common inaccuracy was under-triage of level 2 traumas, with comorbidities of age, concurrent anticoagulation use, and altered mental status as the most common causes.

Overall, 24% of patients were under-triaged, which is greater the acceptable rate (5%) as published by the American College of Surgeons Committee on Trauma (ACSCOT).¹ We believe this can be improved with further education of EMS providers to avoid under-triage of trauma, particularly level 1 and 2.

Background

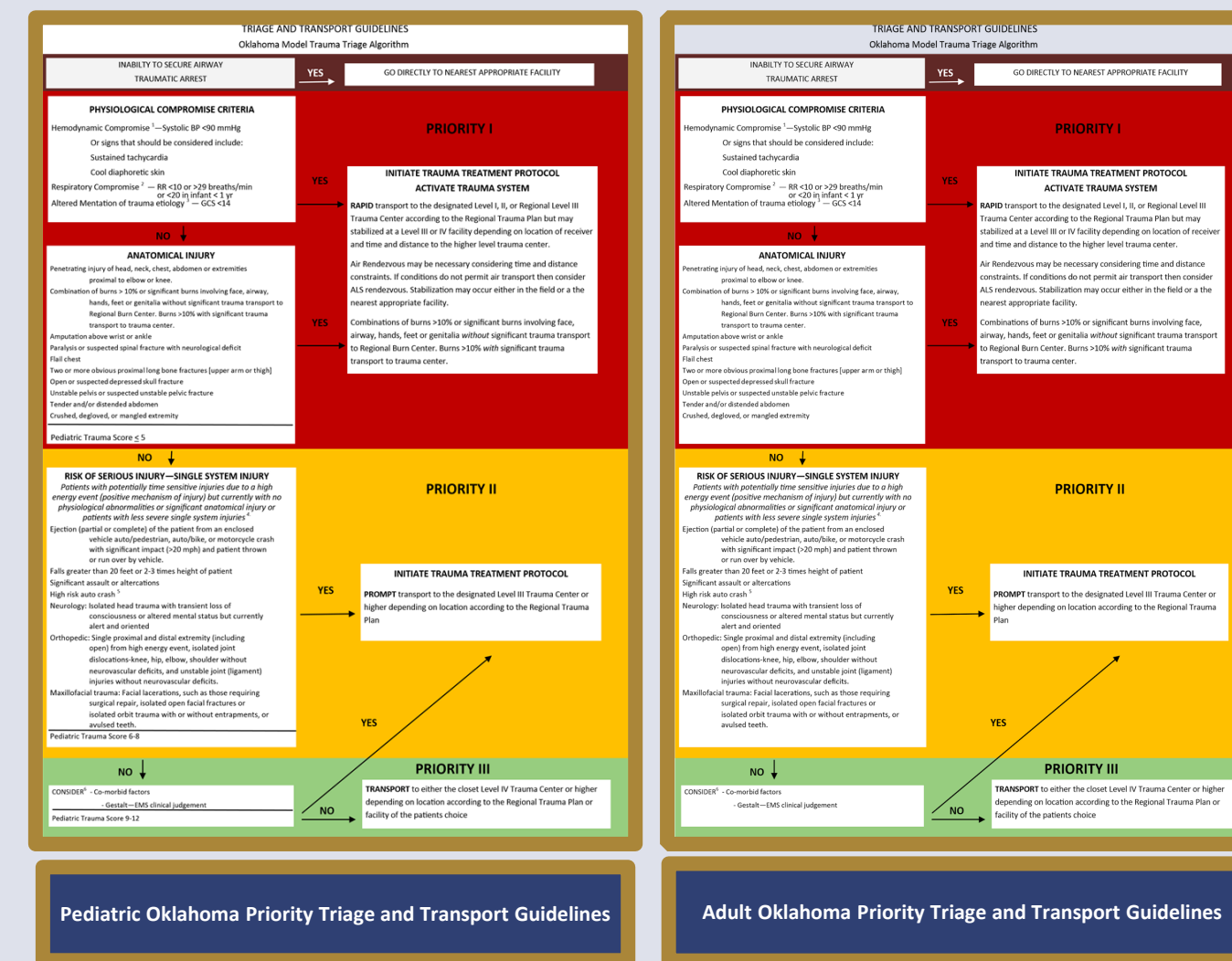
Unintentional injuries remain the leading cause of death among children and adults ages 1-44 and cost an estimated \$177 billion per year in the United States.² The ultimate goal of trauma systems are to match the needs of the injured patient to the closest hospital with the capability to provide definitive care in the most appropriate timeframe. Trauma triage is a critical component of patient care and proper resource utilization.

Studies show that the elderly population is frequently under triaged in the prehospital environment.³ ACSCOT has published acceptable rates for over triage and under triage of 25-35% and <5% respectively.¹

Oklahoma is divided into 8 Trauma Regions. Comanche County Memorial Hospital is located in the southwestern part of the state in trauma region 3 serving a current population of approximately 400,000. There are approximately 100 trauma transports to Comanche County Memorial Hospital per month. Our project sought to compare our rates of over and under-triage with ACSCOT standards.

