CRITERIA FOR PEDIATRIC AND YOUNG ADULT ECMO

These criteria and exclusions apply to patients 4 weeks (post term) to 25 years of age with an acute reversible disease process and evidence of either cardiovascular and/or respiratory failure. Consultation with an ECMO consultant is recommended.

**INCLUSION CRITERIA:**

Any one of the following criteria qualifies the patient for ECMO, check all that apply.

Any one of the below signs of hypoperfusion or severe cardiac dysfunction, following appropriate volume resuscitation (> 60 mL/kg and/or CVP > 10) and inotropic/vasopressor support:

- Plasma lactate > 45 mg/dl (> 5 mM/L) and not improving for > 30 minutes
- SVO$_2$ < 55% (estimated Cardiac Index < 2) for > 1 hour
- Rapidly deteriorating or severe ventricular dysfunction
- Intractable arrhythmia with poor perfusion
- Failure to wean from cardiac bypass
- Need for CPR
- Inotropic equivalent (IE) > 50 for 1 hour, or >45 for 8 hours
  - For patients with acute myocarditis or post cardiotomy, IE >40.
  - 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).

Any one of the following signs of severe respiratory failure with predicted high mortality rate; all values assume an attempt to optimize mechanical ventilation

- Oxygenation Index (OI) = MAP x FiO$_2$ x 100 divided by PaO$_2$
  - OI > 45 for 6 hours on Conventional Ventilation and/or HFOV
  - OI > 35 for > 12 hours
- Exceeding recommended maximal ventilator settings of:
  - Conventional PIP of >35 for 8 hours or HFO AMPlitude of >55 for 8 hours.
- For patients age 12-25 years, a Murray score > 3.0 (see attached calculator)
- Hypercarbia with pH <7.10 for 4 hours
- Acute deterioration on optimal therapy
  - PaO$_2$ < 30 at any time
  - PaO$_2$ < 40 for 2 hours

![Figure 4. Relationship of probability of dying without extubation and OI stratified by the time the measurement of OI was taken after intubation.](image)
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Components of the Murray Lung Injury Score.

The final value is obtained by dividing the aggregate sum by the number of components that were used (1-4).

<table>
<thead>
<tr>
<th>Chest roentgenogram score</th>
<th>No alveolar consolidation</th>
<th>Alveolar consolidation confined to 1 quadrant</th>
<th>Alveolar consolidation confined to 2 quadrants</th>
<th>Alveolar consolidation confined to 3 quadrants</th>
<th>Alveolar consolidation confined to 4 quadrants</th>
</tr>
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<table>
<thead>
<tr>
<th>Hypoxemia Score</th>
<th>PaO₂/FiO₂ &gt;300</th>
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<tbody>
<tr>
<td></td>
<td>PaO₂/FiO₂ 225-299</td>
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<tr>
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<td>PaO₂/FiO₂ 175-224</td>
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<tr>
<td></td>
<td>PaO₂/FiO₂ 100-174</td>
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<tr>
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<td>PaO₂/FiO₂ &lt;100</td>
<td>4</td>
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<table>
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<th>PEEP Score</th>
<th>PEEP &lt; 5</th>
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<tbody>
<tr>
<td></td>
<td>PEEP 6-8 cm H₂O</td>
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<td>PEEP 9-11 cm H₂O</td>
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<td>PEEP 12-14 cm H₂O</td>
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<td>PEEP &gt;15 cm H₂O</td>
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<table>
<thead>
<tr>
<th>Respiratory Compliance Score</th>
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<td>Compliance 60-79 mL/cm H₂O</td>
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<tr>
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<td>Compliance 40-59 mL/cm H₂O</td>
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<tr>
<td></td>
<td>Compliance 20-39 mL/cm H₂O</td>
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</tr>
<tr>
<td></td>
<td>Compliance &lt; 19 mL/cm H₂O</td>
<td>4</td>
</tr>
</tbody>
</table>

EXCLUSIONS FROM PEDIATRIC ECMO:

Any one of the following underlying imminently fatal or irreversible disease states excludes the patient from ECMO:

- Severe CNS injury or asphyxia
  - Persistent plasma lactate > 225 mg/dl (is highly predictive of death); (Note: > 135 mg/dl is highly predictive of adverse neurologic sequela in neonates)
  - Base deficit > 30 on 2 ABG’s
  - Severe neurological exam persistent after respiratory and metabolic resuscitation

- End-stage malignancies or advanced AIDS

- Severe acquired or congenital immunodeficiency

- Major burn

- Advanced liver failure

- Evidence of ongoing uncontrolled bleeding.

  A potentially correctable coagulopathy is not an exclusion.

- Severe fibrosis on lung biopsy

- Severe pulmonary disease ventilated aggressively for > 10 days

- Lethal condition incompatible with long life, including trisomy 13 and 18

Provider Signature: ____________________________________________________________________________ MD Date: __________ Time: __________

References:


Cesar Trial (preliminary result); Society of Critical Care Medicine, presented Feb 3, 2008.