CRITERIA FOR NEONATAL ECMO

All criteria assume aggressive and optimal critical care of the sick neonate should encompass all areas listed below. Escalation of support may take time to achieve stability. Failure in one or more of these areas may be an indication for ECMO support. Failure of medical management is at the discretion of the attending physician. Consultation with an ECMO consultant for patients meeting these criteria may be helpful. A transient improvement should not cancel plans for ECMO.

Neonates with severe respiratory and/or cardiac failure with a high likelihood of mortality and potentially reversible etiology. The following EXCLUDE Congenital Diaphragmatic Hernia patients – see CDH criteria below.

With least 1 of the following:

1.) Inadequate tissue oxygen delivery, despite maximal therapy.
   • Lactate ≥ 50 and rising
   • Worsening metabolic acidosis, with pH < 7.15 x4 hours
   • Signs of end organ dysfunction.
     o Note: An elevated lactate level is not reliable for asphyxia or HIE patients, but a lactate that continues to climb may be indicative of additional pathology (sepsis, poor cardiac output, compromised oxygen delivery) in these patients. Lactate clears slowly in patients undergoing therapeutic systemic hypothermia (core temp 33.5 -34.5)

2.) Systemic hypotension, resistant to fluid and inotropic therapy. Resulting in UOP < 0.5mL/kg/h x 6 hours

3.) Severe hypoxic respiratory failure with acute decompensation.
   • PaO2 < 40 mmHg x2 in 4 hours
   • OI or OSI with sustained elevation and no improvement in 4 hours
     o OI ≥ 40, OSI ≥ 20 for at least 4 hours
     o Use pre-ductal oxygenation saturation index (OSI) if PaO2 is post-ductal
       ▪ OI = 2x OSI
       ▪ OSI = MAP x FiO2 x 100/ SpO2
   • pCO2 > 70 despite ventilator adjustments

4.) Severe Pulmonary Hypertension with evidence of right ventricular dysfunction and/or left ventricular dysfunction non-responsive to pharmacological management.
**Criteria for Neonatal ECMO**

**Congenital Diaphragmatic Hernia (CDH) ECMO Criteria**

(This is part of the CDH guidelines and conservative ventilator management.)

- Inability to maintain pre-ductal saturations 85-90% after stabilization **OR** significant pre-post-split (more than 20) **AND** one or more of the following criteria:
  - pCO2 > 70 and respiratory acidosis with pH < 7.2 x 4 hours
  - Reaching one of the following ventilators setting thresholds
    - AMP > 50 x 6 hours
    - AMP > 60 x 4 hours
    - MAP > 17 **OR** HFJV PIP >28 required to achieve saturations > 85-90%
    **AND** pCO2 < 60 x 4 hours
  - Inadequate oxygen delivery with metabolic acidosis as measured by elevated lactate ≥50 and climbing
  - Systemic hypotension, resistant to fluid and inotropic therapy (as decided by inotropic algorithm) and resulting in UOP < 0.5mL/kg/h x 6 hours
  - OI ≥ 40 for at least 4 hours
    - Use pre-ductal oxygenation saturation index (OSI) if PaO2 is post-ductal
      - OI = 2x OSI
      - OSI = MAP x FiO2 x 100/ SpO2

**Contraindications:**

1.) Lethal Chromosomal Disorder (excludes Trisomy 21) or lethal anomaly
2.) Severe pre-existing brain damage.
3.) Significant intraventricular hemorrhage > grade 2 bilaterally
4.) Evidence of serious brain injury or asphyxia with plasma lactate levels >225 mg/dL (highly predictive of death) or base deficit >30 on 2 ABGs
5.) Uncontrollable bleeding
6.) Vessel size too small for cannulation

**Relative Contraindications:**

1.) Irreversible organ damage (unless considered for organ transplant)
2.) <1800 grams (consider vessel size assessment with US)
3.) <34 weeks postmenstrual age
CRITERIA FOR NEONATAL ECMO

References:

