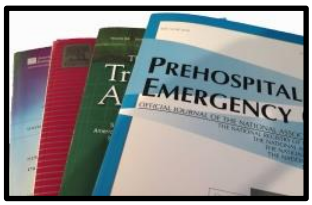
International Prehospital Medicine Institute



IPHMI Literature Review

Keeping You Up To Date with Current EMS Literature and Studies

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3. **Audiovisual Consults by Paramedics to Reduce Hospital Transport After Low-Urgency Calls: Randomized Controlled Trial.** Sykora R, Renza M, Ruzicka J, et al. *Prehosp Disaster Med.* 2020;35:656-662.
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1. Rescue Intubation in the Emergency Department After Prehospital Ketamine Administration for Agitation.

Parks DJ, Alter SM, Shih RD, Solano JJ, Hughes PG, Clayton LM. *Prehosp Disaster Med* 2020;35:651-655.

Ketamine administration has gained growing acceptance in the prehospital community for the control of the severely agitated patients. While ketamine has many uses in the prehospital arena, the use for patients exhibiting signs of excited delirium has caused the most controversy.

This retrospective cohort review took place over a 28-month period. Data from two community hospitals from January 1, 2017 to April 30, 2019 were obtained for patients over the age of 18 who had the words ketamine mentioned in the ED physicians or nursing chart or electronic prehospital chart. These charts were then reviewed by one of the authors and screened for ketamine that was administered only for agitation (other indications such as induction for intubation or for analgesia were excluded).

During the study period 254 patients received ketamine in the emergency department or prehospital setting. Of these, 86 received prehospital ketamine for agitation. Females accounted for 54.7% of the cohort. The mean age was 42.9 years old. Fourteen of the 86 patients required intubation in the Emergency Department after receiving ketamine in the prehospital setting for agitation, accounting for 16.3% of the cohort. The average ketamine dose was 339.3 mg in the group requiring intubation compared to 350.7 mg for the non-intubated group which was not statistically different. There was also no statistical difference when calculated using weight-based dosing, 4.44 mg/kg vs. 4.96 mg/kg.

Indications for intubation included decreased Glasgow Coma Scale (GCS), respiratory failure, hypoxia, hypercarbia, vomiting, airway protection, hypersalivation, and need for paralysis. The authors also found that patients with abnormal lung sounds or higher ED temperature readings were most likely

to be intubated. They also noted that there were no age or dose-related effects on intubation rate. The study did not report any mortality or morbidity outcomes for those patients that did require intubation. The authors noted the largest limitations were the retrospective nature of the study and charts with incomplete prehospital documentation.

The use of ketamine in the prehospital environment is evolving, in particular as it relates to its use in the highly agitated patient. Compared to other published studies, this study demonstrated a lower, but still significant, rate of required intubation. Still the question arises is an intubation rate of nearly 17% acceptable? The study does demonstrate that the need for intubation after ketamine administration is not dose dependent. This is important point needs to be verified through further study. While it was hoped that ketamine would prove to be the ideal medication for the prehospital management of the agitated patient, the subsequent need for intubation and hospital admission shows that the search is not yet over.

2. Tranexamic Acid During Prehospital Transport in Patients at Risk for Hemorrhage After Injury.
Guyette FX, Brown JB, Zenati MS, et al. *JAMA Surg.* 2020; Published online ahead of print, doi:10.1001/jamasurg.2020.4350

Tranexamic acid (TXA) is an anti-fibrinolytic now commonly used in hemorrhaging trauma patients in the in-hospital and military environments. The data on prehospital use of TXA is less robust and its use remains controversial. The Study of Tranexamic Acid during Air Medical and Ground Prehospital Transport (STAAMP) trial studies the efficacy and safety of TXA use in the prehospital setting.

The STAAMP trial is a multicenter, double-blind, placebo-controlled, randomized trial comparing outcomes of prehospital trauma patients receiving TXA during air medical or ground transport. Patients were transported to one of four trauma centers, all of which were associated with advanced EMS trauma systems. Four different dosing schemes were studied: placebo, a 1 g bolus of TXA followed by no additional dosing (1 g total), the traditional 1 g 8-hour infusion (2 g total), or an additional 1 g bolus followed by a 1 g eight hour infusion (3 g total). Each patient received one of the four treatments if they were treated within two hours of injury and were suspected of having life threatening hemorrhage as manifested by tachycardia (heart rate 110 beats per minute or greater) or hypotension (systolic BP 90 mm Hg or less).

