

International Prehospital Medicine Institute



IPHMI Literature Review

Keeping You Up to Date with Current EMS Literature and Studies

Vol. 7.12

- 1. How many minutes matter: Association between time saved with air medical transport and survival in trauma patients.** Boland S, Lu L, Silver DS, Byrd T, Guyette FX, Brown JB. *J Trauma Acute Care Surg.* 2025;98: 890–898.
 - 2. Diagnostic performance of prehospital EFAST in predicting CT scan injuries in severe trauma patients: a multicenter cohort study.** Tikvesa D, Vogler C, Balen F, et al. *European J Trauma and Emergency Surgery* 2025;51:4 Full text available on-line at:
https://traumato.urgenceoccitanie.fr/wp-content/uploads/sites/4/2025/02/Prehospital_EFAST__1739694453.pdf
 - 3. Identifying and profiling pre-arrival characteristics of avoidable emergency department visits transported by paramedics: a cohort study using linked prehospital and hospital data.** Strum RP, Costa A, McLeod B, Mondoux SE. *Emerg Med J* 2025;42:442–450
 - 4. Prehospital and Resuscitation Factors Associated with Favorable Pediatric Drowning Outcomes.** Sheno RP, Nguyen T, Driscoll C, et al. *Pediatric Emergency Care* 2025;41:514-520.
-
- 1. How many minutes matter: Association between time saved with air medical transport and survival in trauma patients.** Boland S, Lu L, Silver DS, Byrd T, Guyette FX, Brown JB. *J Trauma Acute Care Surg.* 2025;98: 890–898.

The time between a traumatic event and definitive treatment is critical in the severely injured trauma patient. Over the past four decades, various triage and time-saving strategies have been developed. Air Medical Transport (AMT) has played a significant role, especially in rural areas with extended transport times.

The authors of this retrospective cohort study assessed the time savings threshold at which air medical transport (AMT) offers a survival advantage over ground transport. This study estimated time savings of air medical transport (AMT) versus ground emergency medical services (GEMS) by calculating hypothetical (counterfactual) prehospital times for each patient using the transport mode they did not receive. For GEMS patients, the team utilized geographic data and average helicopter speeds to estimate the time and distance that AMT transport would have taken. For AMT patients, they calculated road travel times and average GEMS response and scene times. Time savings were then computed as the difference between actual and counterfactual times. Patients whose data showed GEMS would be faster than AMT were excluded, as AMT wouldn't be used in those cases.

The cohort included 280,271 trauma patients over the age of 16 gathered from the Pennsylvania trauma registry from 2000 to 2017 who were transported from within 40 miles of the receiving hospital. Patients who met at least one of the anatomic or physiologic criteria in the National Guidelines for the Field Triage of Injured Patients (NFTG) were included in the cohort. Excluded patients were those who were dead on arrival, prehospital scene or transport times greater than 90 minutes, those with unknown transport mechanism, and those from distances that always utilize air transport.

International Prehospital Medicine Institute

The study found that the survival benefit of air medical transport (AMT) depended on the amount of time saved and the patient's condition. Patients in the NFTG subgroup began to experience improved survival when AMT saved at least 13 minutes, while those in the AMPT subgroup saw a survival advantage starting at 23 minutes saved, with the most significant benefit at that point. For patients who did not meet the criteria for either the NFTG or AMPT groups, no amount of time saved by AMT was linked to improved survival. A sensitivity analysis that accounted for injury severity and scene time confirmed these findings, showing that the survival benefit for the NFTG group began at 17 minutes saved and remained at 23 minutes for the AMPT group.

This study demonstrated for patients meeting physiologic or anatomic NFTG criteria, an AMT time savings of 13 to 17 minutes or more was linked to improved survival. The exact threshold varies across patient groups, likely due to other advantages of AMT, such as advanced medical capabilities. These may include treatment options such as blood products and advanced airway management, not available to ground-based EMS in the study area. These results can help guide decisions in AMT triage protocols.

