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IPHMI EMS Literature Review

Keeping You Up to Date with Current EMS Literature and Studies

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- 1. Efficacy of Video Laryngoscopy versus Direct Laryngoscopy in the Prehospital Setting: A Systematic Review and Meta-Analysis.** Pourmand A, Terrebonne E, Gerber A, et al. *Prehosp Disaster Med.* 2022. Published on-line ahead of print.

Intubating a patient in the emergency setting is one of the more challenging procedures facing a healthcare provider. Direct laryngoscopy (DL) has traditionally been used to visualize the relevant anatomy required to safely perform the procedure. Video laryngoscopy (VL) has supplanted DL in many hospitals. A variety of studies have compared DL to VL in the hospital setting and noted VL to have a higher intubation efficiency, a faster learning curve, better glottic visualization, and a higher overall success rate. To date, few studies have adequately evaluated the potential benefits of VL in the prehospital setting. For VL to become the standard of care for prehospital intubation, there needs to be more data that it is effective in this setting.

This study is a systematic review and meta-analysis of VL versus DL designed to compare the first-pass success rates and overall success rates of the procedure when performed by paramedics on adult patients in the prehospital setting. The primary outcome was the first-pass success rate of VL versus DL. Secondary outcomes studied were the mean number of intubation attempts and overall success rate. To conduct the meta-analysis, data from multiple studies are pooled together to answer the research question, which may not have been adequately answered from the prior smaller studies.

A literature search was conducted for all studies involving prehospital intubation in adult patients. Studies involving pediatric patients or non-human subjects (eg, manikins, animals, simulators) were excluded. Studies involving providers other than paramedics (physicians, nurses, etc) were also excluded. Additionally, studies involving other advanced techniques such as fiber optic devices were excluded.

Seven studies met the inclusion criteria and were included in the review and meta-analysis. Two were randomized controlled trials, one was a prospective study, and four were retrospective studies. A

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total of 17,279 patients were intubated with DL and were compared to 6,674 patients who underwent intubation via VL.

Overall, VL was associated with an 11% higher first-pass success rate than DL (RR 1.116). The secondary outcomes that were studied also demonstrated the superiority of VL over DL. The overall success rate of VL was higher than DL (RR 1.097). The number of attempts was lower for VL than DL.

This study shows that VL compared to DL performed by paramedics in the prehospital setting results in a higher likelihood of first-pass success, a higher likelihood of overall success, and a lower mean number of attempts required per intubation encounter. First-pass success in endotracheal intubation has been shown to limit adverse events or patients, which tend to occur with successive intubation failures. This suggests that VL use in the prehospital setting may reduce adverse patient outcomes.

There are several limitations to this study. There was a lack of information on patient characteristics, patient airway difficulty, and paramedic experience with both VL and DL. There was no mention of the use of different VL devices among the different studies. There was a large variation in study settings – some were ground ambulance while other were aeromedical.

Overall this is a compelling study suggesting prehospital intubation by paramedics with VL is superior to DL. VL resulted in a higher first-pass success rate, overall success rate, and fewer intubation attempts.

2. Prehospital airway management in the pediatric patient: A systematic review. Weihing VK, Crowe EH, Wang HE, Ugalde IT. *Acad Emerg Med* 2022;29:765–771.

Airway management and the maintenance of appropriate oxygen and carbon dioxide levels are critical when dealing with pediatric patients that are decompensating in the prehospital setting. Many options are available to the prehospital provider to accomplish these goals including the bag-mask device, various supraglottic airways, and endotracheal intubation. The authors of this paper attempt to examine the strategies for use of the bag-mask device (BVM), supraglottic airway (SGA) and endotracheal intubation (ETI) and their possible association with patient outcome.

The authors conducted a review of available data bases searching for studies performed in the prehospital setting and that reported the use of the three airway interventions as well as patient outcome. Included studies were limited to children under 18 years old enrolled in retrospective and prospective cohort studies along with randomized and non-randomized controlled trials.

