# Extracorporeal Membrane Oxygenation for Adults

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## Recommendation

- There is insufficient evidence for the COVID-19 Treatment Guidelines Panel to recommend either for or against the use of extracorporeal membrane oxygenation (ECMO) in adults with COVID-19–associated acute respiratory distress syndrome (ARDS) and refractory hypoxemia.

## Rationale

ECMO has been used as a rescue therapy in patients with ARDS caused by COVID-19 and refractory hypoxemia. However, there is no conclusive evidence that ECMO is responsible for better clinical outcomes, regardless of the cause of hypoxemic respiratory failure.[1-4]

The clinical outcomes for patients with ARDS who are treated with ECMO are variable and depend on multiple factors, including the etiology of hypoxemic respiratory failure, the severity of pulmonary and extrapulmonary illness, the presence of comorbidities, and the ECMO experience of the individual center.[5-7] Several multicenter, observational cohort studies from the first half of 2020[8-10] reported that patients who required ECMO for COVID-19 had similar mortality to patients in a 2018 randomized study who did not have COVID-19 but had ARDS and received ECMO.[3]

However, subsequent observational studies reported that in patients who required ECMO for COVID-19, outcomes in late 2020 and early 2021 were worse than outcomes in spring 2020.[11,12] The largest analysis used data from 4,812 patients in the international Extracorporeal Life Support Organization Registry who had COVID-19 and received ECMO in 2020.[11] At centers that provided ECMO throughout 2020, patients who started ECMO before May 1, 2020, had a 90-day mortality of 36.9% after ECMO initiation (95% CI, 34.1% to 39.7%). At the same centers, patients who initiated ECMO between May 2 and December 31, 2020, had a 90-day mortality of 51.9% (95% CI, 50.0% to 53.8%). Furthermore, at centers that started using ECMO for patients with COVID-19 after May 1, 2020, the 90-day mortality after ECMO initiation was 58.9% (95% CI, 55.4% to 62.3%). These observational data should be interpreted with caution, as they may reflect a changing case mix of patients with COVID-19 who were referred for ECMO.

Three target emulation trials compared the efficacy of ECMO and conventional mechanical ventilation in patients with severe COVID-19–associated ARDS.[10,13,14] The largest of these trials included 844 patients with COVID-19 who had hypoxemic respiratory failure and were receiving ECMO.[14] The study reported that the patients who received ECMO had lower 60-day mortality than the patients who received only conventional mechanical ventilation (26% vs. 33.2%; risk difference −7.1%; 95% CI, −8.2% to −6.1%; risk ratio 0.78; 95% CI, 0.75–0.82). Favorable ECMO outcomes were associated with the following factors: aged <65 years, a ratio of arterial partial pressure of oxygen to fraction of inspired oxygen <80 mm Hg, ≤10-day duration of mechanical ventilation, and >15 cm $H_2O$ driving pressure.

Ultimately, the benefits of ECMO cannot be clearly defined for patients with COVID-19 and severe ARDS because no randomized controlled trials have evaluated the use of ECMO in this population.

Clinicians interested in pursuing ECMO for patients with COVID-19 and severe ARDS should consider transferring care to high-volume ECMO centers. These patients should be entered into clinical trials or



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registries so more informative data can be obtained. More information on the use of ECMO in patients with COVID-19 can be found on the Extracorporeal Life Support Organization website.

## References


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