

ECMO for Adult Respiratory Failure: 2017 Update



Extracorporeal membrane oxygenation (ECMO) can support severe derangements in gas exchange in both acute and chronic respiratory failure, with data showing potential for improving survival in patients with high rates of morbidity and mortality, according to a review paper to appear in the journal CHEST.

The use of ECMO for respiratory failure in adults is growing rapidly, driven in large part by advances in technology, which have made ECMO devices easier to implement, safer and more efficient.

However, this treatment method should remain within centres sufficiently experienced with the technology, and additional research is needed before ECMO can be recommended for more widespread application, note authors of the study, Drs. Darryl Abrams and Daniel Brodie, both from the Division of Pulmonary, Allergy and Critical Care, Columbia University Medical Center, New York, NY.

ECMO refers to a circuit that directly oxygenates and removes carbon dioxide from blood via an extracorporeal gas exchange device, commonly referred to as a membrane oxygenator. At the time of ECMO initiation, catheters (or cannulas) are placed with their drainage and reinfusion ports located in central vessels. Deoxygenated blood is drained from the body by an external pump, passes through the membrane oxygenator, and is reinfused back into the patient.

When the drainage and reinfusion cannulas are both located in central veins, the circuit is referred to as venovenous ECMO, and the device only provides gas exchange support. When blood is drained from a vein and reinfused into an artery, referred to as venoarterial ECMO, the circuit provides both gas exchange and circulatory support.

"ECMO can only provide support for patients with advanced respiratory failure as a bridge to recovery or lung transplantation, as no destination device currently exists for respiratory failure, i.e., the equivalent of a ventricular assist device in heart failure," write the authors.

The most common indication for ECMO in respiratory failure is severe acute respiratory distress syndrome (ARDS). Severe ARDS is defined by the presence of bilateral infiltrates on chest imaging within seven days of an inciting event and impaired oxygenation.

Given the high-quality data in favour of lung protective ventilation and other advanced therapies for moderate to severe ARDS, the authors currently recommend that if ECMO is implemented, it should be part of a larger algorithm that includes standard of care management for ARDS, with ECMO reserved for the most severe cases of ARDS, when the current standard of care is insufficient to support the patient.

Patients with acute massive pulmonary embolism may also benefit from institution of venoarterial ECMO. Selected patients may have more favourable outcomes when ECMO support is combined with directed therapies such as thrombolysis, catheter-directed embolectomy, or surgical embolectomy, although there are no randomised controlled trials to inform the optimal approach, the authors point out. For some patients, venoarterial ECMO with standard intravenous unfractionated heparin therapy may be sufficient.

Continuous systemic anticoagulation is generally needed to maintain ECMO circuit patency and minimise the risk of thrombosis within both the circuit and the patient. However, anticoagulation goals must balance thrombotic risk with potential haemorrhagic complications. As the authors note, "There are currently no universally accepted anticoagulation goals for ECMO, nor is there a consensus on how anticoagulation should be monitored."

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