A total of 773 citations were identified in the initial search. After review, a total of eight (8) studies with 4,328 total patients were included. The majority of the studies were retrospective cohort papers (6), one prospective clinical trial, and one randomized control study. Studies were conducted in the USA (5), Japan (2) and the Netherlands (1). There was significant variation in the 8 studies regarding inclusion criteria, study design and patient outcome. Some inclusion criteria only looked at children with head injury, others only out of hospital cardiac arrest. End points of studies also differed some measured only overall mortality, others looking at 24-hour survival and others looking at overall hospital survival with a favorable neurological outcome. Most involved ETI, but the comparisons differed with some comparing it to BVM only and others comparing ETI to SGA.

Given the marked variation in the methodologies of the included studies, the authors were able to conclude that the use of the BVM only or SGA were at least equal if not better than that of ETI. They could not, however, develop a definitive conclusion as to which device or strategy produced the best or better outcome.

While ETI has for years been held as the gold standard in airway management, these and other studies have slowly chipped away at this paradigm in both the adult and pediatric population. Unfortunately, the available pediatric literature is extremely limited and of variable quality. Prospective randomized studies are needed in order to formally recommend one airway management intervention

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as preferred over another. Regardless of the airway selected, maintaining adequate ventilation and oxygenation are paramount to successful resuscitation of pediatric patients.

3. Implementation of a Leave-behind Naloxone Program in San Francisco: A One-year Experience.

LeSaint KT, Montoy JCC, Silverman EC, et al. *West J Emerg Med* 2022;23:952-957. Full text available at: <https://doi.org/10.5811%2Fwestjem.2022.8.56561>

The United States remains in a multi-year opioid epidemic and deaths from opioid overdoses, both illicit and prescribed, continue to rise. In response to the epidemic, many communities have adopted opioid overdose prevention programs and aggressive naloxone (opioid antagonist) distribution and training initiatives for BLS EMS providers along with police and fire first responders. Some municipalities have adopted a “Friends and Families” naloxone distribution programs and provide the opiate antagonist to persons closely associated with opioid abusers. In response to the increased need for access to naloxone, federal and state regulations have been changed to allow for a more robust distribution of the drug to persons that would most benefit with access to naloxone. North Carolina was one of the first states that allowed EMS agencies to leave naloxone behind with patients and their families if they refused transport after an opioid overdose reversal.

The authors of this paper described the implementation, training and efficacy of a similar leave behind naloxone program within a large urban community and EMS System, San Francisco, California. FRIEND (First Responder Increased Education and Naloxone Distribution), a Substance Abuse and Mental Health Services Administration funded program, was developed and implemented as a partnership initiative amongst many EMS, hospital and government state holders. A leadership team was brought together to develop protocols and training for EMS providers. The team also received 1,200 naloxone kits from the California Department of Health Care Services under the Naloxone Distribution Project.

In September of 2019, the team began training EMS personnel on the FRIEND protocols, data collection process, and implementation rationale. EMS personnel were empowered to distribute and register naloxone kits to anyone they felt was at risk of suffering, or being in proximity to someone, with an opioid overdose. As an incentive for registering naloxone kits, EMS providers were entered into a lottery, drawn monthly, for a \$100 gift card when they distributed and registered a kit.

All 1,200 naloxone kits were issued to the three San Francisco EMS agencies. In the first twelve months of FRIEND, 232 kits (19%) were distributed and registered. One hundred forty-six of the registered kits (63%) were given out when EMS was dispatched to an overdose event. Almost half (41%) of the kits were given out in the Downtown / Civic Center area of the city. Patients themselves received 43% of the EMS distributed kits. Registered demographics of the kit recipients revealed that white males, in their mid-thirties, were most likely to be given a FRIEND’s naloxone kit.

