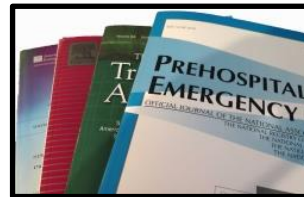


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IPHMI Literature Review

Keeping You Up To Date with Current EMS Literature and Studies

Vol. 4.10

- 1. Evaluating Discrepancies in Percent Total Body Surface Area Burn Assessments Between Prehospital Providers and Burn Center Physicians.** Tran DP, Arnold DH, Thompson CM, Richmond NJ, Gondek S, Kidd RS. *J Burn Care Research* 2022;43:225-231
 - 2. Prehospital extremity tourniquet placements – performance evaluation of non-EMS placement of a lifesaving device.** Mokharti AK, Mimkdad S, Luckhurst C, et al. *Eur J Trauma Emer Surg.* 2022. Published on-line ahead of print. <https://doi.org/10.1007/s00068-022-01973-4>
 - 3. Emergency medical services professional behaviors with violent encounters: A prospective study using standardized simulated scenarios.** Garner DG, DeLuca MB, Crowe RP, et al. *JACEP Open* 2022;3:e12727. Open access, full text available at: <https://onlinelibrary.wiley.com/doi/epdf/10.1002/emp2.12727>
 - 4. Prehospital airway management for out-of-hospital cardiac arrest: A nationwide multicenter study from the KoCARC registry.** Chang H, Jeong D, Park JE, et al. *Acad Emerg Med.* 2022; Published on-line ahead of print. <https://doi.org/10.1111/acem.14443>
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- 1. Evaluating Discrepancies in Percent Total Body Surface Area Burn Assessments Between Prehospital Providers and Burn Center Physicians.** Tran DP, Arnold DH, Thompson CM, Richmond NJ, Gondek S, Kidd RS. *J Burn Care Research* 2022;43:225-231

The prehospital assessment of burn injuries determines the immediate care and receiving facility for burn patients. A key part of this assessment is the assessment of the amount of body surface involved in the burn injury.

In this study, the authors looked at total body surface area (TBSA) calculations performed by Emergency Medical Technicians and firefighter First Responders. The primary objective was to compare the prehospital TBSA estimates with those done by burn surgeons at a level 1 trauma and burn center.

This was a retrospective review of a charts in a burn center registry and a regional EMS patient database along with electronic health records at the author's medical institution from July 2016 to December 2018. Included in the study were adult and pediatric burn patients that were assessed in the field by prehospital care providers in a large urban 911 EMS system that were transported by ambulance and evaluated by burn surgeons at the Level 1 trauma and burn center. Patients transferred from other institutions, arriving by air, private vehicle, or other EMS agencies, and patients with incomplete medical records were excluded.

Over the period studied, of the 1,340 patient encounters at the burn service, 147 patients met inclusion criteria. The mean age of the patients was 35 and 65% were male. Scalds were the most common burn injury (27%). Prehospital providers estimated more than 20% TBSA in 9% of the patients compared to the burn team estimating 5% with more than 20% TBSA. Twenty-seven of the patients were pediatric age ≤ 16 y/o, of which 16 were scald injuries. The mean estimated TBSA performed by

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the prehospital providers was 11.2% while the mean for the burn team physicians was 6.3%. There was a tendency for the disagreement in estimates to increase as the average TBSA size increased.

Limitations of this study include the small sample size and the missing documentation in the EMS reports.

This study showed that as the percent TBSA burned increases, the disparity between the prehospital and hospital assessment increases, with EMS overestimating the extent of the burn. This has implications for over-triage of patients to burn centers. In order to better utilize the limited burn center resources, improved education and training of EMS providers as well as better tools for and documentation of burn assessment are needed.

2. Prehospital extremity tourniquet placements – performance evaluation of non-EMS placement of a lifesaving device. Mokharti AK, Mimkdad S, Luckhurst C, et al. *Eur J Trauma Emer Surg.* 2022. Published on-line ahead of print. <https://doi.org/10.1007/s00068-022-01973-4>

Prehospital tourniquet use for extremity injury has proven to be lifesaving with few, if any, complications. Several studies have demonstrated the success of civilian and non-EMS first responder training programs in prehospital tourniquet application. Additionally, recent mass casualty incidents such as the Boston Marathon bombing demonstrate the ability of untrained civilians to apply tourniquets in extreme circumstances. This study hypothesizes that police, firefighters, and civilians perform prehospital tourniquet placement with a similar efficacy as trained EMS providers.

This is a retrospective study conducted on all adult trauma patients who presented at one of two American College of Surgeons (ACS) verified level I trauma centers in Boston over a five-year period. Any adult patient who presented with a prehospital tourniquet placed for trauma was included in the study. After reviewing the patient's electronic medical record, the investigator characterized the tourniquet placement as either indicated or not indicated, and inappropriately or inappropriately applied. The applicator groups compared in the study were EMS, police, firefighters, and civilian or patient self-application. The primary outcomes of interest included proper indication of prehospital tourniquet application as stratified by applicator. Complications of tourniquet application and mortality rates were also reviewed.

