

TITLE: University Health System Respiratory Failure Guidelines for Venovenous ECMO support in Patients with COVID-19 during the 2020 Pandemic

PURPOSE: The purpose of this guideline is to assist treating physicians in the proper selection of ECMO candidates during the 2020 pandemic when the patient is suspected or confirmed with COVID-19. This is a new guideline. [**Key Words:** ECMO, COVID-19]

POLICY STATEMENT:

The ECMO and Advanced Technologies Department ensures safe and rapid deployment of extracorporeal life support for all patient populations at University Hospital. The following guideline provides direction for selection of potential ECMO candidates due to severe respiratory failure refractory to conventional therapy in the context of suspected or documented COVID-19 infection.

GUIDELINE ELABORATION:

- I. Given the resource-intensive nature of ECMO support, institutional candidacy (during the COVID-19 pandemic) should be considered in a time-specific fashion. If the hospital must commit all resources to other patients, then ECMO should not be considered until the resources stabilize. If ECMO is an available hospital resource that can be safely provided, then it should be offered to patients with severe pulmonary dysfunction who are refractory to conventional mechanical ventilation support strategies. Ideal candidates have mild to moderate extra-pulmonary organ dysfunction without severe pre-existing, life-limiting chronic medical conditions. These guidelines have been developed accordingly.
- II. Candidacy determination: The candidacy of each individual patient will be

evaluated and considered by 3 individuals: the intensive care physician, the ECMO MD and the physician providing cannulation. Three votes that ECMO is a reasonable support modality for the patient are required before cannulation. If there is a discrepancy, the ECMO medical director or another ECMO MD can be consulted to provide further guidance to achieve a third “yes” vote. If that person disagrees with ECMO support, the patient will be deemed not a candidate.

Under very limited ECMO resource situations, the highest priority for allocation should be directed towards the patient(s) with the highest probability of survival with ECMO support. It should be acknowledged that the availability of ECMO support is affected by dynamic prioritization of hospital resources. As resources change, priorities should shift based on what can be safely done in our hospital-specific setting. If unable to support patients who are candidates for ECMO support and these patients are identified with progressing disease, then every effort will be made to obtain transfer to a hospital with available ECMO support and all referrals for ECMO support will be deferred.

It is appropriate to prescreen potential ECMO candidates and review case with primary service to ascertain optimal candidates, anticipate potential barriers or complications to support, and clarify patient/family goals of care.

III. Indications:

- A. Consider ECMO only if attempts to optimize diuresis, prone ventilation (if not contraindicated), neuromuscular blockade, and high PEEP strategy have failed.
- B. Consider ECMO if patient develops acute respiratory failure with an estimated mortality risk of > 50% as indicated by any of the following criteria after treatment maximized:
 - 1. P/F ratio <150 after 4 hrs
 - 2. Murray score 2-3

3. Age-adjusted OI score >60 (Age + OI)
4. Age-PaO₂/FiO₂ and plateau pressure score = 6-7

C. ECMO is indicated if:

1. P/F ratio <150 after 4 hrs **OR**
2. PaCO₂ >60 and pH <7.25 for 4 hrs **OR**
3. Based on the following approach published by ELSO as a consensus guideline for respiratory failure in the patient with COVID-19.

