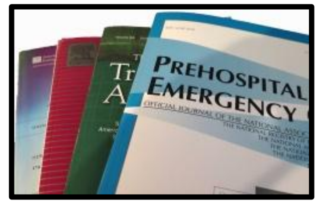
International Prehospital Medicine Institute



IPHMI Literature Review

Keeping You Up to Date with Current EMS Literature and Studies

Vol. 8.4

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1. **Assessing the performance of the updated 2021 Field Triage Guidelines with the Need for Trauma Intervention (NFTI) metric**. Johnston TF, Filiberto DM, DePhillips PB, et al. Am J Surg. 2026:252:116729

Prehospital providers use a stepwise algorithm to determine which trauma patients should preferentially be transported to a trauma center. A survival benefit has been proven for patients transported to a Level 1 trauma center, especially for the most severely injured, as well as those with traumatic brain injury (TBI), penetrating injuries, and hemodynamic instability. Since 1987 the American College of Surgeons – Committee on Trauma (ASC-COT) has defined and refined field triage criteria to guide prehospital trauma triage decisions. The latest version of the Field Triage Guidelines (FTGs) was released in 2021.

Both over-and-under triage occur if accurate triage fails. Over-triage refers to the transport of patients to a trauma center who do not require that level of care. Over-triage can overstress the system and waste resources. Under-triage refers to the failure to transport a patient to a trauma center who meets the criteria for trauma center transport. Under-triage risks the life of the patient as they are not at the appropriate hospital to receive the necessary level of care. The ACS-COT has designated the acceptable rate of over-triage to be ≤ 35% and under-triage to be ≤ 5%.

The 2021 FTGs use Red Criteria to identify patients who should be transported to a Level 1 trauma center, if available in the system, and Yellow Criteria for those requiring any level of trauma center. The Red Criteria are the anatomic and physiologic criteria, while the Yellow Criteria utilizes mechanism of injury and EMS provider judgement. The Need for Trauma Intervention (NFTI) tool uses retrospective criteria based on interventions and outcomes to evaluate the effectiveness of triage decisions. NFTI criteria included: blood transfusion within 4 hours of arrival, operation within 90 minutes, utilization of interventional radiology (usually for hemorrhage control), admission to the ICU for longer than 3 days, and death within 60 hours. The purpose of this study was to evaluate the performance of the 2021 FTGs with a focus on under-triage using NFTI as the gold standard. The authors hypothesized that the 2021 FTGs would not meet the ACS-COT trauma activation goal of ≤ 5% under-triage and ≤ 35% over-triage.

All patients treated at a Level 1 trauma center over a 2-month period were included in the study. Those less than 18 years of age, those missing prehospital run sheets, transfers, and those transported by means other than ambulance were excluded. The prehospital data identified patients who met the Red and/or Yellow Criteria, while hospital data identified patients who met NFTI. Under-triage was defined as any patient who met one of the NFTI criteria (NFTI +) but did not meet Red or Yellow Criteria. Over-triage was defined as any patient who was NFTI- but met Red or Yellow Criteria.

A total of 319 patients were included in the study. The median age was 35 years, 71% were male, and 73% were African American. A slight majority of patients had a blunt mechanism (60.5%). For those meeting Red Criteria, the under- and over- triage rates were 21.3% and 39.6% respectively. Those with Yellow Criteria had an under- and over- triage rate of 47.9% and 66.2% respectively. This equated to under-and over-triage rates of 23.4% and 30.2% respectively for full activation criteria. Under-triage by Red Criteria was most commonly due to normotension (the patient did not meet the requirement for hypotension to be considered Red). Of all patients under-triaged by the Red Criteria, 100% had a blunt mechanism.

This study has some limitations. It is a single-center study of a trauma center with a relatively high percentage of penetrating trauma, so this data may not be reflective of all trauma systems. The small sample size, and the fact that the study took place in June and July, limited subgroup analyses and could have missed any seasonal trends in injury patterns. It is possible some prehospital information was incomplete or inaccurate.

