Clinical Alignment Summary: Veno-venous Extracorporeal Membrane Oxygenation (ECMO)

The purpose of this summary is to display how clinical guidance from different organizations is aligned in this topic area.

**RECOMMENDATIONS and STRATEGIES**

There are insufficient data to recommend either for or against the routine use of extracorporeal membrane oxygenation (ECMO) for patients with COVID-19 and refractory hypoxemia (2).

- Refer to ELSO guidelines: ECMO provision based on system capacity, Figure 2: Conventional VV ECMO for ARDS, Figure 3: Contraindications for ECMO in COVID-19 infected adults, Table 1.
- Patients reviewed on a case-by-case basis (3).
- Criteria may be revised over time to optimally utilize this scarce resource (3).
- Care guidelines for COVID patients under regular revision; capacity to offer ECMO continually assessed with input from hospital leadership and ICU staff (3).

**Cannulation strategies (1,3)**
- Cannulation to occur bedside in the ICU.
- Femoral/Jugular Cannulation to eliminate need for guided imaging.
- Sheaths should be placed early.

**INDICATIONS**

- Screen intubated patients daily for ECMO eligibility (1,3)
- Presence of any of the following despite maximal conventional therapy*
  - PaO2:FIO2 60-80 (1,3)
  - Respiratory instability with prolonged desaturations (1)
  - pH <7.25 with PaCO2 >60 (3)
  - Elevated airway pressures (1,3)

*Maximal conventional therapy (3):
- Low tidal volume ventilation
- PEEP optimization
- Prone positioning
- Consideration of inhaled vasodilators
- Consideration of neuromuscular blockade

**CONTRAINDICATIONS for COVID-19 Veno-venous ECMO**

- Age > 60 (1,3)
- Prolonged mechanical ventilation >7 days (3)
- Multisystem organ failure (1)
- Significant chronic renal (3), cardiac (1,3), pulmonary*(1,3), or hepatic disease (1,3)
  - *exception: asthma (1,3)
- Other significant chronic condition, including
  - dementia (3) or unknown neurologic status (1)
  - disseminated malignancy (1,3), neutropenia, ANC < 1000 (1)
  - uncontrolled diabetes with chronic end-organ dysfunction (3)
  - severe deconditioning or protein calorie malnutrition (3)
  - severe peripheral vascular disease (3)
  - other pre-existing life-limiting medical condition (3)
- Refractory shock requiring >0.5 mcg/kg/min norepinephrine or equivalent (3)
- Massive pulmonary embolism or decompensated acute heart failure, i.e., significant septic/stress cardiomyopathy or myocarditis with need for VA ECMO support (3)
- Acute liver injury with synthetic dysfunction (elevated INR) (3)
- Active bleeding and inadequate hemostasis, contraindications to anticoagulation, or inability to accept blood products (3)
- Active intracranial hemorrhage, cerebral vascular accident, poor neurologic exam (3)
- Ongoing CPR (1,3)/recent cardiac arrest (no E-CPR for COVID-19 associated cardiac arrest) (3)

**SOURCES**

1. Last updated 3/20/20 Massachusetts General Hospital COVID-19 ECMO Protocol
2. Last updated 4/21/20 NIH COVID-19 Treatment Guidelines: Extracorporeal Membrane Oxygenation
3. Last updated 4/23/20 University of Washington ECMO Support for Patients with COVID-19

**CONTRIBUTORS**

ABSOLUTE

- Obesity, BMI >35 (1,3)
- Immunocompromise (1,3)
- Chronic Renal Dysfunction (1)
- Secondary Infections with MDR organisms (1)
- ECRP (1)
- No DPOA or legal medical decision maker available (3)