Failure to distribute a naloxone kit was most likely related to the responding EMS unit already exhausting their supply of kits or the crew forgetting to offer a kit while on scene. Barriers to registering EMS distributed kits included time factors, including the need to respond immediately to another call and challenges filling out the registration form. The latter was believed to be due to the providers failure to complete FRIEND training.

Limitations to this paper include the varied compliance of EMS providers to complete the kit registration form, even with the monthly \$100 lottery. Demographics were often difficult to obtain which could prove beneficial to identify areas within the community that would benefit from focused opioid overdose prevention. Another limitation is the cost of the program. This effort cost \$300,000 which is not easily obtained by many EMS agencies. Lastly, all of the naloxone kits were given to EMS agencies. First Responder agencies may also interact with persons at risk of opioid overdose without EMS being present. First Responder agencies were not included in the FRIEND program.

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Despite the limitations of this project, the authors believe low-barrier-EMS-leave-behind naloxone programs are both feasible and can be successful. The goal of the program was, and is, to save lives. This type of initiative can also help gather data on where in a community the greatest need is and who would benefit most from the program. By engaging at risk individuals and those frequently around them, EMS will help save lives by distributing naloxone to this vulnerable population.

4. Femur fractures and hemorrhagic shock: Implications for point of injury treatment. Mitchnik IY, Talmy T, Radomislensky I, et al. *Injury* 2022;53:3416-3422.

Femur fracture has traditionally be considered to be an important risk factor for hemorrhage and possible shock. Splinting of the fracture in the prehospital setting has been advocated since the development of the Thomas splint in the early 1900s. He reported that during World War I, mortality from gunshot wounds of the thigh with a fractured femur decreased from approximately 80% to 16% after adoption of the Thomas splint. The authors of this study reviewed the association of femoral shaft fractures with hemorrhagic shock.

Prehospital data from the Israeli Defense Force Trauma Registry was retrospectively collected and merged with hospitalization data from the Israeli National Trauma Registry for the years 2000 through 2020 and searched for patients with isolated femoral shaft fractures.

There were 213 patients with femur shaft fractures. Femur fractures resulted from motor vehicle crashes (60.1%), gunshot wounds (17.4%), explosions (8%), and falls (5%). Isolated femur injuries occurred in 129 patients (60.6%). Associated thoracic injuries were found in 56 (26.3%) of patients, abdominal injuries in 21 (9.9%), and head trauma in 41 (19.2%) patients. Isolated femur fracture was found in 129 of the 213 patients. Most of the isolated femur fractures were closed (51.2%). Shock was present in 11 (8.5%) of the 129 patients with isolated femur fracture compared to 26 (31%) of 84 multiple trauma patients. Of the 11 patients with shock and isolated femur fracture, 8 (72.2%) had open fractures.

None of the femur shaft fracture patients were documented as having the application of leg splints. In the 97 patients with open fractures, interventions focused on hemorrhage control were recorded in 33 (34%) of the patients. Tourniquets were used in all 33 patients. Three of the patients also had pressure applied in the groin area. Direct wound pressure was applied in 12 (33%) patients using the Israeli bandage or wound packing with gauze or combat gauze. Hemorrhage was successfully controlled in 27 or 81.8% of the patients. Patients with open fractures that were bleeding required at least one but as many as seven attempts at bleeding control. The data showed no statistical difference in success between the various bleeding control techniques. Ten of these patients received fresh frozen plasma prior to arrival at the hospital and 29 of them received blood products in the Emergency Department.

This study is limited by the fact that it is a retrospective review subject to missing data and bias. The sample size is small. In addition, no cases were documented to use traction splints, even though the splints were available for use, thus any benefit from splinting could not be determined.

This study shows that while shock can occur directly as a result of isolated femur fracture, particularly open femur fracture, patients with a femur fracture in shock should be carefully assessed for other injuries that are responsible for the blood loss. Splinting of the fracture should not delay transport to definitive care.