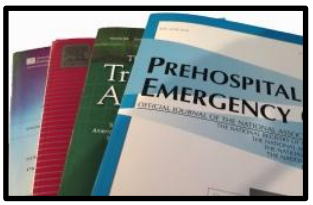
International Prehospital Medicine Institute



IPHMI Literature Review

Keeping You Up to Date with Current EMS Literature and Studies

Vol. 8.10

1. **Prehospital Use of Lights and Sirens in Stroke Is Associated with Faster Door-to-CT Times but Not Door-to Thrombolysis or Door-to-Endovascular Therapy Times.** Wham CD, Nicke D, Espinoza IS, et al. *J Amer Coll Emerg Phys Open* 2026, Full text available online at https://doi.org/10.1016/j.acepjo.2026.100415
2. **Comparing Prehospital Adenosine Initial Dosing of 6 mg Versus 12 mg for Presumed Paroxysmal Supraventricular Tachycardia (PSVT)** Fernandez A, Bourn S, Duncan D, et al. *Prehosp Emerg Care* 2026;30:672-677.
3. **Prehospital needle thoracostomy and the need to implement objective criteria for intervention: A retrospective study.** Boever JC, Ott MJ, Muldiiarov V, et al. *Injury* 2026;57:112973
4. **Long-Term Outcomes of Trauma Patients After Treatment With Prehospital Tranexamic Acid: A Subgroup Analysis From the PATCH-Trauma Trial.** Mitra B, MacKenzie S, Bourke EM, et al. *J Amer Coll Emerg Phys Open* 2026;7:100417. Full text available on-line at https://doi.org/10.1016/j.acepjo.2026.100417

1. **Prehospital Use of Lights and Sirens in Stroke Is Associated with Faster Door-to-CT Times but Not Door-to Thrombolysis or Door-to-Endovascular Therapy Times.** Wham CD, Nicke D, Espinoza IS, et al. *J Amer Coll Emerg Phys Open* 2026, Full text available online at https://doi.org/10.1016/j.acepjo.2026.100415

Prehospital use of lights and sirens (L&S) to rapidly traverse traffic and quickly get patients to definitive care has been a mainstay of treatment since the inception of modern Emergency Medical Services (EMS) systems. While the assumption that patient outcomes are improved with EMS use of L&S, data in other studies show this may not actually be the case. In the case of stroke, time to intravenous thrombolytic (IVT) administration and endovascular thrombectomy (EVT) are the only acute interventions used. These treatments are considered time-sensitive and even small differences in time to treatment may improve outcomes. Conversely, the use of L&S is not without risk to prehospital providers and the general public. The rate of ambulance crashes more than doubles when L&S are used. A “wake effect” has been described, where crashes involving the general public occur after traffic resumes once the ambulance passes.

The objective of this study is to determine if EMS use of L&S in acute stroke is associated with improved in-hospital stroke care and patient outcomes. The study is a retrospective cohort analysis of patients identified by EMS as having either a primary or secondary impression of stroke, cerebrovascular accident (CVA), or transient ischemic attack (TIA), or who were activated as a “stroke alert” from the prehospital setting between 2020-2022. The study population was derived from a mix of 70 private and fire-based EMS agencies and 30 associated hospitals. Interfacility transfers were excluded. Participating hospitals were a mix of community and academic medical centers, with varying levels of stroke care capabilities. In-hospital data were extracted from the local Get with the Guidelines Stroke (GSTG-S)

registries for any hospital that is a registered stroke center and a standardized form created for EMS agencies and non-stroke center facilities.

A total of 3,161 patients were included in the study. Of those, 75% (n=2,384) were transported with L&S and 25% (n=776) were transported without. Those transported with and without L&S did not differ by race, sex, or ethnicity, although the L&S group were younger (75 vs 76 years old). The median National Institutes of Health Stroke Scale (NIHSS) score transported by L&S was higher than those transported without (8 vs 3). The total transport time for patients transported without L&S was 2.7 minutes longer than those transported with L&S. The American Heart Association (AHA) recommendations for prehospital care of patients with suspected stroke were followed with greater compliance in those transported with L&S (13% vs 5%).

Transport with L&S was associated with a faster door-to-CT time. Additionally, pre-notification by EMS resulted in a 31% reduction in door-CT time. While door-CT time was improved with L&S, this did not translate to improved time to definitive treatment as the overall difference was small between those transported with and without L&S. Of the entire cohort, 18% (n=5790) patients received IVT. Of these, 89% (n=513) were transported with L&S. When controlling for cofounders, transport with L&S compared to transport without L&S was not associated with reduced door-IVT time. Total transport time was also not associated with reduced door-IVT time. The average door-IVT time with L&S was 45 minutes and without L&S was 48 minutes. A total of 5.6% (n=182) received endovascular therapy (EVT). When controlling for cofounders, neither transport with L&S or total transport time were associated with improved door-EVT time. The average door-EVT time with L&S was 101 minutes, versus 104 minutes in those without L&S. Finally, the use of L&S was not associated with a difference in patient outcomes – the rate of discharge to home or long-term care compared to death or hospice placement did not differ among those transported with or without L&S. Those patients transported to a primary stroke center instead of an unrecognized hospital did have a 19 times higher odds of discharge to home instead of death or hospice, but EMS use of L&S did not change this outcome.