2. Diagnostic performance of prehospital EFAST in predicting CT scan injuries in severe trauma patients: a multicenter cohort study. Tikvesa D, Vogler C, Balen F, et al. *European J Trauma and Emergency Surgery* 2025;51:4 Full text available on-line at:
https://traumato.urgenceoccitanie.fr/wp-content/uploads/sites/4/2025/02/Prehospital_EFAST__1739694453.pdf

Hemorrhage remains a leading cause of death in blunt trauma patients. Early detection of intra-abdominal hemorrhage, as well as pneumothorax and hemothorax, can improve time to intervention and potentially decrease mortality. The ultrasound is routinely used in most emergency departments to detect fluid in the abdomen, which in the trauma patient is presumed to be blood. Additionally, the ultrasound can be used to detect a hemothorax and pneumothorax. The Extended Focused Assessment with Sonography in Trauma (EFAST) is an ultrasound assessment of the chest and abdominal cavities to detect a pneumothorax and fluid (blood). Recently, some prehospital services have been trialing prehospital EFAST (pEFAST), which has the theoretical advantage of giving the receiving trauma team advanced notice of possible hemorrhage. The objective of this study was to evaluate the pEFAST in comparison to CT scan results obtained later in the hospital.

This was a retrospective, multicenter study of a trauma database from four University Hospitals in France from 2017-2021. All four centers are Level 1 trauma centers and have their own mobile intensive care unit (MICU) staffed by physicians. All patients 14-years or older with blunt thoracic or abdominal trauma were included. Patients with penetrating injuries, pregnant patients, and those with indeterminate eFAST results were excluded. The portable ultrasound scan was performed by emergency physicians certified in EFAST procedures. The primary outcome of the study was the presence of at least one injury detected on CT scan at admission.

A total of 495 patients were included in the study. The average age was 40 years, 70% were male. All patients had blunt trauma. A total of 87 (18%) patients had a positive pEFAST. A positive CT scan was found in 273 (55%) patients. The sensitivity of the pEFAST was 27% and the specificity was 94%. A positive pEFAST was highly correlative with a positive CT scan on arrival to the hospital (indicating the presence of an injury). For thoracic trauma, the pEFAST had a sensitivity and specificity of 23% and 97% and for hemothorax 21% and 97% respectively.

This study has several limitations. It is a retrospective study of a large database, subject to the limitations of those studies. The trauma system in France may not translate to other countries. All pEFAST exams were performed by trained physicians and not medics, so these results would not be seen in EMS systems without physicians on scene. By performing the pEFAST on-scene an artificial negative study may be due to not having enough time for blood to accumulate and to detect hemorrhage, but

International Prehospital Medicine Institute

that hemorrhage would be detected later at the hospital. A selection bias was present – only patients with available data were included. The authors did not include inconclusive pEFAST exams and this altered the final results.

In conclusion, this study demonstrates the pEFAST exams performed by trained physicians in the field have a very good specificity (meaning a positive result is likely demonstrative of an injury) but a poor sensitivity (meaning a negative result does not rule out an injury). The usefulness of prehospital ultrasound for trauma remains debatable as it likely will not change treatment at a well-established trauma center. Further study is warranted to evaluate the usefulness of pEFAST.

3. Identifying and profiling prearrival characteristics of avoidable emergency department visits transported by paramedics: a cohort study using linked prehospital and hospital data. Strum RP, Costa A, McLeod B, Mondoux SE. *Emerg Med J* 2025;42:442–450

Crowded Emergency Departments are common and present challenges to EMS agencies and healthcare systems the world over. Many visits to Emergency Departments might be avoidable if they were to be effectively managed outside of the ED. Increased attention is being paid to the idea of Paramedics re-directing patients to community-based care before resorting to transport to the ED. Citing limited evidence that identifies which patients might be suitable for non-ED care solutions, the authors sought to identify patient characteristics associated with “avoidable and potentially avoidable ED visits prior to ED transport”.

This was a cohort study using linked data from the Hamilton, Canada Paramedic Services and an academic receiving hospital for the 25-month period between January 2022 and January 2024. ED visit records were then classified using the Emergency Department Avoidable Classification and placed into one of three categories: avoidable, potentially avoidable or not avoidable.

Of 23,891 patients with linked data transported during the study period, 4.9% were classified as avoidable and 16.8% as potentially avoidable resulting in a total of 21.7% being classified as either avoidable or potentially avoidable.

Patients in the avoidable and potentially avoidable group were predominantly aged between 18 and 64 years of age. The not avoidable group were older, being predominantly 65 years old or older. Gender was balanced across all three classifications. Using the Canadian Triage and Acuity Scale for medical acuity, the majority of the patients across all three categories would be classified as CTAS3 (urgent), although they found a significantly higher number of CTAS1(resuscitation) and CTAS2 (emergent).