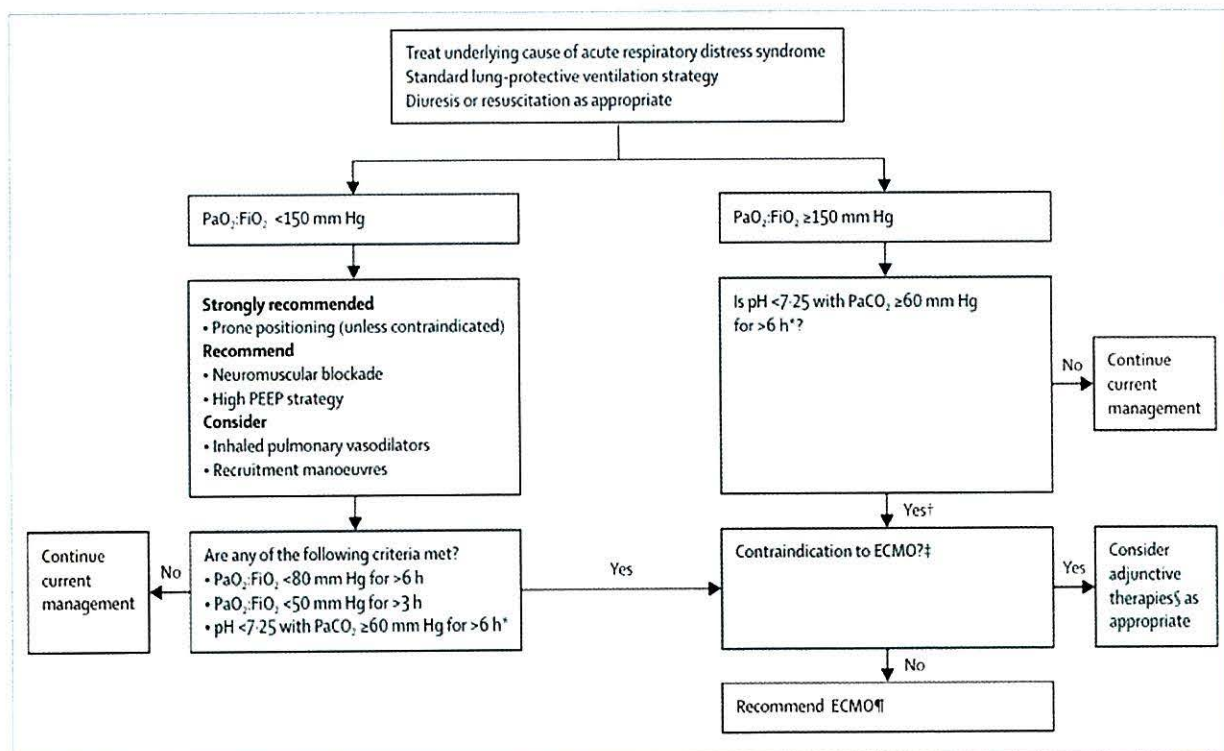


Figure: Algorithm for management of acute respiratory distress syndrome

PEEP=positive end-expiratory pressure. PaO₂:FiO₂=ratio of partial pressure of oxygen in arterial blood to the fractional concentration of oxygen in inspired air. ECMO=extracorporeal membrane oxygenation. PaCO₂=partial pressure of carbon dioxide in arterial blood. *With respiratory rate increased to 35 breaths per minute and mechanical ventilation settings adjusted to keep a plateau airway pressure of ≤32 cm of water. †Consider neuromuscular blockade. ‡There are no absolute contraindications that are agreed upon except end-stage respiratory failure when lung transplantation will not be considered; exclusion criteria used in the EOLIA trial¹ can be taken as a conservative approach to contraindications to ECMO. §Eg, neuromuscular blockade, high PEEP strategy, inhaled pulmonary vasodilators, recruitment manoeuvres, high-frequency oscillatory ventilation. ¶Recommend early ECMO as per EOLIA trial criteria; salvage ECMO, which involves deferral of ECMO initiation until further decompensation (as in the crossovers to ECMO in the EOLIA control group), is not supported by the evidence but might be preferable to not initiating ECMO at all in such patients.

IV. Contraindications

A. Absolute:

1. Advanced directives limiting care
2. Nonrecoverable major CNS damage
3. Severe, acute neurologic injury, e.g. anoxic, stroke
4. Significant underlying comorbidities: Stage III CKD, cirrhosis, dementia, baseline neurologic compromise that would preclude rehabilitation potential, disseminated malignancy, advanced lung disease without transplant potential, uncontrolled diabetes with chronic end-organ dysfunction, severe peripheral vascular disease, non-ambulatory or unable to perform ADL
5. Greater than 10 days of mechanical ventilation
6. Severe multiorgan failure
7. Futility of current treatment
8. Vascular incompatibility based on cannula sizes required for ECMO support
9. Ongoing CPR
10. Contraindication to anticoagulation or blood product transfusion
11. ECMO device not immediately available

B. Relative:

1. Advanced age with significant underlying comorbidities
2. BMI >40
3. ANC <400/mm³
4. Advanced chronic systolic heart failure
5. High dose vasopressor requirement and not under consideration for VA ECMO
6. Coagulopathy at high risk for bleeding (Platelet count <50K, INR >5, DIC)

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ELSO Guidelines for Adult Respiratory Failure v1.4

ELSO General Guidelines v1.4

ECMO Extracorporeal Cardiopulmonary Support in Critical Care 5th Edition

ECMO Specialist Training Manual 4th Edition

OFFICE OF PRIMARY RESPONSIBILITY:

Director of ECMO and Advanced Technologies

GUIDELINE AUTHORIZATION AND REVIEW:

	<u>Name</u>	<u>Date</u>
WRITTEN OR REVISED BY:	<u>V. Armijo-Garcia</u> Veronica-Armijo-Garcia, MD, Medical Director, ECMO & Advanced Technologies	<u>5/21/20</u>
APPROVED BY:	<u>Casey Howard</u> Casey Howard, BSRC, RRT Director of ECMO & Advanced Technologies	<u>5/20/20</u>
APPROVED BY:	<u>V. Armijo-Garcia</u> Veronica Armijo-Garcia, MD, Medical Director ECMO and Advanced Technologies	<u>5/21/20</u>