Extracorporeal Membrane Oxygenation for Children

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Recommendation

• The COVID-19 Treatment Guidelines Panel recommends that the use of extracorporeal membrane oxygenation (ECMO) should be considered for children with acute COVID-19 or multisystem inflammatory syndrome in children (MIS-C) who have refractory hypoxemia or shock when hemodynamic parameters cannot be maintained or lung-protective strategies result in inadequate gas exchange (CIII). Candidacy for ECMO should be determined on a case-by-case basis by the multidisciplinary team.

Rationale

ECMO is used as a rescue therapy for children with refractory hypoxemia or shock. Similar to outcomes for adults, outcomes for children managed with venovenous ECMO are variable and influenced by the etiology and duration of the respiratory failure and by underlying, comorbid medical conditions.\(^1,2\) In addition, studies have shown that pediatric centers that treat fewer patients with ECMO have worse outcomes than facilities that treat a high volume of patients with ECMO.\(^3,4\) Other than studies of neonates, no randomized trials have evaluated the efficacy or benefit of ECMO for the treatment of hypoxic respiratory failure in children without COVID-19. In an observational study of 122 children with severe pediatric acute respiratory distress syndrome (PARDS), children who received ECMO and those supported without ECMO had similar 90-day mortality (25% vs. 30%).\(^5\)

The 2023 Pediatric Acute Lung Injury Consensus Conference suggests that patients with severe PARDS from potentially reversible causes and children who are candidates for lung transplantation be evaluated for management with ECMO if lung-protective strategies result in inadequate ventilation (conditional recommendation, very low quality of evidence).\(^6\) The Surviving Sepsis Campaign International Guidelines for the Management of Septic Shock and Sepsis-Associated Organ Dysfunction in Children issued a weak recommendation, based on very low-quality evidence, for the use of venovenous ECMO in children with PARDS and refractory hypoxemia.\(^7\)

Venoarterial ECMO has been used successfully for the treatment of refractory shock in children, although no trials have evaluated this approach, and the potential benefits must be weighed against risks of bleeding and thromboembolic events.\(^8-10\) The Surviving Sepsis Campaign guidelines for children issued a weak recommendation, based on very low-quality evidence, for the use of venoarterial ECMO in children with refractory shock who have not improved with any other treatments.\(^7\) However, a standardized definition for refractory shock in children is not available.

Studies that have evaluated data on the use of ECMO in children with COVID-19 and MIS-C have suggested that these patients have outcomes similar to patients who have received ECMO for illnesses not related to COVID-19.\(^11-15\) The Extracorporeal Life Support Organization published guidelines for the use of ECMO in patients with COVID-19.\(^16\) In general, children with COVID-19 or MIS-C who are candidates for ECMO should be assessed using criteria similar to those used for children with severe respiratory failure or shock due to other causes. Cannulation approaches and management principles should follow published international guidelines and local protocols for patients who do not have COVID-19. Pediatric clinicians should consider entering patients into clinical trials or registries to
inform future recommendations regarding the use of ECMO in children with COVID-19.

References