The limitations of this study include using the linked data from one EMS agency and one hospital which may limit the generalizability of these findings to other settings and systems. Also, differences in Paramedic training, community policies and available community-based care services may affect the applicability of these findings.

This study shows that identifying key patient characteristics and problems that contribute to avoidable and potentially avoidable ED visits can help mitigate some of the ED overcrowding problems. By identifying community resources, developing appropriate policies and supporting paramedics to redirect some specific patients to appropriate non-ED care settings care may be optimized.

4. Prehospital and Resuscitation Factors Associated with Favorable Pediatric Drowning Outcomes. Shenoi RP, Nguyen T, Driscoll C, et al. *Pediatric Emergency Care* 2025;41:514-520.

Drowning is the number one cause of death for children between the ages of one and four. In the United States alone in 2020, 837 children between 0 and 18 years of age died from unintentional drowning. Prevention is the best way to decrease the number of children lost to unintentional drowning.

International Prehospital Medicine Institute

The authors of this paper looked for commonalities of drowning survivors grouped by Cerebral Performance Category (CPC) scores at the time of discharge from the hospital. This is an eight-year (1 January 2010 – 31 December 2017), Baylor College of Medicine and the University of Texas institutional review board approved, retrospective study of children (<18 years of age) who drowned in Harris County Texas, the third most populated county in the United States. Data was gathered via hospital records, EMS data and fatality reports.

The authors' primary goal was to study resuscitation and pre-hospital factors common to favorable CPC scores (scores range from 1- Good cerebral performance to 5- Death) at the time of hospital discharge. The secondary goal was to examine the relationship between Bystander CPR (BCPR) and desirable CPC scores at the time of hospital discharge.

Drowning was defined as: "the process of experiencing respiratory impairment from submersion/immersion in liquid". "Water Rescues", submersions without respiratory impairment, were excluded from the study, as were suicides, homicides and those with undetermined causes. In addition to standard patient demographics, the authors collected data on what type body of water was involved, constructed (pools, tubs, buckets, etc.) and natural (ponds, streams, lakes, etc.), if the child was supervised at the time of drowning (parent, lifeguard, babysitter) and total time submerged. Water temperature and salt versus fresh water were also included in the data sets. Two of the authors evaluated hospital discharge summaries and applied a CPC rating to each patient included in the study.

The authors initially identified 803 study candidates. Of that initial group, 107 died as a result of their drowning, either at scene or after arrival at the hospital. Another 44 were excluded due to unknown discharge status. A total of 759 patients survived to hospital discharge and were included in the study. A favorable outcome (CPC 1 & 2) was associated with 636 patients while an unfavorable (CPC 3-5) outcome was assigned to the remaining 123 patients. The majority of the patients were less than 5 years of age and male. Overall, approximately 84% of the study patients had favorable outcomes at the time of hospital discharge. A vast majority of the included patients drowned in constructed bodies of water. Favorable outcomes were associated with having supervision present at the time of drowning, submersion time less than 5 minutes, EMS transport and bystander CPR. The authors report that their study did not have enough power to sufficiently evaluate their secondary goal. It was also noted that a witnessed submersion was not associated with a favorable outcome.

The authors concluded that favorable outcomes from pediatric drowning are more likely to happen with supervision present, submersion less than 5 minutes and drowning in a constructed body of water.

There were limitations to this study. It was retrospective by design. While encompassing a large populace, it only included a single region. Patients that were treated at community hospitals and healthcare centers, then discharged to home, were excluded by default. Proximity of the supervision to the drowning patient was not documented. The indications for bystander CPR and the efficacy of that CPR could not be determined.

Unintentional pediatric drowning is a preventable disease. While EMS providers should be well versed and practiced in the art of pediatric resuscitation, prevention is the cure. EMS agencies and their personnel should engage with their community, government and non-government agencies to promote water safety. They can educate parents and supervisors of children that water related tragedies can happen at any time, with just a few minutes of non-supervision or distracted supervision. Lastly, providers at all levels should lead by example. Any provider operating on or near water should wear a personal flotation device. Their non-swimmer and weak swimmer family members and friends should be mandated to wear personal flotation devices while on the water and not be left unsupervised by pools, bathtubs and natural bodies of water for even a short period of time.