The Impact of Venovenous Extracorporeal Membrane Oxygenation on Trauma Patient Outcomes: Should We Cannulate?

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Introduction

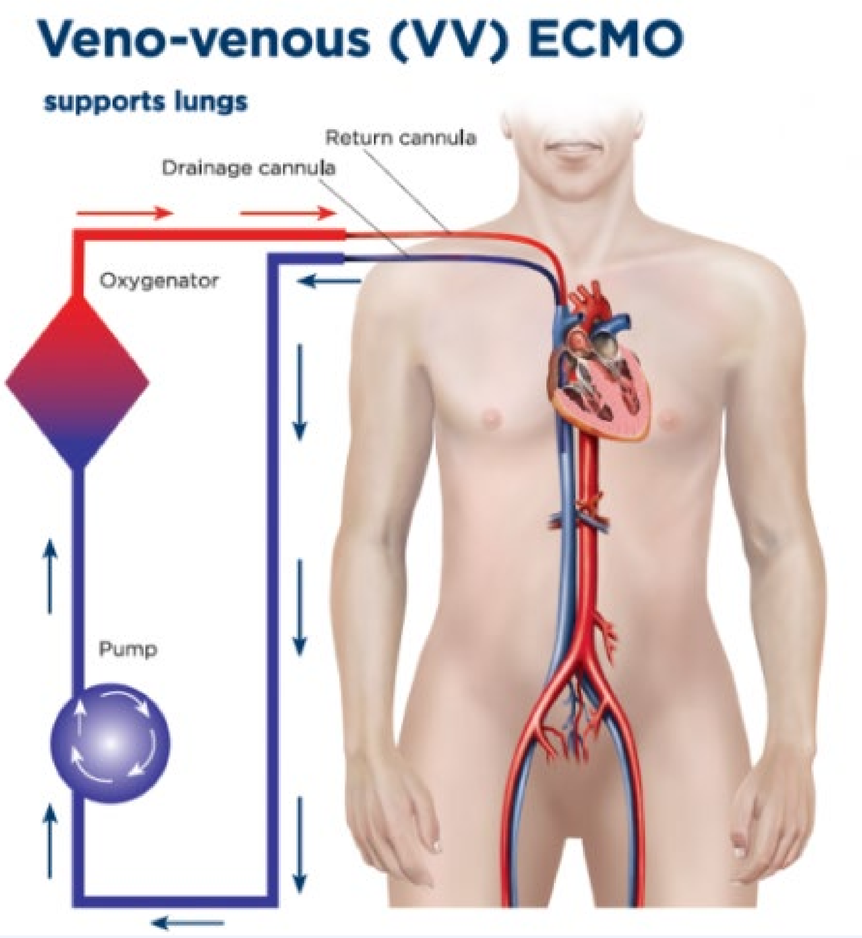
Acute respiratory distress syndrome (ARDS) is a significant cause of morbidity and mortality in trauma patients (1), with an incidence of 8.4% according to a systematic review by Pfeifer et al. in 2017. Trauma patients sustaining thoracic injuries, traumatic brain injuries (TBI), and those patients undergoing massive transfusion are particularly susceptible to developing ARDS (1, 3) with a staggering incidence of 10 to 25% reported in the setting of thoracic trauma in particular (4). Although the incidence of ARDS due to over-resuscitation has declined, it remains a common complication in the setting of TBI, thoracic trauma, and pneumonia, and its associated mortality continues to increase over time (5, 6).

Specific risk factors that are associated with an increased mortality include a lower initial Glasgow Coma Scale (GCS), higher initial injury severity score (ISS), male gender and older age (6).

While ECMO use in non-trauma patients is well described, its use in the setting of post-traumatic respiratory failure is more controversial as patient outcomes have been variable and formal guidelines are lacking (11).

The variability in outcomes and the lack of formal guidelines underscore the need for further research in this area with a critical knowledge gap. Currently, most existing studies are single center with limited sample sizes. Furthermore, there is no data detailing whether social determinants of health impact access to ECMO or cannulation practices.

This study aims to address these gaps by evaluating the impact of VV-ECMO on patients who have sustained blunt or penetrating trauma and who have subsequently developed acute respiratory failure across multiple centers.



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Aims

Primary Aim: To compare the morbidity and mortality of trauma patients with acute respiratory failure managed with VV-ECMO to similar patients managed with conventional ventilatory strategies.

Secondary Aim: To determine both the optimal timing for VV-ECMO cannulation to maximize survival benefits and to identify the patient populations that are most likely and least likely to benefit from VV-ECMO.

Tertiary Aim: To determine if a patient's geographic proximity to an urban, level 1 trauma center and social determinants of health impact the likelihood of VV-ECMO cannulation.

Hypothesis: We hypothesize that trauma patients in acute respiratory failure who are managed with veno-venous extracorporeal membrane oxygenation (VV-ECMO) will demonstrate improved mortality when compared to similar patients who are treated with conventional ventilatory methods.

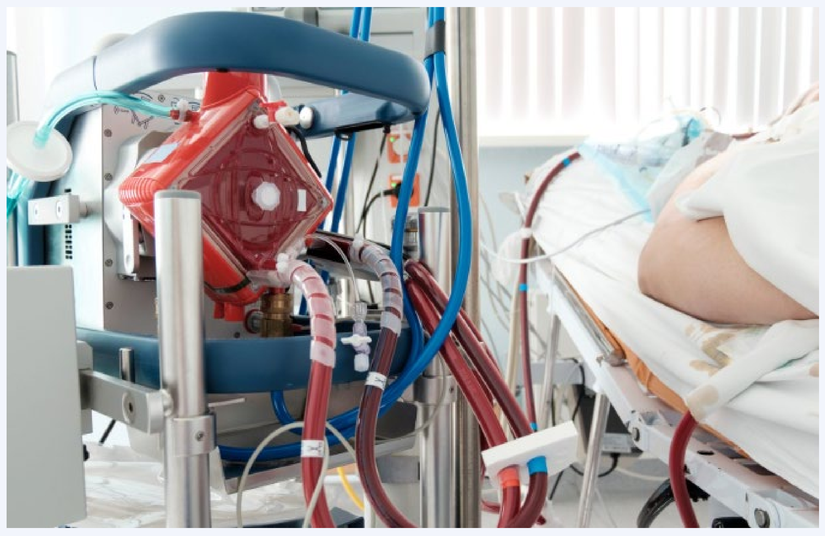
What is VV-ECMO?

VV ECMO (veno-venous extracorporeal membrane oxygenation) is a critical, short-to-medium-term life support technology that circulates blood outside the body, using a pump and artificial lung to oxygenate blood for patients with severe, reversible heart or lung failure. It is used when other treatments fail, and acts as a bridge to recovery, allowing organs to rest for days or weeks.

Study Procedures

This is a multicenter, retrospective study conducted by the Baylor College of Medicine with approximately 20 other participating sites. They developed the protocol and will serve as the coordinating center.

This multicenter trial will be the largest cohort study evaluating the impact of VV-ECMO on trauma patient outcomes. Findings from this study will serve as the basis for future research and will potentially influence the development of formal guidelines for ECMO use in the setting of trauma.



ECMO machine NYU Langone Health. Photo iStock Photos

This study was approved by the Trinity Health IRB and is actively collecting data.

References and Acknowledgements