The primary outcome was 30-day mortality. There were several secondary outcomes that were studied, including 24- hour and in-hospital mortality, blood transfusion volumes, incidence of pulmonary embolism and deep vein thrombosis, rate of seizures, multisystem organ failure, and acute respiratory distress syndrome.

A total of 903 patients were included. There were 447 patients in the TXA group and 456 patients in the placebo arm. Tachycardia was the most common qualifying vital sign (642 patients, 71%) with prehospital hypotension noted in 203 patients (22%). One third of patients required a blood transfusion in the first 24 hours. Surgery was performed in 45% of patients within the initial 24 hours.

The authors noted no differences in the 24-hour mortality or in-hospital mortality among the TXA and placebo groups. Additionally, there was no difference in the 6- and 24-hour blood transfusion requirement. From a safety standpoint, there were no differences in the incidence of pulmonary embolism, deep vein thrombosis, or seizures among the groups. They did note a slight survival benefit in the group which received the larger overall dose of TXA (3 g total; 2 1-g boluses followed by a 1 g infusion over eight hours) compared to placebo. In addition, the subgroup of patients who received TXA within one hour of injury had a lower 30-day mortality rate compared to patients who received placebo. There did appear to be decreased mortality in the subgroup of patients with the highest shock severity.

There are limitations to this study. Overall, the injury severity and blood transfusion requirement in this patient cohort was low, with only one third of patients requiring a blood transfusion and less than

one half requiring surgery. The population sample size was small compared to some other TXA studies and perhaps statistical significance would have been achieved with a larger cohort of patients. The trauma centers used in this study had associated prehospital trauma systems which were quite advanced, and results may not be translatable to other EMS systems.

In conclusion, prehospital administration of TXA compared to placebo did not result in a lower rate of 30-day mortality in this trauma population. There were several subgroups which did show potential benefit including the 3 g dosing group, patients who received TXA within one hour of injury, and those with evidence of severe shock. Further studies of these subgroups are warranted. While this is a very well-done study across four trauma centers with strong EMS systems, the debate will continue as to whether prehospital TXA use is beneficial.

3. **Audiovisual Consults by Paramedics to Reduce Hospital Transport After Low-Urgency Calls: Randomized Controlled Trial.** Sykora R, Renza M, Ruzicka J, et al. *Prehosp Disaster Med.* 2020;35:656-662.

For as long as Emergency Medical Services (EMS) have been organized and analyzed, EMS administrators have puzzled over how best to manage the volume of EMS requests, prioritize patient transports according to need, and allow for non-transport of patients that do not need to be taken to the hospital.

This study, performed by the Karlovy Vary Emergency Medical Service in the Czech Republic, looked at using audio visual consults (AVCs) with base physicians in an attempt to see if it would reduce transports of low urgency medical calls for assistance and be superior to their current practice of simple phone consultation with the base physician.

This was a single-system, randomized controlled trial with low urgency call participants divided into three groups:

1. Routine operation of the EMS crew with optional phone consultation with the base physician;
2. Mandatory phone consultation with the Base Physician; or
3. Video consultation (mandatory) with the base physician.

Eleven of the nineteen continuously operating EMS crews and eleven base physicians were selected and trained to participate. Physicians volunteered to participate along with their normal workload and commitments and participated when they were not involved in another trip. Smart phones were used for both standard phone and AVC consults. The study period was restricted to the hours of 7am to 11pm daily and data were collected for six weeks in this service area of 297,000 inhabitants.

Their primary objective was to evaluate the proportion of patients left at the scene after AVC consultations and whether there were return calls to these patients within 48 hours. The secondary objective was analysis of the quality of the communication and care. Surveys addressing the transfer of clinical information, the safety of care, the satisfaction with the care delivered, and the technical quality of the equipment were completed by both the EMS crews and the participating base physicians using a four point Likert scale of excellent, good bad or insufficient.

Prior to the study, 10% of low acuity patients were treated on site. The authors hypothesized that using AVC could double that percentage.

