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# Abstracts

## ☐ THE ED-SED STUDY: A MULTICENTER, PROSPECTIVE COHORT STUDY OF PRACTICE PATTERNS AND CLINICAL OUTCOMES ASSOCIATED WITH EMERGENCY DEPARTMENT SEDATION FOR MECHANICALLY VENTILATED PATIENTS.

Fuller B, Roberts B, Mohr N, et al. *Crit Care Med* 2019. doi:10.1097/CCM.0000000000003928. [Epub ahead of print]

Sedating patients on mechanical ventilation is a common role of Emergency Medicine Physicians. Recent studies have suggested that deep sedation in mechanically ventilated patients within the first 48 hours of intensive care unit (ICU) admission is associated with worse clinical outcomes. Emergency Department (ED) sedation practices in mechanically ventilated patients and their clinical outcomes are poorly studied and thus there are many variations in sedation management.

The goal of this multicenter prospective cohort study was to review ED sedation practices in multiple centers and to determine if deep sedation in the ED is associated with worse clinical outcomes. Patients met inclusion criteria if they were started on mechanical ventilation in the ED. Exclusion criteria included death or discontinuation of mechanical ventilation within 24 hours, transfer to another hospital, neurological injury, and chronic/home ventilation. Choice of sedation included opiates, benzodiazepines, propofol, ketamine, dexedetomidine, etomidate, haloperidol, quetiapine and neuromuscular blockers. Sedation depth was recorded using the Richmond Agitation-Sedation Scale, Riker Sedation-Agitation Scale or GCS with scores -3 to -5, 2 or 1, or less than or equal to 9 respectively, defined as deep sedation. The primary outcome was number of ventilator-free days. Secondary outcomes included the incidence of acute brain dysfunction (coma and delirium) within the first 48 hours of ICU admission, mortality, and days out of the ICU and hospital.

The study included 324 patients from 15 medical centers. The most commonly used sedation agents were fentanyl (64.5%), propofol (65.7%), and midazolam (23.8%), while 35 (10.8%) patients received no sedatives or analgesics. The rate of deep sedation in the ED was 52.8% and these patients received higher cumulative doses of propofol. Patients who were deeply sedated in the ED had a higher frequency of deep sedation in the ICU on day 1 compared to light sedation (53.8% vs. 20.3%; p<0.001) and day 2 (33.3% vs. 16.9%; p <0.001). In the deep sedation group, mortality was 21.1% and 17% in the light sedation group (between-group difference, 4.1%; odds ratio, 1.3; 0.74-2.28; p=0.35). Acute brain dysfunction had an occurrence rate of 68.4% in the deep sedation group and 55.6% in the light sedation group (between-group difference, 12.8%; odds ratio, 1.73; 1.10-2.73; p=0.02).

In this study, acute brain dysfunction was the only clinically significant adverse effect of deep sedation. There were no differences between the two groups in terms of mortality, ICU or hospital-free days. It is common for ICUs to have set protocols aimed at reducing medication requirements, ventilator duration, and lengths of stay, however there tends to be a lack of protocol in the ED. The authors concluded that sedation practices in the ED and their clinical outcomes warrant further investigation and quality improvement. The authors make a note that the ED environment is different from the ICU in terms of nurse-patient ratios, which plays a role in monitoring patients on light sedation for safety purposes, awareness, distress, and device removal. There may also be a relationship between deep sedation and severity of illness in critically ill patients.

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Comments: This study suggests that the depth of sedation achieved in mechanically ventilated patients in the ED plays an important role in determining the depth of sedation during the first 48 hours of admission in the ICU and potential clinical outcomes, such as acute brain dysfunction. However, severity of illness can certainly contribute to level of sedation or acute brain dysfunction. Equally concerning as the high level of deep sedation occurring in this study is the high incidence of patients receiving no analgesia or sedation at all. Currently there is a lack of consensus regarding appropriate sedation goals in the ED. As the authors state, this is an area in need of further investigation.

## ☐ HEMODYNAMIC DECOMPENSATION IN NORMOTENSIVE PATIENTS ADMITTED TO THE ICU WITH PULMONARY EMBOLISM.

Patel H, Shih JA, Gardner R, et al. *Journal of Critical Care* 2019;54:105-109

Pulmonary embolus (PE) is a common presenting complaint in the emergency department whose clinical severity varies greatly among patients. In cases of decompensation secondary to a PE, there are many management guidelines in place and most involve sending patients to the intensive care unit (ICU). However, many normotensive patients diagnosed with acute PE also are admitted to the ICU with no clear evidence of mortality benefit. The objective of this study was to identify rates

and causes of acute decompensation in patients who were admitted to the ICU for pulmonary embolus.

