

International Prehospital Medicine Institute



IPHMI Literature Review

Keeping You Up to Date with Current EMS Literature and Studies

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1. **Epinephrine in Prehospital Traumatic Cardiac Arrest – Life Saving or False Hope?** Witt CE, Shatz DV, Robinson BRH, et al. *Prehospital Emergency Care* 2026;30:153–161.

The etiology of cardiac arrest differs between medical and trauma patients, yet prehospital epinephrine administration is often utilized for both. For medical cardiac arrest, the etiology is usually an electrical abnormality leading to a life-threatening dysrhythmia. The Advanced Cardiac Life Support (ACLS) algorithm focuses on early defibrillation, closed chest compressions, and the use of epinephrine. In traumatic cardiac arrest the etiology is hemorrhage, severe hypoxia, or impairment of cardiac function from tamponade or tension physiology. Despite the differences, ACLS principles are often applied to patients in traumatic cardiac arrest.

There are limited data for the use of ACLS in traumatic cardiac arrest. Closed chest compressions (CPR) have been shown to be of limited value in cardiac arrest from hemorrhagic shock. Epinephrine, which has inotropic and vasoconstrictive effects, is less effective in a heart which may not be filled. The authors hypothesize that the use of epinephrine does not improve survival in patients with traumatic cardiac arrest.

This was a retrospective cohort study from 7 U.S. trauma centers (6 Level 1 centers and one Level 2 center). The data were collected over a 6-year period from 2011-2017. Data collected included the use or exclusion of epinephrine in the field and in the emergency department (ED), heart rhythm in the field and the ED, EMS scene time, injury mechanism, demographics, hospital procedures, and discharge outcomes. The primary variable studied was the use of epinephrine. Doses were not reported. Patients who were suspected of having a medical cause to their cardiac arrest and inadvertently classified as traumatic arrest were excluded. The primary outcome was survival to hospital discharge.

A total of 1,631 patients were included in the final study cohort. Prehospital epinephrine was administered to 844 patients (52%). The median age of the patients was 35 years, and 21% were female. The median time from EMS arrival at the scene to arrival at the ED was 22 minutes. Overall survival was

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10%. Survival was 5% with a penetrating mechanism, 9% with a blunt mechanism, and 8% for those classified as “blunt/penetrating.”

Survival to hospital discharge was significantly lower in the prehospital epinephrine cohort compared to the no-epinephrine cohort (5% vs 16%). When stratified by mechanism, epinephrine was associated with poorer survival in blunt mechanism and in the blunt/penetrating mechanism. Among the penetrating cohort, survival to hospital discharge was not significantly different. In these penetrating patients there was an increase in survival for ED disposition, but no difference in overall survival to hospital discharge.

There are several limitations to this study. This is a retrospective cohort study of 7 trauma centers, subject to limitations associated with retrospective studies, such as selection and survivor bias. Practice patterns in the 7 trauma centers may not be applicable to all systems. Other prehospital interventions such as blood transfusion, tranexamic acid use, pelvic binders, and tourniquet use were not studied.

In this study of prehospital epinephrine use in traumatic cardiac arrest among 7 trauma centers, prehospital epinephrine did not improve survival and may actually worsen outcomes. This is likely attributable to the different etiologies of cardiac arrest due to trauma compared to medical arrest. These results have been replicated in several international studies as well. Currently there are not clear national guidelines for the management of the patient with traumatic cardiac arrest and this study may provide a framework for adoption of a “no epinephrine” policy for management of cardiac arrest due to trauma

2. Vascular access by paramedics during cardiopulmonary resuscitation in out-of-hospital cardiac arrest: A retrospective study of insertion success rates and survival outcomes of intravenous versus intraosseous route. Doa TN, Rashford S, Rolley A, Schultz B, Bosley E. *American Journal of Emergency Medicine* 2026;103:73–78.

Current resuscitation guidelines continue to recommend intravenous access (IV) as the primary route for medication administration in patients experiencing cardiac arrest. This is true for both the in-hospital and out of hospital environment. With the introduction of drill style insertion devices, intraosseous access (IO) has become easier and faster and is frequently replacing IV access as the first route of medication administration during out of hospital cardiac arrest.

Does the route of resuscitation medication administration affect return of spontaneous circulation (ROSC) rates, survival to discharge rates and 30-day survival rates? The authors of this article attempted to answer these questions and also look at first attempt success rates with IV and IO access.

This is a single system (Queensland Ambulance Service [QAS]; Queensland, Australia) retrospective chart review study. The authors looked at all adult, out of hospital cardiac arrests (OHCA) of medical origin, between January 2018 and December 2024 that were treated by QAS paramedics. In the QAS treatment protocols, the preferred first attempt at vascular access is via IV followed by IO if IV access cannot be obtained. Paramedics have autonomy over the location of vascular access. The authors matched data from prehospital electronic patient care reports to hospital records and the death registry for outcome data.

There were 9,854 OHCA patients identified for the study. A vast number of the patients' (93.3% / 9,197) first pass vascular access was attempted via the IV route. The remaining group (6.7% / 657) underwent IO insertion as a first attempt at vascular access. The overall first attempt success rates of combined IV and IO access was 70.2%. In total, 77.5% of patients received medications via the IV route, 16.6% via IO and 5.9% never had successful vascular access established. Before and after propensity scoring, patients in the IO group were less likely to have experienced ROSC on arrival at the hospital (19.4% versus 26.7%, $p < 0.001$). There was no difference in survival to hospital discharge and no difference in 30-day survival rates.

