**Ventilator Overview and Troubleshooting**

**Settings and Management Tip Sheet for Providers**

**VARIABLES TO CONSIDER FOR MECHANICAL VENTILATION**

<table>
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<tr>
<th>Mode of Ventilation</th>
<th>Controlled: Breath size and Minimum RR set by vent</th>
<th>Spontaneous: Breath size and RR set by patient</th>
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**Ventilation Variables**

- Respiratory Rate (RR): Adjust to maintain pH > 7.2
- Tidal Volume (Vt): Goal 6 or less cc/kg ideal body weight (IBW) for ARDS
- Fraction inhaled Oxygen (FiO2): Ranges 30%-100%

**Oxygenation Variables**

- Airway resistance
- Pleural effusion
- Abdominal distention

**When to Check:**

- ARDS Management (see ARDS Tip Sheet): Workup of Elevated Peak Inspiratory Pressure (PIP)

**MANEUVERS FOR ASSESSING PULMONARY MECHANICS**

**Inspiratory Pause to Assess Plateau Pressure**

- Pplat: Pressure felt by the lungs, determined by Vi and lung compliance; Goal Pplat < 30 in ARDS (see ARDS Tip Sheet)

**Expiratory Pause to Assess autoPEEP**

- autoPEEP: Hyperinflation as a result of incomplete emptying before next breath; Risk of ↓ BPs / PEA; See Management of autoPEEP

**ADDITIONAL NOTES**

- Please see dedicated ventilator cards (QR Codes below) for instructions on checking an inspiratory and expiratory hold maneuver for various ventilator brands.

**Suggested Initial Ventilator Settings Post-Intubation**

- Mode: Assist Control-Volume Control (AC-VC)
- Tidal Volume (Vt): 6 cc/kg (IBW)
- Respiratory Rate (RR): Match pre-intubation RR
- FiO2: 100%
- PEEP: 10 cm H2O (5 if hypotensive)

**Overview of Select Modes of Mechanical Ventilation**

<table>
<thead>
<tr>
<th>MODE OF VENTILATION</th>
<th>SET BY PROVIDER</th>
<th>DETERMINED BY PATIENT FACTORS</th>
<th>ADDITIONAL NOTES</th>
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<tbody>
<tr>
<td>MANDATORY</td>
<td></td>
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<tr>
<td>Assist-Control-Volume-Cycled*</td>
<td>AC-VC</td>
<td>Vt, Minimum RR, PEEP, FiO2, and Inspiratory Flow (V) or Inspiratory-Expiratory ratio (I:E)</td>
<td>Peak Inspiratory Pressure (PIP) and Plateau Pressure (Pplat) Actual RR</td>
</tr>
<tr>
<td>Pressure Control Ventilation</td>
<td>ACVC/PRVC</td>
<td>Inspiratory Pressure (Pipp), PEEP, Minimum RR, FiO2, and I:E (through rise time and inspiratory time, TI)</td>
<td>Vt and Inspiratory Flow (V) Actual RR</td>
</tr>
<tr>
<td>Spontaneous Intermittent Mechanical Ventilation</td>
<td>SIMV</td>
<td>For mandatory breaths: Vt, RR, PEEP, FiO2, Inspiratory Flow (V) For spontaneous breaths: Pipp, PEEP, and FiO2</td>
<td>For mandatory breaths: For spontaneous breaths:</td>
</tr>
<tr>
<td>Pressure Support Ventilation</td>
<td>PSV</td>
<td>Inspiratory Pressure (Pipp), PEEP, and FiO2</td>
<td></td>
</tr>
</tbody>
</table>

**VENT ADJUSTMENTS**

- **Ventilation**
  - pH and PaCO2
  - PaO2 and SpO2

- **Oxygenation**
  - FiO2
  - PEEP

**WEANING FROM THE VENT**

- Proceed with a Spontaneous Breathing Trial (SBT) and Spontaneous Awakening Trial (SAT)
- Ensure no other barriers to extubation
- Assess for Failure of SAT/ SBT

**High Peak Pressure Alarm**

- Peak Pressure (Peak Inspiratory Pressure, or PIP)
  - Reflects how hard the ventilator must work to deliver a breath
  - Normal < 40 cm H2O
- Function of:
  - Inspiratory flow (V), flow pattern
  - Airway resistance (including patient, ETT, and circuit)
  - Compliance of patient’s respiratory system

**AutoPEEP Evaluation**

- Step 1: Check hemodynamics
- autoPEEP → hyperinflation → decreased preload → ↓BPs → PEA
- If ↓BPs due to autoPEEP, disconnect ETT from ventilator
- Step 2: Check an expiratory pause and assess expiratory flow at end of expiration
- Step 3: Improve I:E ratio (↓RR, ↓VT, ↑flow rate, square wave)