Researchers conducted a single-center retrospective cohort study of patients who were admitted to either medical or surgical ICU for PE during an eight-year period from 2010-2017. Patients were excluded if they had another reason to need ICU-level care, if they were admitted to the floor, if they were already intubated or started on vasopressors at the time of ICU admission, or if they received thrombolytics or mechanical clot disruption prior to admission. The primary outcome was hemodynamic decompensation, defined as a need for use of vasopressors within 48 hours of admission. Secondary outcomes include in-hospital mortality, need for other interventions, major bleeding events, and length of stay. Additional sensitivity analyses were also performed, including patients with biochemical or radiographic evidence of RV strain, patients with saddle PE, patients who were admitted to the ward who were subsequently transferred to the ICU. They also extended the decompensation window to 72 hours from 48 hours.

A total of 293 patients were included in the study. Of those 293 patients, only 8 had hemodynamic compromise during the first 48 hours of their ICU stay. When comparing the 2 groups, the patients who decompensated were more tachypneic at presentation (RR 29 vs. 21, $p<0.001$) and had higher Brain Natriuretic Peptide (BNP) levels (3133 vs 1265pg/ml, $p=0.04$). There was no statistical difference in troponin levels, comorbidities, PE size, or right ventricular dysfunction. Causes of decompensation included: medications (1), left ventricular dysfunction (1), sepsis (1), PE/RV dysfunction (2), bleeding (2), and bleeding and/or RV dysfunction (1). In the cohort of 100 patients initially admitted to the floor, no one experienced hemodynamic decompensation during the first 48 hours of their ICU stay. There were no additional patients who experienced hemodynamic compromise when the time period was expanded to 72 hours. When looking at only the patients with a saddle PE, only 1 of the 88 patients experienced decompensation. When looking at patients with evidence of right heart strain on both imaging and laboratory studies, 7 of the 172 patients experienced decompensation. Of these 172 patients, 14% of them received thrombolytics and none of these patients experienced decompensation.

The authors concluded that hemodynamic decompensation during the first 48 hours of admission was rare for patients who presented with an acute pulmonary embolus and were normotensive. While RV dysfunction was one of the most common causes of hemodynamic instability, hemorrhage was just as common and needs to be considered in this patient population.

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Comment: Though this is a limited single center retrospective study, it sets the stage for future to help determine whether patients with findings of "significant" PE (saddle embolus, RV strain, etc) could actually be safely managed on the floor as opposed to in an ICU. The number of patients that decompensated in this study is low, which suggests that rates of decompensation are low in normotensive patients who present with acute PE. While this sounds promising, we must remember that it can be difficult to attempt to delineate risk factors for very rare outcomes.

### ☐ A SIMPLE DECISION RULE PREDICTS FUTILE RESUSCITATION OF OUT-OF-HOSPITAL CARDIAC ARREST.

Nancy K Glober, Christopher R Tainter, Tiffany M Abramson, et al. *Resuscitation*, 2019;142;8-13

Emergency Department (ED) physicians are commonly called upon to continue resuscitation efforts on patients who have suffered out of hospital cardiac arrest (OHCA) and have achieved Return of Spontaneous Circulation (ROSC) in the field. Rates of reported survival to hospital discharge range from 3-20% and resuscitation cost has been reported at $118,000, regardless of outcome. Risks of futile resuscitation efforts include emotional and financial trauma to family members and burden on limited healthcare resources. This study seeks to establish a decision rule with high reliability in predicting futile resuscitation of OHCA and thus influence Termination of Resuscitation (TOR) guidelines in the field.

A retrospective cohort analysis was performed using the Cardiac Arrest Registry to Enhance Survival (CARES) database to review all OHCAs in San Mateo county, CA to which paramedics were dispatched from 2015-2018. Researchers collected the following data: patient demographics, arrest characteristics (location, witnessed vs unwitnessed, initial rhythm), defibrillation, whether or not bystander CPR was performed, on-scene time and transport time, and patient survival to ED, to admission and to hospital discharge. Recursive bipartite partitioning was then used to develop the simplest decision rule that would be 100% specific in predicting failure to survive to hospital discharge. Separate analysis was performed to assess if there were different characteristics that would lead to survival with good neurologic function, defined as a CPC score of 1 or 2.

A total of 1706 patients were treated for OHCA and met the inclusion criteria. They found that following criteria predicted failure to survive: age > 80 years, unwitnessed arrest, and non-shockable initial rhythm. These three criteria were present in 13.1% of patients, none of whom survived to hospital discharge. They suggest the NUE rule (Non-shockable, Unwitnessed, Eighty or older) was 14.4% sensitive and 100% specific in predicting non-survival. When the rule was modified to include age > 80 years, non-shockable rhythm, and arrest at home, it encompassed 17.4% of arrest patients, none of whom survived to have good neurologic outcomes. The rule was found to be 18.6% sensitive and 100% specific for this metric. Age was the least important predictor in this analysis, while absence of shockable rhythm was the most important.

The authors conclude that these 3-element decision rules have the potential to improve utilization of healthcare resources and reduce trauma to family of those who suffer OHCA. They favor use of the more conservative rule predicting death rather than poor neurologic outcome as a guideline for Termination of Resuscitation in the field due to the more complex issues surrounding the definition of neurologic outcomes and potential differences in family and provider preferences regarding this concept. The authors acknowledge that study participants