This study shows an under-triage rate of 21.3% and an over-triage rate of 39.% with the 2021 FTGs. The 2021 FTGs still do not meet the ACS-COT criteria for under- and over-triage of ≤ 5% and ≤ 35% respectively. Further studies are warranted to predict which patients would benefit from trauma center transport.

2. **Comparative Clinical Outcomes of Trauma Transport: Emergency Medical Services vs. Police Transport, A Systematic Review and Meta-Analysis.** Shapovalov V, Tran QK, Sarani B, MD, et al. J Emerg Med 2026;80:8–19

For many years, treatment of trauma patients was focused on rapid transport to an appropriate trauma center with limited intervention prior to the start of transport following the rationale that the sooner a patient can be treated at the trauma center, the better the outcome. This is well supported by the literature and is standard protocol in most EMS services. A few larger cities allowed for the local police to transport patients with penetrating trauma to the nearest hospital prior to the arrival of EMS. The authors of this Systematic Review evaluated the evidence and outcomes of patients transported by Police Transport (PT) and by standard EMS.

The authors conducted a literature search using the keywords of Police, Law Enforcement, Transport, and Trauma. The search conducted in January 2025 yielded 631 titles and abstracts containing the keywords. After evaluation, 32 full-text articles were reviewed; 10 met the study criteria and were included in the final evaluation. Of the 10 studies included, nine (9) were retrospective, and one (1) was prospective. Nine of the studies were predominantly penetrating trauma, with one (1) focused on blunt trauma.

All of the studies reviewed reported mortality as their primary outcome. The overall mortality rate was 14%, with a 12.7% (12,742 patients) mortality rate for the EMS transport group and a 25% (2933 patients) mortality rate for the Police transport group. There was no statistically significant difference in surgical interventions required between the two groups. However, it was noted that, using SBP and higher ISS scores as markers, the data demonstrated EMS transported patients were as not severely injured compared to those police-transported. The authors noted, however, that "neither of these characteristics independently accounted for the increase in mortality."

While this literature review demonstrates a decrease in mortality for patients transported by EMS, questions still remain. The question of the selectivity by police of which patients to transport versus waiting for EMS may have resulted in a bias for more severely injured patients to be transported by the police. As the studies were retrospective in nature, prospective studies should be conducted using a robust study design and a well-defined patient selection protocol in place.

3. **Impact of on-scene time interval on survival in traumatic out-of-hospital cardiac arrest.** Choi Y Injury. 2026 Jan;57(1):112821

Trauma is a leading cause of death world-wide contributing to over 4.4 million deaths each year with traumatic out-of-hospital cardiac arrest (TOHCA) having an overall mortality rate of 96%. The importance of timely intervention to correct life-threatening conditions cannot be overstated. Prolonged prehospital time contributes to delaying definitive care. Previous studies showed shorter total prehospital time was associated with improved survival outcomes but that the effect on-scene time, specifically had not been investigated.

This study set out to assess the impact of the on-scene time interval on survival in traumatic out of hospital cardiac arrest (TOCHA) and to determine whether there is an optimal on-scene time interval. The team analyzed TOHCA patients aged >15 years in South Korea from January 2019 to December 2021. They defined the on-scene time interval as the amount of time EMS spent at the scene from arrival at to departure from the scene to the hospital. The Primary outcome was survival to discharge from the hospital.

A total of 6,106 TOHCA cases were included in the study. The data was gathered from the Out of Hospital Cardiac Arrest Surveillance and the Community-Based Severe Trauma Survey collected by the Korea Disease Control and Prevention Agency. The survival to discharge rate for TOHCA patients was 3.7%. Survivors were more likely to be male, experiencing witnessed cardiac arrest with bystander CPR and presenting with a shockable rhythm. The most common cause of these injuries was Motor Vehicle Crashes. The rest were caused by slips or falls, direct blow injuries, penetrating injuries and machine related trauma. Slips and falls had the worst survival to discharge rates at 2.1% followed by motor vehicle crashes at 4.3%, penetrating injuries at 6.4%, direct blow injuries at 7.6% and machine related injuries at 9.8%. Their analysis showed "a negative relationship between on-scene time interval and the odds of survival to discharge with intervals exceeding 10 minutes significantly reducing the odds of survival to discharge."

