UMMC MECHANICAL VENTILATION AND REFRACTORY HYPOXIA PROTOCOL

MECHANICAL VENTILATION

6mL/kg PWB Tidal Volume

PEEP/FiO2 Table

PEEP ≥ 10 & FiO2 ≥ 0.6?

PaO2:FiO2 < 150?

- Consider Pulmonary/CCM assistance with ventilator
- Optimize fluid status (diuresis or ultrafiltration)
- Consider PRBC transfusion to HGB=12g/dL (if not volume overloaded)

Paralyze and Prone Algorithm

GOALS MET? (See GOALS reverse side)

Evaluate ECMO Criteria

CANDIDATE?

YES

Call ECMO Team

ECMO

NO

CANDIDATE?

YES

Review criteria to wean paralysis and prone ventilation

NO

Consider Rescue Therapies

NO
UMMC MECHANICAL VENTILATION AND REFRACTORY HYPOXIA PROTOCOL NOTES

GOALS
- PaO2 = 55-80mmHg
- SaO2 = 88-95%
- pH = 7.30-7.45
- Pplat < 30cmH2O
- Driving pressure < 15cmH2O
- Poor grade SAH and TBI with GCS < 8: goal PaO2 > 70mmHg and SaO2 > 90%

HIGH PEEP + FiO2
- PEEP > 10cmH2O
- FiO2 > 0.8

PARALYZE PRONE ALGORITHM
- If pt's PaO2:FiO2 ratio remains < 150mmHg on PEEP > 10cmH2O and FiO2 > 0.6, allow a 12-24h stabilization period. MD then has option to:
  - Start paralysis and prone positioning OR
  - Start paralysis and wait for a subsequent 12h. If PaO2:FiO2 remains < 150mmHg on PEEP > 10cmH2O and FiO2 > 0.6, then begin prone positioning. If PaO2:FiO2 is > 150mmHg on PEEP < 10cmH2O and FiO2 ≤ 0.6 continue paralysis for full 48h period and re-assess.
- For pts on neurosurgery service: neurosurgery attending must be contacted at the beginning of the 12-24h stabilization period

Absolute Contraindications to Prone Treatment:
- Massive hemoptysis requiring immediate surgical or interventional radiology procedure
- Tracheal surgery or sternotomy in the previous 15 days
- Unstable spine, pelvic, or femur fracture
- Lung transplant in previous 15 days

Relative Contraindications to Prone Treatment:
- Intracranial pressure > 25mmHg or cerebral perfusion pressure < 60mmHg
- Burn location
- Serious facial trauma or facial surgery in the previous 15 days
- Anterior chest tubes with air leak – attempt to reposition the chest tube laterally then prone
- Pregnancy > 24 weeks – consider emergent delivery prior to prone positioning
- Open abdomen or open abdomen with wound vac

Criteria to Stop Prone Treatment:
- PaO2:FiO2 ratio ≥ 150mmHg with PEEP ≤ 10cmH20 and FiO2 ≤ 0.6 after 4h in supine position
- Drop in PaO2:FiO2 ratio of > 20% relative to the supine position
- Complications occurring during a prone session and leading to its immediate interruption such as bradycardia (<30bpm for >1min), cardiac arrest, hypotension (SBP< 60mmHg for > 5min), or elevated ICP (> 25mmHg for > 5 minutes)

Relative Contraindication to Paralysis:
- ICP > 25mmHg or CPP < 60mmHg

Criteria to Stop Paralysis:
- Clinical judgement at > 48h of paralysis based on patient response to therapy
- Persistent bradycardia

ECMO INCLUSION CRITERIA
- One of the following:
  - PaO2:FiO2<50 with FiO2>0.8 for >3h
  - PaO2:FiO2<80 with FiO2>0.8 for >6h
  - pH<7.25 for >6h with RR increased to 35/min and Pplat<32cmH20
- Reached appropriate step on protocol
- Age < 70 years
- Attempt at temperature control < 38.5C
- Transfusion to HGB > 12g/dL (if able)
- Recruitment maneuver
- Optimal PEEP trial

ECMO EXCLUSION CRITERIA
- Mechanical ventilation >7d
- Cannot be systemically anticoagulated
- Terminal disease with short expected survival
- Underlying moderate to severe chronic lung disease
- Advanced multiple organ failure syndrome
- Unresponsive septic shock
- Uncontrolled metabolic acidosis
- Central nervous system injury
- Severe immunosuppression
- Morbid obesity (BMI > 45kg/m²)

RESCUE THERAPIES
- Diuresis or ultrafiltration
- Drain pleural effusions
- Transfusion to HGB > 12g/dL
- Consider use of APRV or BiVent
- Consider inhaled epoprostenol [Veletri] or nitric oxide
- Infuse sodium bicarbonate to compensate for acidemia
- Consider aborting pressure limited volume control and use elevated pressures
- Reconsider any contraindications to prone or paralysis treatment
- Evaluate goals of care with family and consider change in code status to DNR if appropriate

ARDSnet Goals and PEEP Titration
- PaO2 = 55-80mmHg
- SpO2 = 88-95%
- pH = 7.30 – 7.45
- Pplat < 30cmH20
- Tidal Volume = 6mL/kg PBW

<table>
<thead>
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<th>FiO2</th>
<th>0.3</th>
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<td>15</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>22</td>
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</tbody>
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Predicted body weight:
- Males: 50 + 2.3 [height (in) – 60]
- Females: 45.5 + 2.3 [height (in) – 60]