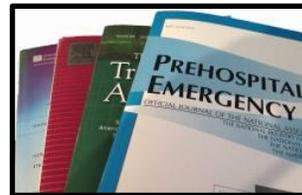


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IPHMI Literature Review

Keeping You Up to Date with Current EMS Literature and Studies

Vol. 8.5

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- 1. Mode of transport and prehospital interventions in urban penetrating trauma: A systematic review and practice management guideline from the Eastern Association for the Surgery of Trauma.** Taghavi S, Chang G, Maher Z, et al. *J Trauma Acute Care Surg.* 2026;100: 136–146.

Time to definitive hemorrhage control has been demonstrated to be the most important factor in prehospital care which can affect survival of the bleeding trauma patient. Trauma literature has suggested a survival benefit to a “circulation first” approach to management of the trauma patient, suggesting that decreasing time to definitive care at a trauma center should take precedence over prehospital procedures such as intubation/airway control and intravenous (IV) fluid administration. Animal studies demonstrate that prehospital procedures in severe hemorrhagic shock worsen physiology – IV fluids dilute coagulation factors and positive pressure ventilation after intubation or bag-valve mask ventilation decreases venous return to the heart and can compromise vital organ perfusion. Major trauma organizations such as the Eastern Association for the Surgery of Trauma (EAST) recognize the limitation to certain prehospital procedures. In 2009, EAST recommended that IV access in trauma patients be obtained only while en route to the hospital and not on scene. They additionally recommended that prehospital fluids should be withheld in patients with penetrating torso trauma. In 2018, EAST recommended against the use of routine cervical collar placement on patients with penetrating neck trauma.

In certain U.S. cities such as Philadelphia, Detroit, and Sacramento the police preferentially transport penetrating trauma patients to the closest trauma center instead of waiting for EMS to arrive. This practice has led to several studies examining the effectiveness of police and private vehicle transport compared to EMS transport. The EAST Guidelines Committee convened a working group of 12 trauma surgeons, emergency medicine physicians, and EMS experts to review the data on police and private vehicle transport of urban penetrating trauma patients and make recommendations based on their findings. The Grading of Recommendations Assessment, Development and Evaluation (GRADE)

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methodology was used by the group. They asked two PICO (population, intervention, comparator, and outcome) questions for review. Both PICO questions reviewed any adult trauma patient with a penetrating injury, in an urban location, where transport to definitive care is short. PICO 1 compared police transport vs EMS transport. PICO 2 compared private vehicle transport vs EMS transport. The outcomes studied included mortality, blood transfusion requirements, and development of complications such as renal failure and acute respiratory distress syndrome (ARDS). Studies that included patients older than 16 years with penetrating trauma in urban locations were included. Publications using animal studies, case reports, editorials, and review articles were excluded. All studies were based in the United States and were either retrospective, prospective, or observational studies.

Nine studies were reviewed for the PICO 1 group (police vs EMS transport). The studies demonstrated that patients transported by police had a higher survival to discharge rate than those transported by EMS. This result was also noted in another study showing that those most severely injured, defined as an Injury Severity Score (ISS) > 15, had a higher survival rate when transported by police. Other studies showed less clear results. A study compared ALS, police, and BLS transport. For the most severely injured there was no benefit of police or ALS transport over BLS, leading the authors to question whether prehospital procedures in urban penetrating trauma had a role. Other studies showed similar outcomes between ALS transport and police transport, further emphasizing that the procedures performed during ALS may not improve outcomes. The group conditionally recommended police transport over waiting for EMS transport for adults with urban penetrating trauma. Ten authors voted for a conditional recommendation and two authors voted neutral.

The data for private vehicle vs EMS transport was also reviewed (PICO 2). Four total studies were analyzed, two of which focused on survival to discharge. Private vehicle transport was associated with a higher rate of survival to the hospital in all studies. The authors all voted in favor of recommending private transport over waiting for EMS arrival, with ten voting for a conditional recommendation and two voting for a strong recommendation.

