# Mayo Clinic Mechanical Ventilation Guide

## Resp Failure

<table>
<thead>
<tr>
<th>Goals</th>
<th>Initial Settings</th>
<th>Monitoring 6 P’s</th>
<th>Targets Basic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemodynamic Stability</td>
<td></td>
<td>1 BLOOD PRESSURE</td>
<td>SBP &gt; 90mmHg</td>
</tr>
<tr>
<td>Barotrauma Prevention</td>
<td></td>
<td>2 PEAK INSPIRATORY PRESSURE (PIP)</td>
<td>&lt; 35cmH₂O</td>
</tr>
<tr>
<td>Volutrauma Prevention</td>
<td></td>
<td>3 AutoPEEP</td>
<td>None</td>
</tr>
</tbody>
</table>

## Loss of Airway

<table>
<thead>
<tr>
<th>Airway Maintenance</th>
<th>OXYGENATION</th>
<th>VENTILATION</th>
<th>Pulse Oximetry (SpO₂)</th>
<th>PEEP</th>
<th>Tidal Volume</th>
<th>pH</th>
<th>Minute Ventilation (V_min)</th>
<th>Work of Breathing</th>
<th>Patient-Ventilator Synchrony</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female ETT</td>
<td>F₂Ο₂ 21 - 100%</td>
<td>TIDAL VOLUME 5'5” = 350cc [max 600]</td>
<td>&gt; 90%</td>
<td>5 [5-15]</td>
<td>40mmHg</td>
<td>7.4</td>
<td>&gt; 5L/min</td>
<td>Decreased</td>
<td>Comfortable Breaths</td>
</tr>
<tr>
<td>Male ETT</td>
<td>PEEP 5</td>
<td>6'0” = 450cc [max 750]</td>
<td>pO₂ &gt; 60mmHg</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>6'5” = 500cc [max 850]</td>
<td>pCO₂ 40mmHg</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>BPM (RR) 14 [10-30]</td>
<td>ETCO₂ 45</td>
<td></td>
<td></td>
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## Hypoxia

## Hypercapnia

## High Work of Breathing (WOB)

## 2° Assessment

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<tr>
<th>Patient</th>
<th>Circuit</th>
<th>Vent</th>
</tr>
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<tbody>
<tr>
<td>Mental Status</td>
<td>RR, WOB</td>
<td>PIP</td>
</tr>
<tr>
<td>Pulse, HR, Rhythm</td>
<td>Trachea</td>
<td>Tidal Volume (V_t)</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>SpO₂</td>
<td>Syncrony</td>
</tr>
<tr>
<td>Skin Temp/Color</td>
<td>ETCO₂</td>
<td>Air-Trapping</td>
</tr>
<tr>
<td>Cap Refill</td>
<td>ETT/Trach Position</td>
<td>Minute Ventilation (V_min)</td>
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1. Recognize Signs of Shock  ➔ Work-up and Manage
2. Assess 6Ps  ➔ If single problem  ➔ Troubleshoot Cause
3. If Multiple Problems ➔ QUICK FIX ➔ Troubleshoot Cause(s)
**Hypovolemia**
- Dehydration
- Pneumothorax

**Obstructed Blood Return**
- Abdominal Compartment Syndrome
- Air-Trapping (AutoPEEP)

**Cardiac Failure**
- Stun, Contusion, Chronic HF
- Ischemia/Infarction
- Arrhythmia
- Diastolic or Valve Dysfunction
- Right Heart Failure

**Vasodilation**
- Spinal Shock & Anaphylaxis

**Lung Disease / Injury**
- Lung Injury / ARDS / Contusion
- Pneumonia
- Cardiogenic Pulmonary Edema
- Alveolar Hemorrhage

**Lung Compression**
- Pneumothorax
- Hemorrhax / Effusion
- Abdominal Compartment Syndrome
- Atelectasis

**Dysynchrony**
- Incomplete Exhalation & Airway Obstruction

**Airway Disease**
- ETT Obstruction
- Airway Secretions / Debris
- Severe Bronchoconstriction

**Ventilator Settings**
- ↑ I:E Ratio
- ↑ RR

**Low Oxygen Supply**
- Low FiO₂, Supply, ↑ Altitude

**Airway Disorder**
- ETT / Trach Mal-position
- Upper Airway Obstruction
- Secretions / Debris
- Severe Bronchoconstriction

**Air SAC (Alveolar) Disease**
- Pneumothorax, Hemorrhax, Effusion, Abdominal Compartment Syndrome, Atelectasis

**↓ Blood Flow (Perfusion)**
- ETT / Trach Mal-position
- Upper Airway Obstruction
- Airway Secretions / Debris
- Bronchoconstriction

**Airway Hypoventilation**
- Lung Disease (ARDS, ALI, I LD, Pneumonia, Pulmonary Edema, Contusion, Alveolar Hemorrhage)
- Lung Compression (Pneumothorax, Hemorrhax, Effusion, Abdominal Compartment Syndrome, Atelectasis)

**Quick Fix**

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**Management**

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**Management Actions**

- Transfuse, Treat cause, Temperature control
- Fluid Resuscitation (End points = hypoxia, ↑ SiO₂, ↓ PIVI)
- Treat cause, Beware of hypoxia (3rd spacing in lungs)
- Needle D, Chest tube
- Treat Cause, Paralyze, Surgery (Open Abdomen)
- Pop off vent & SEE SEPARATE CHART
- Reduce PEEP
- Pericardiocentesis, Drain. Avoid mechanical ventilation if possible
- Time, Rest (Sedate), Avoid cardiac stress
- Treat cause, Consider ↑ PEEP, Limit suctioning, Fix coags
- Needle D, Chest tube
- Thoracentesis, Chest tube, Fix injury/Surgery, Transfuse
- Treat Cause, Sedate/Paralyze, Surgery
- Pop off vent & SEE SEPARATE CHART
- Weigh risk & need for current PEEP
- Adjust Trigger setting on vent
- Treat pain, anxiety, agitation
- Treat cause, ↑ NaHCO₃, SEE SEPARATE CHART
- Adjust Tidal Volume / PIP
- Change mode (Consider AC), ↑ RR
- Adjust trigger setting on vent
- Needle D, Chest tube
- Treat Cause (i.e. Pneumothorax, ARDS, Inhalation Injury)
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- Pop off vent & SEE SEPARATE CHART
- Anticoagulation, O2, Monitor for RR failure, INO, ↑ TPA if no bleeding
- Adjust, replace ETT / Trach, Ensure cuff inflation
- Adjust ETT/Trach, Stop biting (Sedate)
- Bronchoconstriction, ↑ Exhalation time (↓ t-Time)
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