A total of 146 patients were included in the study. The median age was 35 years old and predominantly male (90%) and white (64%). Most of the injuries were due to penetrating trauma (63%). Patients who were transferred from outside hospital comprised 21% of the study population.

Longitudinal data showed that an increased proportion of patients received a prehospital tourniquet from a non-EMS provider during the study. The number of hypotensive patients was similar across all tourniquet applicators. There was no significant difference in overall prehospital vital signs among the study groups. Not surprisingly, police applied the highest proportion of tourniquets following penetrating injury (89%). EMS applied the highest proportion of commercial tourniquets (95%). Comparatively, 82% of tourniquets applied by the police were commercially made followed by 71% of firefighter applied tourniquets. Tourniquets applied by the patient and bystanders were frequently improvised (100% bystander, 85% patient). When reviewing inappropriately applied tourniquets, police and firefighters recorded similar proportions (22% and 21% respectively) compared to EMS (24%).

Overall complication rates among all groups were low (5%) which is in concordance with prior studies on tourniquet usage. There was no difference in complication rates among the various groups. One indication of inappropriate or unindicated tourniquet application is in those patients who have a prehospital tourniquet placed but are subsequently discharged from the emergency department without further treatment. For EMS, 5% of patients on whom they placed a tourniquet were discharged directly home from the emergency department. This is in comparison to the police (28%), firefighters

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(21%), and the patient (23%). Interestingly, bystander placed tourniquets also had low rates of direct discharge to home (5%).

Limitations of the study include its retrospective nature. There was a limit on the data in the electronic medical record with inconsistencies of availability throughout the study period. Many civilians, police, and firefighters are also EMS certified or have received some sort of first-aid or tourniquet application training so extrapolation of this data may not apply to all such responders. This study took place in a large urban environment and may not be applicable to a rural setting where transport times are long and bystander placement of a tourniquet can be of even more benefit.

This study demonstrates a trend toward increased utilization of tourniquets in the prehospital setting over a five-year period. The data show that non-EMS personnel such as fire and police may tend to apply tourniquets that are unindicated and at a higher rate than EMS. However, complications of tourniquet placement remain low regardless of who applies the tourniquet. Continued training and quality review of police, firefighters, and the public should improve the number of an indicated tourniquet applied. It is refreshing to see that tourniquet use among non-EMS personnel increased during the study period, indicating increasing acceptance of this practice in society.

3. Emergency medical services professional behaviors with violent encounters: A prospective study using standardized simulated scenarios. Garner DG, DeLuca MB, Crowe RP, et al. *JACEP Open* 2022;3:e12727. Open access, full text available at: <https://onlinelibrary.wiley.com/doi/epdf/10.1002/emp2.12727>

Few professions, outside of law enforcement, accept workplace violence as “just part of the job”. With increasing frequency, healthcare providers of all types are victims of violence perpetrated by the very individuals they are trying to help or the family and friends of their patients. Abuse, both verbal and physical, is often under reported, under prosecuted, and often not trained for by EMS providers resulting in work related injuries, increased stress levels and decreased job satisfaction.

The authors of this paper hypothesized that the longer EMS professionals were in the profession, they would be able to better read a scene and evade an abusive physical or verbal encounter. They also thought that EMS field personnel with formal de-escalation training would use that training to both de-escalated potential violent encounters and recognize when the situation became out of control and retreat to safety.

The authors conducted a study using 270 providers from one county’s EMS system. The providers were a mix of paramedics and EMT’s (79% paramedic, 10% AEMT and 11% EMT). This was a prospective simulation study. Providers did not know the context of the study and were observed through a one-way mirror during one of three scenarios in a simulation center. Both the scenario evaluators and role players were practiced and rehearsed with the escalating timing of the scenario.

The four scenarios used for the simulations were:

- Scenario 1 – Possible overdose: Providers were dispatched to a “sick call”. A friend reports the patient intentionally overdosed with acetaminophen. The patient is uncooperative with EMS.
- Scenario 2 – Intoxicated Person: Providers were dispatched to render care to an altered individual. During the course of their assessment and treatment, a friend of the patient presents in an altered state and interferes with the provider’s care.
- Scenario 3 – Aggressive Family Members: Providers were dispatched for an unconscious individual. Upon assessment the patient met the criteria of a deceased person. The patient’s adult son arrives and challenges the EMS providers why nothing is being done to care for his parent.
- Scenario 4 – Domestic Violence: Providers were dispatched to care for an individual with traumatic facial injuries. The patient repeatedly states that care is not needed. The patient’s spouse enters

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the scene and insists that EMS is not needed and demands that they immediately leave. As this encounter escalates, a baby begins to cry loudly in the next room.

The end point of all four of these 8-minute scenarios is when a role player makes physical (touch) contact with an EMS provider, or an EMS provider makes physical contact with the scenario's aggressor. A dedicated safety officer was in each scenario to immediately intervene and end the simulation at that point. A positive outcome would have been for EMS to retreat to safety before the simulation progressed to contact.

