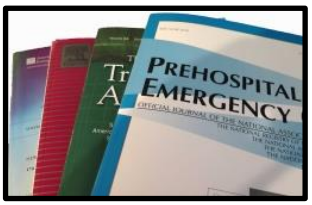
International Prehospital Medicine Institute



IPHMI Literature Review

Keeping You Up to Date with Current EMS Literature and Studies

Vol. 6.12

1. **Implementation of a prehospital whole blood program: Lessons learned**. Levy MJ, Garfinkel EM, May R, et al. *J Amer Coll Emerg Phys Open* (*JACEPOpen*) 2024: e13142. Full text available at: https://doi.org/10.1002/emp2.13142
2. **Assessing the one-month mortality impact of civilian-setting prehospital transfusion: A systematic review and meta-analysis.** Schoenfeld DW, Rosen CL, Harris T, Thomas SH. *Acad Emerg Med* 2024;31:590–598 Full text available online at: https://onlinelibrary.wiley.com/doi/10.1111/acem.14882
3. **At-risk patient documentation and naloxone dispersal for a rural statewide EMS "Naloxone Leave Behind" program**. Naumann J, Benson J, Lamberson M, et al. *JACEP Open* 2024;5:e13186. Full text available at https://doi.org/10.1002/emp2.13186
4. **Perceived Versus Actual Time of Prehospital Intubation**. Shou D, Levy M, Troncoso R, Scharf B, Margolis A, Garfinkel E. *West J Emerg Med*. 2024;25:645–650.

1. **Implementation of a prehospital whole blood program: Lessons learned.** Levy MJ, Garfinkel EM, May R, et al. *J Amer Coll Emerg Phys Open (JACEPOpen*) 2024: e13142. Full text available at: https://doi.org/10.1002/emp2.13142

The early administration of blood to patients experiencing hemorrhagic shock is a lifesaving intervention. In addition to traumatic injuries, patients can suffer life threatening bleeding due to coagulopathic conditions, gastrointestinal bleeding, renal dialysis graft injuries and peripartum hemorrhage. All are common complaints resulting in an EMS response and transport. At the time this paper was being prepared, at least 121 EMS agencies in the United States were carrying and administering whole blood or blood products. Approximately 70% of these agencies had protocols in place for the administration of low-titer O-Positive whole blood. Many other EMS systems are either planning their own prehospital blood program or in the process of implementing a blood program.

The authors of this paper shared their lessons learned while developing and implementing the state of Maryland's prehospital blood protocols and training for prehospital blood transfusion providers. The development of their system was based on four pillars of success; the rationale for a prehospital blood program and which blood products will be made available, how to safely store blood products outside of a hospital's blood bank and deliver them to the patient's bedside, prehospital blood transfusion protocols and trained personnel to administer blood products, and documentation of prehospital blood administration and handover at a receiving hospital.

The Food and Drug Administration licenses low-titer O-Positive whole blood for life-threatening emergencies when the patient's blood type is not known. While low-titer O-Negative blood is the universal donor blood for all patients, including females of childbearing age, it is not widely available. Thirty eight percent of the United States population is O-Positive while only 7% are O-Negative. Blood

component therapy comprised of separated and diluted components of whole blood reduces the oxygen carrying capabilities and dilutes the effectiveness.

Protocols for when and how to administer blood products need to be clearly written. They should include indications for use in hemorrhagic shock, from both traumatic and medical origins. They should also align with the regional healthcare's protocols and philosophy for blood transfusions. Field providers need to be well trained on not just the blood transfusion process but also blood transfusion theory, the physiology of hemorrhagic shock, and how to immediately recognize and treat blood transfusion reactions.

EMS agencies must serve as good stewards for the region's blood supply, therefore every effort must be made to ensure no blood products are wasted. Regulatory standards require blood to be stored between 1C and 6C. Coolers specifically designed for pre-hospital use, with real-time temperature monitoring and an out-of-temperature range alert system, should be deployed to store and monitor that blood is kept at safe temperatures outside of the blood bank. Systems typically have agreements in place that allow blood that is soon to expire to be reintroduced into the blood bank system and deployed first when an immediate need for blood within a hospital is realized. A commercial blood warmer, along with the required tubing and infusion pressure bags, should be co-located with the blood products. Blood should be warmed during transfusion to prevent hypothermia in the patient already in hemorrhagic shock.

2. **Assessing the one-month mortality impact of civilian-setting prehospital transfusion: A systematic review and meta-analysis.** Schoenfeld DW, Rosen CL, Harris T, Thomas SH. *Acad Emerg Med* 2024;31:590–598 Full text available online at: https://onlinelibrary.wiley.com/doi/10.1111/acem.14882

The military experience with prehospital transfusion (PHT) has been shown to reduce death. However, the data supporting prehospital civilian transfusion (CivPHT) is less robust. Despite the paucity of data supporting prehospital transfusion, it is becoming a common practice in many civilian EMS agencies. This review evaluates all CivPHT randomized controlled trials (RCTs) to evaluate the effect of CivPHT on 1-month mortality (i.e. does transfusion of a civilian prehospital trauma patient improve survival out to 1-month post-injury). The authors defined "transfusion" as the prehospital administration of whole blood (WB), red blood cells (RBCs), plasma, or other blood products.

The authors compared studies which only included civPHT with the comparator being those who received crystalloid alone or additional non-transfusion therapy such as tranexamic acid (TXA). To minimize bias and repetition they excluded post hoc studies incorporating cases already reported in studies which were reviewed for this meta-analysis (MA). They utilized GoogleScholar and the HOLLIS database to review and filter studies. After initial review, 44 records which met initial screening criteria were reviewed in full text, and 3 studies were found which met all criteria. The 3 studies of CivPHT RCTs which met all criteria were the COMBAT trial, the PAMPer trial, and the RePHILL trial. The COMBAT trial was an urban prehospital plasma transfusion trial in Denver, CO. The PAMPer trial was based in Pennsylvania and involved aeromedical transfusion of plasma on top of standard therapy, which could include RBC transfusion. The RePHILL trial occurred in England and involved transfusion of up to 2 units each of RBCs and plasma.