The study has a number of limitations. The database does not include injury severity scores, making it impossible to adjust for severity. In addition, it does not record what prehospital interventions were performed.

This study shows, not surprisingly, that increasing on-scene time intervals was significantly associated with a reduced likelihood of survival to discharge with a sharp cutoff when the on-scene interval exceeded 10 minutes. While they propose a solution of focusing on BLS care for TOHCA patients to ensure that the on-scene interval does not exceed 10 minutes giving these patients their best chance of survival, the ultimate goal should be a scene time as short as possible.

4. **Evaluating the Success Rate of Distal Femur Intraosseous Access Attempts in Pediatric Patients in the Prehospital Setting: A Retrospective Analysis.** Zitek T, Antevy P, Garay S, et al. PREHOSPITAL EMERGENCY CARE 2025;29:776–781

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Intraosseous (IO) cannulation has become commonplace in the prehospital environment. It is both a fast and effective way to gain vascular access for the administration of medications and fluids for volume resuscitation. Prehospital IO success rates are estimated at 76% -100% in all age groups and greater than 80% in the pediatric patient population. Common sites for IO access include the proximal humerus, the sternum and the proximal tibia. While a popular site due to its location away from the chest and head, some studies have suggested a large number of pediatric IOs placed into the proximal tibia may not be correctly positioned.

Palm Beach (Florida) Fire Rescue (PBFR) providers have been trained and authorized to use the distal femur for IO access since 2015. Providers are not mandated to use the distal femur for IO placement but it has been recommended since 2019 in the pediatric population. Providers are trained to place distal femur IOs approximately 1-2cm proximal to the superior border of the patella and 1cm medial to the mid-line. Providers are trained to use a "drill style" IO insertion device.

The authors of this article embarked on an Institutional Review Board waived, retrospective chart review study to evaluate success rates, complication rates, medication administration, IO needle size and ROSC rates in pediatric patients (<15 years old) treated by PBFR between May 2015 and January 2024.

After initial review of the data, the authors identified 163 patient charts with documented IO attempts. Female patients accounted for 51.5 of the cohort population. The median age of the patients was 1.9 years and 39.9% were black followed by non-Hispanic white at 26.4% and 21.5% Hispanic. The number of patients in cardiac arrest was 105 (64.4%). Overall, there were 235 attempts with a success rate of 97.5%. First vascular access attempts were 41.1% distal femur, 31.3% proximal tibia, 14.7% intravenous, 48% distal tibia and 9% proximal humerus. The success rate for distal femur IO access was 89% compared to 84.7% for proximal tibia placement. There were four distal femur complications documented and three proximal tibia complications including dislodgement, infiltration and loss of patency. Distal Femur IO access was the first attempt for vascular access in 49.5% of the cardiac arrest group patients with 23.1% of that group achieving ROSC. Comparatively, 34.3% of the cardiac arrest patient's vascular access was via proximal tibia IO with 22.2% achieving ROSC. Lastly, the mean for medication administration was 3.3 medications per distal femur IO and 3 via proximal femur IO. The authors were unable to include IO needle size due inconsistent and missing documentation on the study group patient care reports.

Limitations of this article include the single agency, retrospective chart review nature of the study. The sample size examined was relatively small. The data was self-reported by the providers and may not have included all IO attempts. Complications were limited to stability of the IO, patency of the IO and IO line infiltration; all prehospital factors with no inclusion of subsequent hospital complications such as osteomyelitis.

This study did not reveal a statically significant advantage of distal femur IOs over proximal tibia IOs. At the same time, it did not reveal a statistically significant disadvantage either. They did find slightly higher success rates and ROSC rates with the distal femur approach versus the proximal tibia. The authors did note that at the time of publication there was no commercially available distal femur IO training device. This may be demonstrative of the ease of distal femur IO placement. EMS services that currently restrict IO access to the sternum, proximal humerus and proximal tibia may want to consider authorizing providers to gain vascular access via a distal femur IO.