Of the 1,760 calls that were screened for potential participation, 791 calls were randomized and 643 events were analyzed. Calls were excluded due to missing surveys. There were 281 events in the control group, 222 in the phone consultation group, and 288 in the AVC group.

AVC consultation did not result in more treated on scene and not transported compared to phone consultation (17.7% versus 18.1%) although routine operation resulted in significantly fewer patients being treated and left on scene than either mandatory consultation method. Interestingly, repeated

trips to the scene within 48 hours of being treated and left at the scene occurred 8.6% of cases in the phone group compared to 19.6% of the cases in the AVC group.

As described above, the secondary outcomes analysis was a quality analysis based on surveys filled out by participants. The analysis showed that the perceived quality of the transferred clinical information was better in the case of AVC versus phone communication. Paramedics felt safety of care was the same in whether by phone or AVC whereas the physicians reported that it was better with AVC compared to phone communication. Interestingly, patients who were surveyed after conclusion of their EMS contact did not report improved satisfaction with the care provided using audio-visual consultation.

The authors concluded that while AVC was no better than standard phone communication regarding on-scene care and transport decisions, it did increase the decision-making confidence of the physicians involved in the cases. They noted that paramedics who independently decide whether or not to call in to the hospital will transport more to the hospital and that fewer of those left at the scene require additional calls to the scene within 48 hours.

An important limitation of this study is that it is very dependent on the context in which the data is obtained and may not be generalizable to other settings. Case mix, level of staff training, work habits are among the factors that will influences its application to other systems. In addition, benefit to crews, patients or hospital teams could not be determined.

In summary, this study found no benefit in using video communications over regular phone communication. Other studies have shown that just because we can do something, we should not assume that we should. Studies such as this reinforce the need for critical analysis of benefit before change in practice is implemented.

4. **Top 10 evidence-based countermeasures for night shift workers.** Wallace PJ, Haber JJ. *Emerg Med J* 2020;37:562-564.

Healthcare and public safety are 24 hours a day, 7 days a week professions. Practitioners are often required to work shifts rotating between days, evenings and nights, often with short transition periods disrupting circadian rhythms. Sleep deprivation associated with night shifts can result in errors in clinical judgement, medical errors, performance degradation, decreased provider wellness and a higher incidence of injuries. There is no formal education on how to lessen the impact of shift work on providers. The authors completed a literature search to identify the top ten best practices providers can use to minimize the impact of night shift work on their practice and to improve their general wellbeing.

- Whenever possible, providers required to work rotating shifts should choose schedules that rotate in a clockwise fashion (days to evenings to nights).
- Productivity tends to drop off after 04:00 on night shifts. Therefore, complex or administrative tasks should be completed earlier in the shift.
- Providers should attempt to nap prior to a night shift. A nap as short as one hour may improve alertness and performance. The best time to nap is between 14:00 and 16:00.
- Providers should maximize exposure to bright light, especially blue light, while working a night shift.
- If feasible and permitted, napping while on shift, especially between 01:00 and 03:00 may improve provider performance.
- Night shift workers should avoid large meals while at work and instead eat small snacks throughout their shift.
- While bright light while on shift is beneficial to adjusting circadian rhythms, bright light should be avoided on the commute home after a night shift. Providers are encouraged to wear sun glasses with dark lens on their commute home to help maximize sleep during the day.

- While melatonin has not been conclusively proven to improve sleep, some studies have shown an increase in the duration of sleep by persons taking a melatonin supplement before attempting to sleep during the day. With its low side effects risk, providers may want to consider taking melatonin before attempting to sleep during the day.
- Providers should sleep in darkened rooms during the day. Blackout curtains and shades along with sleep masks have been shown to improve daytime sleep quality.
- Sleeping in a cool room also improves sleep initiation and quality by rapidly dropping the provider's core body temperature.

By choosing healthcare or public safety as a career, our patients and the public rely on us to be at our best whenever we encounter them, regardless of time of day. For those that choose to, or are rotated onto nights, optimizing sleep cycles and avoiding sleep deprivation will help prevent decreased performance and reduced cognitive function while at work. The authors identified simple and common-sense techniques to minimize the effects of shift work.