Each crewmember of a two-person team was individually identified and evaluated. Evaluators used a predetermined rubric for each simulation. Slightly less than half (45%) of the participating EMS providers had ten or more years of field EMS experience.

Slightly more than half (54%) of the providers recognized the unsafe situation and escaped the scenario. The same percentage (54%) of providers attempted to de-escalate the situation. Only 29% of the providers in simulation made an adequate attempt to de-escalate the situation prior to escaping the unsafe encounter. Twenty percent of providers made no attempt to de-escalate or escape the unsafe encounter.

Secondary findings from the study revealed that only 33% of providers with past military experience escaped the encounter compared to 57% of providers without military experience. Providers with crisis intervention training did escape the unsafe encounters in higher numbers than those without. Paramedics more often attempted to de-escalate the encounter than AEMT's or EMT's. Interestingly, paramedics were 60% less likely to escape the scene compared to their EMT counterparts. Providers with the greatest number of field experience years were less likely to escape the violent encounter (twenty years of experience equated to 68% greater chance of not escaping than that of counterparts with only 2 years of field experience).

Limitations of this study included the fact that these were simulations and do not reflect real-life situations. Knowing that this was a simulation may have prompted the participants to remain involved longer than would occur on a real scene that was escalating. In addition, each scenario was limited to 8 minutes. In a real incident, the EMS providers could potentially take more time to defuse the confrontation.

Verbal abuse and physical violence should never be an acceptable interaction between individuals. It is especially egregious in the workplace. EMS and other healthcare providers should not accept patient and family member abuse as part of the job. Providers need to report abuse. This study demonstrated that street smarts and years of experience do not equate to a reduction in violent encounters. Learned de-escalation techniques and crisis intervention skills may increase provider's chances of recognizing an escalating unsafe encounter and safely escaping the scene. As societal violence and the lack of civility toward caregivers continues to rise, providers should be trained in how to de-escalate potentially violent encounters and refresh this training regularly. As with all illness, prevention should always be the first course of action. When providers accept that it is better to step backward than forward during abusive encounters, the rate of injury and burnout from these encounters will begin to decrease. Being the recipient of workplace violence should not be part of a caregiver's job description.

4. Prehospital airway management for out-of-hospital cardiac arrest: A nationwide multicenter study from the KoCARC registry. Chang H, Jeong D, Park JE, et al. *Acad Emerg Med.* 2022; Published on-line ahead of print.

Airway management has long been a component of cardiopulmonary resuscitation. In the early years of CPR and EMS this was accomplished by either mouth-to-mouth ventilation or a bag-mask (BM) resuscitator. As EMS systems matured advanced, airway procedures moved from the hospital to the

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field. Advanced providers placed endotracheal tubes and some basic providers were authorized to place supraglottic devices to secure the airway. In recent years, many studies have questioned whether advanced airway management is beneficial in out-of-hospital cardiac arrest (OOHCA).

The authors of this multicenter retrospective observational study attempt to determine if advanced airway management (AAM), defined as endotracheal intubation or supraglottic airway placement, compared to basic life support bag-mask ventilation has any effect on the survival of patients transported to emergency departments in the Republic of Korea. The authors identified patients using the Korean Cardiac Arrest Research Consortium (KoCARC), a multicenter OOHCA patient registry which includes data from 65 participating hospitals throughout the Republic of Korea. The endpoint of the study was positive neurological status at 30 days post prehospital arrest.

During the 6-year study period ending 2020, a total of 12,321 patients sustained a medical cardiac arrest and were transported to the local emergency department. Those under 18 years of age and those with incomplete data were excluded leaving 9,586 patients in the analysis. Sixty-five percent (6,232) of the patients had advanced airway intervention with thirty-five percent (3,354) receiving bag-mask management. Supraglottic airways were the most common device used for AAM (86.8%). Those who received AAM were predominantly non-witnessed arrests in residential areas that presented with a non-shockable rhythm. The AAM group also was more likely to receive bystander CPR prior to EMT arrival and have a longer EMT CPR time.

Unadjusted data suggested that survivability in the AAM group was less than in the BVM group. However, after controlling for confounders, there was no statistical difference in neurologic outcome between the two groups.

There are a number of limitations in this study. This was a retrospective study and patients were not randomized to receive one or the other airway intervention. It was not stated if EMS providers are allowed to cease CPR and pronounce patients on the scene without transport and, if so, if these patients were included or excluded from the study. Differences in care between rural hospitals and urban centers were not determined. The first pass AAM success rate as well as the time to successful placement was not determined. It was not reported if ETCO₂ monitoring was used to document proper endotracheal tube position and to avoid hyperventilation.

This study does not answer the question of what is the best airway management technique for victims of out-of-hospital cardiac arrest. Randomized prospective studies in a mix of urban and rural locations remain necessary to answer this fundamental question. However, this study suggests that patients in cardiac arrest need a patent airway by whatever method can be accomplished.