This review has several limitations. The studies were retrospective and observational, with the weaknesses associated with those studies. The largest contributors of patients were cohort studies of large administrative databases, which may contain errors in data entry, missing data, and selection bias. Many of the studies did not delineate between ALS and BLS transport. The recent adoption of prehospital blood transfusion by many EMS agencies could potentially alter data in future studies.

The authors used available evidence to conditionally recommend police or private vehicle transport in urban penetrating trauma patients in lieu of waiting for EMS arrival. A significant body of literature now suggests many traditional prehospital trauma practices do not improve outcomes and results from major cities where police transport penetrating trauma victims themselves are compelling.

2. Prehospital Whole Blood Administration Not Associated with Increased Transfusion Reactions: The Experience of a Metropolitan EMS Agency. Raetz E, Wampler D, Greebon L, et al. *Prehospital Emergency Care*. 2025;30:169-173.

Cold-stored low titer O+ whole blood (LTO+WB) is frequently used by trauma centers and community hospitals as the key component of their rapid transfusion protocol. Since the Iraq and Afghanistan wars, the United States military has brought LTO+WB forward into the prehospital environment with success treating hypovolemia in the field. In 2018, the Association for the Advancement of Blood & Biotherapies officially reviewed and approved the use of LTO+WB for use by civilian EMS programs. Many urban and now rural EMS systems have protocols for prehospital LTO+WB administration for patients in hypovolemic shock. Prehospital providers are trained on the advantages of blood transfusion, the mechanics of transfusion therapy, blood storage, the risks associated with LTO+WB and transfusion reactions with their specific treatment modalities.

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The authors of this article compared the frequency and severity of their system's, San Antonio Fire Department (SAFD), prehospital LTO+WB transfusion reactions to national average of all in-hospital blood transfusions (1%). This was a Brooke Army Medical Center and UT Health San Antonio Institutional Review Board waived, retrospective chart review study. Inclusion criteria were trauma patients treated by SAFD that received LTO+WB in the field and were transported to one of the two trauma centers within their system. Patients that received transfusions of LTO+WB for a non-traumatic reason, were declared dead in the field or on arrival at the hospital, trauma center blood bank records not available for review or experienced transfusion reaction(s) greater than 10 days after the SAFD transfusion were excluded from the study. Blood bank records at each of the two trauma centers were reviewed for any transfusion reactions experienced by SAFD patients that received prehospital LTO+WB.

After culling through 4.5 years of SAFD LTO+WB data, 572 patients were identified for inclusion. Of those included patients, only two (<1%) experienced a trauma center identified transfusion reaction. One of those two patients had an allergic reaction and the other a febrile reaction within their first day of hospital admission. There were no hemolytic reactions, true anaphylaxis reactions from transfusion, transfusion related acute lung injury or transfusion associated circulatory overload.

The retrospective nature of this study and single system design with a relatively small number of patients are limitations of this work. The authors also noted that many of the patients in their inclusion group also received additional blood transfusions originating within the hospital, which could have skewed the prehospital data. Isoimmunization in female Rh-negative patients of childbearing age who received prehospital LTO+WB was not examined within this body of work.

The authors concluded that prehospital LTO+WB transfusions have a similar rate of transfusion reactions as in-hospital LTO+WB transfusions. As more EMS systems consider the inclusion of LTO+WB in their trauma care protocols, transfusion reactions and their treatment should be included in provider education and addressed within the protocol. Concerns about prehospital transfusion reactions should not limit expansion of protocols to include LTO+WB.

3. Advanced Airway Device Use Order During Out-of-Hospital Cardiac Arrest. Gage CB, Kamholz JC, Powell JR, Nassal MMJ, Wang HE, Panchal AR. *JAMANetworkOpen*.2026;9(1):e2553413. doi:10.1001/jamanetworkopen.2025.53413

Advanced airway management has been incorporated into out-of-hospital cardiac arrests (OHCA) for over 50 years. In the past 15 years, considerable debate has focused on the type of advanced airway used during resuscitation.