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The authors reported high success rates for vascular access in OHCA patients using both IV and IO routes. They concluded that patients with primary IO access in OHCA may have lower incidences of ROSC, leaving IV as the preferred first attempt route of vascular access.

There were limitations of this study, the first two being the retrospective nature of the study and its single agency source of data. The authors did not account for variables that may have contributed to the paramedics' decision to use one route of vascular access over the other (body habitus & co-morbidities). The authors also noted that a portion of this study occurred during the COVID-19 pandemic, which may have affected survival data.

Prehospital providers should follow local protocols for vascular access during OHCA and all patient interactions. Resuscitation guidelines still describe IV access as the preferred first attempt at vascular access for patients in cardiac arrest. Although ROSC is lower using the IO route for medication administration, it is an appropriate alternative when IV access is either unsuccessful or difficult to obtain.

3. Paramedic i-gel® Placement and Perception of Use in Prehospital Airway Management. Wilhelm K, Toy J, Warren J, et al. *Prehospital Emergency Care*, 2026;30:290-295.

The use of supraglottic airways (SGA) in prehospital medicine has spanned over 40 years. It was first used as a primary device for advanced airway management by paramedics prior to the widespread adoption of endotracheal intubation (ETI). As ETI became the device of first choice for paramedics, supraglottic airways became relegated to backup or rescue devices. In the last decade, the development of more efficient devices has propelled SGAs back to the forefront of prehospital airway management. The authors of this prospective study examined the use of the I-gel over a 4-month period in a large metropolitan area as a replacement for the King LT airway.

From June to September 2021, four fire-based departments in Los Angeles County participated in a proactive study investigating the implementation and use of the I-gel in prehospital patients with cardiac or respiratory arrest

The data were collected from providers immediately following the call, including patient demographics (age, sex), paramedic impressions, number of i-gel® attempts, placement success, ease of placement and ventilation, and complications (e.g., regurgitation, bleeding, hypoxia, dislodgement). A follow-up call was held with one of the investigators.

Over that period, 102 patients were enrolled in the study. Placement was successful in 90 patients (88%), with 85 (83%) having successful i-gel® insertions on the first attempt. Complications included regurgitation/emesis (28%), bleeding (8%), hypoxia (7%), and dislodgement (5%). Most paramedics rated ease of placement and ventilation as "very easy" (69% and 78%) or "somewhat easy" (23% and 9%).

The authors noted limitations related to the study design. The study was conducted to evaluate the use of the I-gel as a replacement for the King Airway within the Los Angeles County EMS system. The agencies used for the study were fire-based dual paramedic responses to critical patients which may not be comparable to other EMS systems. Other significant limitations included the absence of patient outcomes and a small sample size.

While this study demonstrated an 88% positive placement rate and perceived ease of I-gel airway placement, it did not investigate patient outcomes. This study may serve as guidance for agencies investigating the implementation of the I-gel into their system protocols.

4. Could We Have Stopped the Bleed? An Examination of 5,765 Homicide Autopsies Across 13 Years. Okum SE, Mehta A, Lunardi N, et al. *J Am Coll Surg* 2026;242:562–571.

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Over 5.3 million Americans have been trained in Stop the Bleed courses since 2015. Previous studies have suggested that many extremity hemorrhages are potentially survivable with rapid intervention using Stop the Bleed skills. The authors state that still, the population-level impact is not clear. To address this, they looked at autopsy reports from the Maryland office of the Chief Medical Examiner between January 1, 2005 and December 31, 2017, to determine whether any of these patients might have survived if Stop the Bleed skills were applied by bystanders.

This is a retrospective study of autopsy reports that included gunshot or stab wounds that were categorized as isolated or non-isolated extremity wounds. A total of 5,765 patients had gunshot or stab wounds, of which 84% were gunshot wounds and 16% were stab wounds. Of these injuries, 55 or 2.4% of the gunshot wounds and 17 or 5.3% of the stab wounds were isolated injuries. The isolated gunshot injuries had a 10-fold greater likelihood of vascular injury. The difference with stab wounds was not significant. Gunshot wounds were more likely to die in a hospital compared to stab wound victims who were more likely to die at home (9.5% versus 25.3%). Gunshot and stabbing victims were equally likely to die at the scene of the injury (26.5% versus 23.8%).

In their discussion, the authors stated that “we identified a significant burden of extremity and extremity vascular wounds among victims of penetrating injury, the injury profiles theoretically most amenable to prompt intervention with STB techniques.”

A limitation of this study was the failure to examine individual autopsy reports to better assess which decedents sustained injuries that may have been survivable with prompt application of STB techniques. They also felt that utilizing data from a single state was a limitation in that trauma systems and patient populations are different from one state or region to another and that wider studies might produce different results.

In their conclusion, the authors described their work as the first large, multi-year analysis of homicide injury profiles aimed at identifying deaths that may have been preventable with STB intervention. An important finding however was that while extremity wounds were common among homicide victims, isolated extremity wounds were not and only accounted for 1% of deaths. Further study using more granular survivability criteria will help to determine the burden of potentially survivable non-isolated extremity injuries with prompt hemorrhage control.