The authors found a suggestion of benefit – a 13% reduction in 1-month mortality, however it did not reach statistical significance. Of the three trials, the COMBAT and RePHILL trials did not demonstrate a statistically significant benefit from prehospital administration of blood or blood products. A suggestion of benefit in survival occurs in blunt trauma patients of moderate acuity with longer (> 20 minutes) transport times.

There are several limitations to this study. Each of the three studies which met criteria were robust studies but with different patient populations, EMS systems, and methodologies. This paper's definition of transfusion combined plasma-only studies with plasma + RBC studies. Current practice is evolving toward a whole blood transfusion strategy, or at least a RBC-only practice. These studies don't all address this current practice. The low study numbers were another limitation. Finally, there is no definitive agreement that measuring 1-month mortality is superior to other time frames, such as 24-hour mortality.

The conclusion of this paper is interesting – evidence does not yet exist proving a mortality benefit in civilian prehospital blood transfusion. Despite the lack of convincing evidence, it does make intuitive sense and EMS agencies are increasingly adopting this practice. Further robust prehospital transfusion studies are warranted in the civilian population to see if the military experience translates into the civilian world.

3. **At-risk patient documentation and naloxone dispersal for a rural statewide EMS "Naloxone Leave Behind" program.** Naumann J, Benson J, Lamberson M, et al. *JACEP Open* 2024;5:e13186. Full text available at https://doi.org/10.1002/emp2.13186

The opioid crisis in the United States impacts not just major cities but also rural and suburban areas. Although Emergency Medical Services (EMS) agencies typically transport patients who have received naloxone to the hospital for further assessment, studies show that 30 to 40% of these patients who respond to the naloxone decline transport. EMS providers are now often tasked with helping to prevent opioid overdose deaths by educating the public before incidents occur as wells as implementing a naloxone leave-behind program for high-risk individuals who decline transportation after an overdose event.

In this retrospective study, the authors investigate the implementation of a naloxone leave-behind program in predominantly rural Vermont. The primary study outcomes were to identify missed opportunities for the distribution of naloxone leave-behind kits and the documentation of the implemented protocols. The state of Vermont initiated a statewide naloxone leave-behind program for at-risk patients on October 1, 2020, following comprehensive training for all EMS responders. At-risk patients eligible to receive a naloxone kit included those who refused transport and admitted they use opioids, concern for opioid use expressed by family members, presence of drug paraphernalia, or clinical findings suggesting opioid use. The authors analyzed data from the statewide EMS database spanning a one-year period from October 1, 2020, to September 30, 2021.

Chart review identified 2,507 at-risk patients during the study time period. Of these, 1,714 were transported for further care, while 793 declined transport by EMS. Among those who refused transport by EMS, no documentation of the naloxone leave-behind protocol was found in 386 patients. Of the remaining 407 patients, documentation confirming the distribution of naloxone leave-behind kits was made in 141 patients. Of 266 patients that did not receive a kit, 15 cases documented why with reasons including patient refusal, already have a kit and denial of opioid use. The authors identified the major limitations to the study being the non-mandatory reporting format of the protocol in the EMS charting software.

EMS providers respond to opioid overdoses daily. This issue extends beyond urban centers to rural areas, exacerbating strain on limited and already stretched emergency resources. Addressing the opioid crisis requires collective effort from the medical community. EMS providers can significantly impact patient outcomes through proactive education and programs that leave naloxone behind. This study highlighted the necessity for improved documentation of program protocols by EMS providers. Further

research is essential to determine the effectiveness of these leave-behind kits in future overdose incidents.

4. **Perceived Versus Actual Time of Prehospital Intubation**. Shou D, Levy M, Troncoso R, Scharf B, Margolis A, Garfinkel E. *West J Emerg Med*. 2024;25:645–650.

Endotracheal intubation (ETI) has traditionally been the gold standard for airway management in prehospital settings. Minimizing the procedure time and maximizing the first attempt success rate are key to preventing complications and adverse events such as hypoxia.

This retrospective review investigated the perceived versus actual time to complete ETI when using a video laryngoscope. For each ETI performed, a debriefing was conducted by a supervisor, and the intubating paramedic estimated the time from when the laryngoscope blade passed the teeth until the endotracheal tube balloon was visualized past the vocal cords. Videolaryngoscope recordings were reviewed to determine the actual total time.

The study analyzed EMS runs from a high-volume EMS system from January 5, 2021, to May 21, 2022, identifying 122 intubations that met inclusion criteria. Ten patients were excluded due to a lack of video recordings. The paramedics had an average of 10.7 years of experience, performing 2-3 intubations per year.

Among the 112 intubations analyzed, the mean actual laryngoscopy time was 50.0 seconds, and the median difference between actual and perceived time was 18 seconds. The paramedics estimated the time to be 27.8 seconds on average. First-pass success was achieved in 83% of cases, with an average time of 47.5 seconds.

The study noted the limitation of being conducted at a single site with a small sample size. In addition, the study could only evaluate intubations that were performed using video laryngoscopes. No information was available concerning any episodes of hypoxia that occurred during intubation and the effect of longer intubation times.

The findings indicate that paramedics underestimated the time to intubation by an average of 18 seconds. This misperception of actual procedure time could lead to hypoxia and hypercarbia in already critical patients. Further research is needed to develop training aids and tools to better understand and address the discrepancy and effect between perceived and actual intubation times.