Methods

Retrospective chart review was performed to determine trauma priority scores based on OPTTG compared to trauma priority scores documented by EMS. Preliminary data was collected from EMS reports between January 1st, 2017 and will continue through December 31, 2019. Methodology and data extraction points such as time of day, level of medic, gender, EMS agency, mechanism of injury were predetermined. Chart review and data entry were performed by two physicians in attempt to further decrease bias and increase validity.⁵ Data was analyzed for statistical relationship using Spearman Correlation. Correction for chance in data points was addressed with Kappa scoring.



Pediatric Trauma Score (PTS)		Score		
Component	+2	+1	-1	
Weight	>20 kg	10 - 20 kg	< 10 kg	
Airway	Normal	Oral or nasal airway	Intubated or tracheostomy	
Systolic BP	>90 mm Hg	50 - 90 mm Hg	<50 mm Hg	
Level of Consciousness	Awake	Obtunded or any loss of consciousness	Comatose	
Open Wounds	None	Minor	Major or penetrating	
Fractures	None	Minor	Open or multiple	
Total Score	9 - 12 Minor Trauma 6 - 8 Potentially life threatening 0 - 5 Life threatening < 0 Usually fatal			

Results

- Our preliminary data consisted of 1,118 trauma patient charts, of which 1,095 patients had a listed trauma priority score by EMS. When the study is complete, we anticipate n=3,600
- The most common mechanisms of injury were same level fall (52.1%), MVC (17.1%), assault (11.2%) and assault by stabbing (5.28%).
- The overall percent agreement for level 1 trauma was 45%, level 2 trauma was 29% and level 3 trauma 96%.
- The highest level of disagreement was due to under-triage of level 2 trauma.
- Of the 236 patients that were under-triaged as level 3 by EMS, age > 55 years with concurrent anticoagulation use, altered mental status, and hemodynamic compromise (tachycardia) were the most commonly missed indications for triaging at a higher level.

EMS Trauma Scores compared to OPTTG scoring				
EMS Trauma Score	OPTTG Trauma Score			Percent of Agreement
	1	2	3	
1	66	10	17	45%
2	26	77	12	
3	56	180	651	

Of the 236 patients that were under-triaged as Priority 3, it was failed to account for age + anticoagulation use, altered mental status and hemodynamic compromise were the most commonly missed indications by EMS for upgrade

Conclusions

- Only 45% of the time did EMS correctly recognize a Priority 1 patient, presumably the most critical of all patients
- The greatest inaccuracy in EMS trauma scoring occurs in failure to recognize Priority 2 with only 29% accuracy. Common overlooked elements included comorbidities of age + anticoagulation and altered mental status.
- The greatest agreement between EMS and OPTTG trauma scoring occurred among level 3 with 96% agreement.
- Overall, 24% of the patients were under-triaged and 3.6% of the patients were over-triaged, which does not meet standards for trauma triage by ACSCOT.¹
- Further education is needed for EMS providers to avoid under triage of trauma patients.

References

1. American College of surgeons Committee on Trauma. Resources for optimal care of the injured patient, Chapter 3; 2014; 23-9.
2. Center for Disease Control Publications, 2004-2006.
3. Garwe T, Stewart K, Stoner JA, et al. Out-of-hospital and Inter-hospital Under-triage to Designated Tertiary Trauma Centers among Injured Older Adults: A 10-year Statewide Geospatial-Adjusted Analysis. Prehospital Emergency Care. 2017;21(6):734-743. doi:10.1080/10903127.2017.1332123.
4. James MK, Clarke LA, Simpson RM, et al. Accuracy of pre-hospital trauma notification calls. The American Journal of Emergency Medicine. 2018;37(4):620-626. doi:10.1016/j.ajem.2018.06.058.
5. Kaji AH, Schriger D, Green S. Looking Through the Retrospectroscope: Reducing Bias in Emergency Medicine Chart Review Studies. Annals of Emergency Medicine. 2014;64(3):292-298. doi:10.1016/j.annemergmed.2014.03.025.
6. Kerby JD, MacLennan PA, Burton JN, McGwin G, Rue LW. Agreement Between Prehospital and Emergency Department Glasgow Coma Scores. The Journal of Trauma: Injury, Infection, and Critical Care. 2007;63(5):1026-1031. doi:10.1097/ta.0b013e318157d9e8.
7. Nishijima DK, Gaona SD, Waechter T, et al. Out-of-Hospital Triage of Older Adults With Head Injury: A Retrospective Study of the Effect of Adding "Anticoagulation or Antiplatelet Medication Use" as a Criterion. Annals of Emergency Medicine. 2017;70(2):127-138. doi:10.1016/j.annemergmed.2016.12.018.
8. Peng J, Xiang H. Trauma undertriage and overtriage rates: are we using the wrong formulas? The American Journal of Emergency Medicine. 2016;34(11):2191-2192. doi:10.1016/j.ajem.2016.08.061.

Acknowledgement

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