

Neonatal ECMO

All criteria assume optimal support of respiratory and/or cardiovascular failure including mechanical ventilation, trial of nitric oxide, and appropriate inotropic support. Stress hydrocortisone may also be indicated. We recommend not exceeding: PIP of 35 (30 for diaphragmatic hernia patients) on conventional ventilation, Jet PIP of 45, an HFOV AMplitude of 40 or MAP of 20 (15 for CDH patients), prior to qualifying for ECMO. A transient improvement should not cancel plans for ECMO.

Any one of the following criteria qualifies a patient for ECMO:

Respiratory Criteria:

_____ **Oxygenation Index (OI)** = $MAP \times FiO_2 \times 100 / PaO_2$:

All Infants

- >60 for 30 min
- >40 for 60 min
- >35 for 6 hours
- >30 for 24 hours
- >25 for 72 hours

Infants with Diaphragmatic Hernia:

- > 35 for 30 min.
- > 30 for 2 hours
- > 25 for 4 hours
- OR need for MAP > 15, HFO AMP or Jet PIP > 40, or conventional PIP > 30

_____ Barotrauma:

Ventilator settings exceeding: PIP > 35, MAP > 20, HFOV AMplitude > 40, or Jet PIP > 45.
Hypercarbia with pH < 7.10 on: PIP = 35, Jet PIP = 45, or HFO AMplitude = 40 for 4 hours.
Severe air leak unresponsive to other therapies.

_____ Acute Deterioration without rapid solution:

PaO₂ < 30 or preductal SaO₂ < 70%

Cardiovascular/Oxygen Delivery Criteria:

_____ **Plasma lactate:** > 45 mg/dl (5 mM/L) and not improving, despite volume expansion and inotropic support.

_____ **Inotropic equivalent (IE)** > 50 for 1 hour or > 45 for 8 hours.

IE = DOPamine(mcg/kg/min) + DOBUTamine(mcg/kg/min) + EPInephrine (100Xs mcg/kg/min) + NORepinephrine(100Xs mcg/kg/min) + ISOproterenol(100Xs mcg/kg/min) + MILrinone (15Xs mcg/kg/min).

_____ **Mixed Venous Sat** of < 55% for 30 min. (< 60% for CDH patients)

_____ **Rapidly deteriorating or severe ventricular dysfunction**

- Intractable arrhythmia with poor perfusion**
- Cardiac Arrest**

Exclusion to Neonatal ECMO

1. Gestational age < 34 weeks
2. Birth weight or current dry weight < 1700 grams
3. Serious ongoing hemorrhage
4. Coagulopathy that is unlikely to resolve with transfusion therapy
5. Recent (< 3 days) intracranial hemorrhage > Grade I germinal matrix hemorrhage
6. Irreversible lung disease, or high pressure mechanical ventilation >14 days
7. Cardiac lesion that cannot be corrected or palliated
8. Lethal condition incompatible with long life including trisomy 13 and 18
9. Evidence of serious brain injury or asphyxia – may be difficult to define but some experts recommend using:
 - a) Severe neurological syndrome persisting after respiratory and metabolic resuscitation (i.e. stuporous, flaccid, and absent primitive reflexes)
 - b) Plasma lactate > 225 mg/dL (25 mM/L) Note: > 225 mg/dl is highly predictive of death, whereas > 135 mg/dl (15 mM/L) is highly predictive of adverse neurologic outcome.
 - c) Base deficit > 30 on 2 ABGs
10. Congenital Diaphragmatic Hernia patients whose best OI is > 45 or never have a preductal sat > 85% are felt to have minimal chance of survival, even with ECMO.