This study had some limitations. It was a retrospective study of a database involving multiple different EMS agencies and types of hospitals. However, this could also be a strength of the study, as it included a very heterogenous population. Since the dataset was derived from emergency situations, some data was missing.

This study demonstrates that EMS use of L&S for transporting suspected stroke patients did not improve time to intravenous thrombolytic therapy, endovascular thrombectomy, or overall outcome. As noted, use of L&S only decreased transport time by an average of 2.7 minutes, without any demonstrated improvement in outcomes. When considering the inherent dangers to EMS personnel and the general public with use of L&S and the minimal time savings, one must consider that the risk of this practice may outweigh any potential benefits. Further studies are definitely warranted to see if this also applies to potential cardiac and trauma emergencies.

2. **Comparing Prehospital Adenosine Initial Dosing of 6 mg Versus 12 mg for Presumed Paroxysmal Supraventricular Tachycardia (PSVT)** Fernandez A, Bourn S, Duncan D, et al. *Prehosp Emerg Care* 2026;30:672-677.

In 1990, the Federal Drug Administration approved adenosine for treatment of paroxysmal supraventricular tachycardia (PSVT). The American Heart Association adopted the use of adenosine in their PSVT treatment algorithm in 1992 and it was subsequently incorporated into prehospital treatment protocols. In the United States, it is estimated that there are 89,000 new cases of PSVT annually.

Patients experiencing PSVT frequently complain of palpitations, chest discomfort, diaphoresis, shortness of breath and chest pains. Left untreated, PSVT may result in syncope, ischemic stroke, hypotension and even sudden death. The current recommendation for treatment of PSVT involves giving a 6mg rapid IV bolus dose of adenosine followed by subsequent 12 mg rapid IV boluses of the drug if the first dose is not effective. Patients that fail adenosine treatment often undergo emergent synchronized cardioversion.

The authors of this paper conducted a St David's Healthcare institutional review board waived, retrospective chart analysis of prehospital patient care reports of patients that received prehospital adenosine for the treatment of their PSVT. Data were obtained from the ESO Data Collaborative public use dataset. The goal of the study was to compare adenosine 6mg to 12mg dosing regimes for PSVT. In addition to standard patient demographics; conversion rates, ER and inpatient hospital stays and patient complications were examined.

All patients were treated emergently via a 9-11 system between January 1, 2022 and December 31, 2022. In total, 1,350 EMS agencies treated 11,245 patients with prehospital adenosine. An initial 6mg dose was given to 7,825 (70%) patients and 3,314 (30%) patients received an initial 12mg dose. One hundred and six patients were excluded for receiving an initial dose other than 6 or 12mgs.

The patients that received the initial 12mg dose had a 65% increased odds of prehospital improvement. The 12mg group was more likely to improve with one adenosine dose than the 6 mg group (75% vs. 52%). An initial 12 mg dose was associated with reduced odds of hospital admission. Complications following adenosine administration were rare and there was no statistical difference in the odds of mortality between the 6mg and 12mg groups.

This study was limited by its retrospective design and the use of provider self-reported data. Further limitations included the assumption that all patients that received adenosine for PSVT were actually in PSVT. No pre-adenosine administration ECG tracings were examined. IV catheter size and location of vascular access was not standardized. Patient status post adenosine administration was subjective and limited to the prehospital provider's documentation (improved, unchanged or worse).

This paper presents evidence that increased prehospital patient improvement, decreased hospital admission rates and fewer medication re-doses can be achieved by using an initial dose of adenosine 12mg, instead of the frequently administered 6mg first dose, for the treatment of prehospital PSVT. It should be noted that the 2025 American Heart Association Adult Tachyarrhythmia with a Pulse Algorithm recommends a 6mg first dose of adenosine when adenosine is used to treat normotensive patients without altered mental status, signs of shock, ischemic chest discomfort or acute heart failure.

3. Prehospital needle thoracostomy and the need to implement objective criteria for intervention: A retrospective study. Boever JC, Ott MJ, Muldiiarov V, et al. *Injury* 2026;57:112973

Needle thoracostomy (NT) has been taught and utilized by advanced prehospital providers for decades. In the face of tension pneumothorax, NT is the most commonly available procedure to most prehospital providers to decompress the chest. However, debate continues as to the safety and efficacy of the procedure.

The authors of this retrospective study reviewed the records of patients transported to a Level 1 ACS-accredited trauma center in Omaha between January 1, 2015, and September 12, 2024. Patients were identified from the trauma registry, and data were obtained for those who were identified as having ND in the prehospital phase of care. The primary research outcome was to evaluate the effectiveness of NT as they relate to clinical findings.

