Accuracy of prehospital trauma scoring by EMS in a rural community hospital setting: A retrospective analysis

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Objective

The purpose of this study is to analyze the accuracy of prehospital trauma scoring by Emergency Medical Services (EMS) providers based on Oklahoma's Prehospital Triage and Transport Guidelines (OPTTG). Rates of over and undertriage are compared to national guidelines set by American College of Surgeons Committee on Trauma (ACS-COT).

Abstract

The purpose of this study is to analyze the accuracy of prehospital trauma scoring by EMS providers based on OPTTG in order to identify inaccuracies and improve patient care. Our hypothesis is that EMS inaccurately triages trauma patients at a rate exceeding the guidelines of ACS-COT.

A retrospective chart review was performed assessing EMS patient care reports and their corresponding Emergency Department (ED) record of trauma patients transported to a single rural hospital. Data was extracted from EMS reports dated from January 1, 2017 through December 31, 2019 to determine accurate trauma priority scores (TPS). To decrease uncertainty and bias, two physicians performed chart review and data entry.[5]

Data review consisted of 2,751 patient encounters which included records from both EMS and the ED. After reviewing both records, a TPS was determined consistent with OPTTG which was compared to the TPS score assigned by EMS.

Priority 1 traumas were undertriaged 61.7% of the time. Priority 2 traumas were the most commonly misidentified, up to 62.6% of cases. Failure to recognize elements of advanced age, anticoagulation use, and transient altered mental status were the most commonly overlooked.

Overall, 59.3% of patients were undertriaged, which is greater than the acceptable rate (5%) as published by ACS-COT.[1] We believe that TPS accuracy can be improved with further education of EMS providers.

Background

Unintentional traumatic 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] Studies show that the elderly population is frequently undertriaged in the prehospital environment.[3]

The ultimate goal of a trauma system 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. Prehospital TPS determines the proper destination early in utilization of the trauma system. ACS-COT has published acceptable rates for overtriage and undertriage of 25-35% and <5% respectively.[1] ur project sought to compare our rates of over and undertriage with ACS-COT standards.

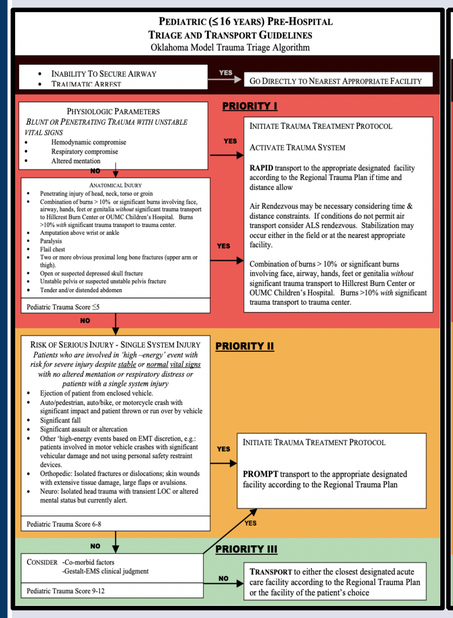
Oklahoma is divided into eight trauma regions. Comanche County Memorial Hospital is located in the southwestern part of the state in trauma region 3 serving a population of approximately 400,000. There are approximately 100 trauma transports to Comanche County Memorial Hospital per month.

Methods

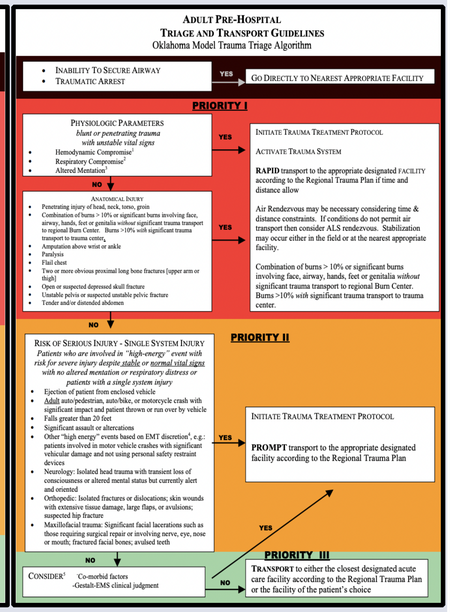
Retrospective chart review was performed to determine TPS based on OPTTG compared to TPS documented by EMS. Data included were EMS reports with corresponding ED records dated from January 1, 2017 through December 31, 2019. Methodology and data extraction points including time of day, level of prehospital provider, gender, EMS agency, mechanism of injury were predetermined by the research team. Chart review and data entry were performed by two physicians in attempt to decrease bias and increase validity.[5] Data was analyzed with assistance from the Oklahoma State University Center for Health Sciences epidemiologist.

Results

- Our data consisted of 2,751 trauma patients in which pre-hospital care reports were matched with the hospital ED records.
- The most common mechanisms of injury were less than great fall and motor vehicle collision (MVC).
- The overall accuracy for scoring priority 1 trauma was 38.3%, priority 2 trauma was 37.4% and priority 3 trauma 93.9%.
- Failure to correctly triage priority 1 trauma occurred 61.7% of the time.
- Of the 683 patients that were undertriaged by EMS, age > 55 years with concurrent anticoagulation use, transient loss of consciousness, and hemodynamic compromise (tachycardia) were the most commonly missed indications for triaging at a higher level.



Pediatric Oklahoma Priority Triage and Transport Guidelines



Adult Oklahoma Priority Triage and Transport Guidelines

EMS Trauma Scores Compared to OPTTG Scoring

EMS Trauma Score	OPTTG Trauma Score 1	OPTTG Trauma Score 2	OPTTG Trauma Score 3
1	148	34	59
2	75	286	38
3	163	445	1503
Percent of Agreement	38.3%	37.4%	93.9%

Of the 683 patients that were undertriaged by EMS, age > 55 years with concurrent anticoagulation use, transient loss of consciousness, and hemodynamic compromise (tachycardia) were the most commonly missed indications for triaging at a higher level.

Conclusions

- Only 38.3% of the time did EMS correctly recognize a priority 1 patient, presumably the most critical of all patients. Failure to recognize sustained tachycardia, centralized penetrating trauma, and GCS < 14 were the most common elements overlooked.
- Priority 2 patients were the least accurately identified at 37.4%. Overlooked elements included comorbidities of age, anticoagulation use, and transient altered mental status.
- The greatest agreement between EMS and OPTTG scoring occurred among priority 3 patients with 93.9% agreement.
- Overall, 59.3% of the patients were undertriaged and 5.5% of the patients were overtriaged, both of which do not meet the guidelines for trauma triage by ACS-COT.[1]
- Findings of this study have been presented to EMTs in training and at Oklahoma state level trauma systems meetings. Dissemination of these findings continue to be a priority.

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 Retrospectoscope: 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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