The authors of this retrospective study used data from the National EMS Information System (NEMSIS) database covering the period from January 2018 to December 2023, to determine the order of advanced airway placement in patients presenting with OHCA and whether the device type and sequence of insertion affect success rate. The authors identified two categories of advanced airway placement: endotracheal intubation (ETI), which encompasses all forms of visualization, including video-laryngoscopy, and supraglottic airways (SGA), which encompass all currently available devices. During the study period, 2,365,224 patients in the data set experienced OHCA. Of those 650,440, met the study inclusion criteria and either received ETI or SGA during resuscitation.

ETI was the most common first-choice airway, accounting for 458,546 (70.5%) patients⁹¹²¹⁹⁴⁹. While SGA was used less often as the first-choice airway, it also had a higher first-pass success rate (93.0% vs 71.0%). Of those for whom ETI was unsuccessful on the first attempt (29%), seventy-two percent (72.3%) switched to SGA on the second attempt. Of the first-pass failures within the SGA group, 38.1% then switched to ETI.

The authors noted three (3) limitations. The first being reporting bias. The variations in what constituted an attempt were defined by local protocols rather than by a national standard. Second was

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recall bias and incomplete reporting. Third, the data does not include patient outcomes, placement time intervals, or return of spontaneous circulation. Fourth, the rationale for switching devices after an attempt failure was not captured.

This study demonstrates that ETI is the most commonly used advanced airway as the first choice in patients presenting with OHCA. However, as this and many other studies have demonstrated, SGA provides a higher first-pass success rate. While one might assume that a higher first-pass rate would yield better patient outcomes, this study provides data only on device selection order; it lacks patient outcome data. Further investigation is needed to determine whether device selection and timing are important to overall patient outcomes.

4. Prehospital spinal immobilization and motion restriction strategies: A scoping review of the literature. Cucci F, Marasciulo D, Lupo R, et al. *Injury*, 2026;57:113024

In this scoping review of the available literature, the authors looked at the evolving strategies for managing spinal injuries in prehospital care. Recent studies have questioned the effectiveness and safety of conventional spinal immobilization and policies and procedures have changed in response towards Spinal Motion Restriction.

The authors searched for relevant papers in PubMed, Scopus and Web of Science databases. After identifying 1,259 records, 533 duplicate records were removed before screening the remaining 726 records. 699 of these records did not meet their eligibility criteria leaving them with 27 studies to be included in their review. These studies included observational, experimental and qualitative analysis.

Twenty-two of the 27 studies favored Spinal Motion Restriction vs Spinal Immobilization. While observational studies have shown that the failure to recognize spinal injuries can lead to neurological deterioration, there was no evidence to show a clear advantage of spinal immobilization versus spinal motion restriction. One multicenter analysis showed that SMR protocols reduced unnecessary hospital admissions in pediatric patients by 25% without increasing missed injuries.

Patients report feeling reassured during immobilization, however they also reported being uncomfortable. Prolonged use of rigid immobilization devices is associated with discomfort, pain, and the potential for complications. Healthy volunteers in the observational studies reported significant pain and discomfort. Near-infrared spectroscopy studies showed reduced tissue perfusion over bony prominences raising concern over pressure injuries.

In discussing the limitations of this study, the authors note that the choice of databases may have omitted relevant studies. They also point out that the studies are heterogeneous in design, population and protocols thus complicating uniform synthesis. Further, they note that observational studies pose risks of confounding indications which limit the ability to draw definitive conclusions.

This review showed that the management of suspected spinal trauma is evolving from routine complete immobilization to selective SMR based on clinical criteria. The evidence suggests that systemic complete immobilization is increasingly unjustifiable and that selective strategies can reduce unnecessary immobilization without increasing the risk of missed injuries. Structured risk assessment and clinical decision protocols are essential for guiding management of potential spinal injuries.

Agencies transitioning to SMR have shown success in their educational programs by reducing use of longboards by 58% without increasing adverse effects. Going forward continuous training and clinical audits will be needed to facilitate and evaluate this change in practice. The transition to SMR will improve patient comfort and reduce unnecessary imaging and interventions after arrival to the hospital.