During the study period, a total of 214 patients received NT by EMS providers. Seventy-nine (37%) of the patients received CPR during transport and of these, two (2) patients survived (3%). Blunt trauma accounted for the majority of the cases at 68%, with the remaining being from penetrating trauma.

Mortality in the blunt trauma group was 49%, and 60% for the penetrating group. Primary indications charted by EMS personnel were: absent breath sounds (55%), cardiac arrest (37%), with a combined mortality rate of 53%. Of the 118 patients with diminished or absent breath sounds, 33 were reported to have hypoxia. Sixty-six percent of the patients noted to have hypoxia and absent breath sounds showed improvement in hypoxia following the NT. Overall, 30% of the patients enrolled demonstrated improvement after NT. When patients who received CPR were excluded, 54% showed improvement. No documented improvement in systolic BP was noted. In the study, excluding cardiac arrest patients, 14% had documented improper needle placement identified by CT scan. In the study, 9 patients had needles inserted into the lung tissue and 7 patients subsequently required chest tubes due to needles being positioned in chest cavities without the presence of a pneumothorax. Furthermore, one patient experienced a needle placement in the heart, resulting in cardiac arrest and necessitating surgical intervention for repair.

This study shows that the use of diminished or absent breath sounds alone as an indication for NT is not enough to warrant the intervention. Simple pneumothorax which is much more common than tension pneumothorax does not need treatment in the prehospital setting.

The authors conclude that "there is a pressing need for standardized protocols that emphasize objective criteria for intervention, ensuring that NT is performed only when there is clear evidence of benefit. Future research is necessary to evaluate the efficacy of and indications for NT in the prehospital setting."

4. **Long-Term Outcomes of Trauma Patients After Treatment With Prehospital Tranexamic Acid: A Subgroup Analysis From the PATCH-Trauma Trial.** Mitra B, MacKenzie S, Bourke EM, et al. *J Amer Coll Emerg Phys Open* 2026;7:100417. Full text available on-line at https://doi.org/10.1016/j.acepjo.2026.100417

Tranexamic Acid is a commonly used anti-fibrinolytic medication used to treat severely injured trauma patients and has been shown to reduce mortality. The PATCH-Trauma study showed improved survival at 28 days pots injury however there were no differences in functional outcomes after 6 months as evaluated by the Glasgow Outcome Scale-Extended.

The authors of this study looked to evaluate survival outcomes and the long-term function of trauma patients treated with tranexamic acid (TXA) compared to placebo after 24 months. To accomplish this, they performed a sub-group analysis of the PATCH-Trauma trial.

In the Patch Trauma -trial, adult patients ($\geq$18 years of age) were enrolled at the scene of their incidents by 15 EMS agencies in Australia, New Zealand and Germany. Randomization was stratified by state jurisdictions. Patients received one dose of TXA or placebo prehospital followed by an 8-hour infusion in hospital. For this study, patients enrolled in the state of Victoria, Australia were included.

Primary outcome in the original study was characterized as favorable functional outcomes at 6 months as assessed with the use of the GOS-E, administered as a standardized questionnaire by trained telephone interviewers. For this study the time frame was extended to assess at 24 months using methodology consistent with the primary analysis. They also assessed mortality at 24 hours, 28 days, 6 months and 24 months.

Of the 584 patients in the original study, there were 516 patients who had follow up data available for 24 months after injury. At 24 months, 167 of these patients had favorable outcomes in the TXA group and 149 in the placebo group. They found no difference in the GOS-E profile from 6 to 24 months and no statistical differences in mortality at any point. At 24 hours after injury there were 31 deaths in the TXA groups and 42 deaths in the placebo group. AT 28 days after injury, there were 51 deaths in the TXA group and 63 in the placebo group. At 6 months after injury there were 575 patients had outcome data available and there were 58 deaths in the TXA group 66 deaths in the placebo group. At 24 months,

516 patients' data were available. Of the patients randomized to the TXA group there were 61 deaths while there were 71 in the placebo group.

The limitations of this study included being a post hoc subgroup analysis of patients from the PATCH-Trauma trial. While patients were randomized to TXA or placebo in this sub group, the smaller sample size reduces the statistical power and is at risk for type 2 error. Ongoing improvement in participants with severe disability after 6 months could affect the interpretation of the PATCH-Trauma results. This entire patient population was transported by Helicopter with long prehospital times so these results cannot be readily applied to EMS systems with shorter prehospital times. This subgroup also had higher injury severity and more traumatic brain injury.

Based on these findings, the authors concluded that "Prehospital treatment and ongoing hospital infusion of TXA did not result in improved survival or statistically significant functional outcomes at 24 months compared to placebo." The administration of TXA in most studies prioritizes survival over long-term functional outcome. They suggest that perhaps differences in functional outcomes might be observed at a longer time point although significant improvement after 24 months does not seem likely.