Title: Evaluation of pain and sedation strategies in extracorporeal membrane oxygenation
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Background/Purpose:
In patients undergoing Extracorporeal Membrane Oxygenation (ECMO), adequate sedation is important in optimizing respiratory status and preventing cannula dislodgement. However, drug interactions with the ECMO circuit and altered physiologic pharmacodynamics make it difficult to achieve predictable drug action. No specific society-driven recommendations exist to guide therapy choices to achieve goal sedation in this population.

Objective:
The purpose of this study was to compare the efficacy of combination analgesic and sedative regimens in ECMO patients.

Methodology:
A single center, retrospective, cohort study was performed in adult patients undergoing either veno-arterial (VA) or veno-venous (VV) ECMO who received at least 72 hours of a continuous intravenous analgesia/sedation regimen from 10/2012-7/2018. The primary endpoint was time to achieve adequate pain and sedation and secondary endpoints were duration of intensive care unit (ICU) and hospital length of stay (HLOS), time on mechanical ventilation, and in-hospital mortality. Optimal sedation was defined as the achievement of a critical care pain observation tool (CPOT) <3 or Richmond Agitation-Sedation Scale (RASS) 0 to -2. All opioids were converted to milligram morphine equivalent (MME).

Results:
Of the 88 patients who received ECMO, 48 met inclusion with an age of 61±12 yrs and APACHE II of 27±6. Primary ECMO type was VA (85%) with a duration of 178±84 hrs. A total of four treatment groups were identified, each containing an opioid: dexmedetomidine (17%), midazolam (23%), propofol (25%), or 2 sedatives (25%). Time to target CPOT/RASS was more likely in the first 24 hrs with the MME/propofol regimen compared to all other regimens (94% vs 55%, p=0.008). Average CPOT was 0.3 [0, 0.8] and RASS was -2 [-1.3, -3.4] during the same time frame. All patients in the MME/dexmedetomidine group achieved goal sedation consistently throughout the 72 hour study period. The MME/propofol group had lower MME than other regimens (113±121 vs 213±229, mg, p=0.007). In corollary, the MME/2 sedative group had higher MME than other regimens (383±344 vs 155±139, mg, p=0.002). Hospital LOS tended to be longer with the MME/midazolam regimen (29.2±12.4 vs 19.4±11.3 days, p=0.09). Overall, mortality was 33% and tended to be higher in the MME/midazolam group (55% vs 27%, p=0.08).

Conclusion:
Optimal analgesia and sedation are essential in patients receiving ECMO. This evaluation found that initiation with a MME/propofol or MME/dexmedetomidine regimen achieved target sedation scores with comparable efficacy while the use of the MME/midazolam regimen was associated with greater mortality and HLOS.