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Caring for the Mechanically Ventilated Patient

Mechanical ventilation is utilized in intensive care and long-term care settings to assist patients who require additional respiratory support. This handy reference guide provides critical patient care essentials, tips for trouble-shooting ventilator alarms, and potential complications.

Care Essentials for Patients on Mechanical Ventilation

- Maintain a patent airway. Per policy, note endotracheal (ET) tube position (centimeters) and confirm that it is secure.
- Assess oxygen saturation, bilateral breath sounds for adequate air movement, and respiratory rate per policy.
- Check vital signs per policy, particularly blood pressure after a ventilator setting is changed. Mechanical ventilation increases intrathoracic pressure, which could affect blood pressure and cardiac output.
- Assess patient's pain, anxiety and sedation needs and medicate as ordered.
- Complete bedside check: ensure suction equipment, bag-valve mask and artificial airway are functional and present at bedside. Verify ventilator settings with the prescribed orders.
- Suction patient only as needed, per facility policy; hyperoxygenate the patient before and after suctioning and do not instill normal saline in the ET tube; suction for the shortest time possible and use the lowest pressure required to remove secretions. Monitor for upper airway trauma as evidenced by new blood in secretions.
- Monitor arterial blood gas (ABG) after adjustments are made to ventilator settings and during weaning to ensure adequate oxygenation and acid-base balance.
- To minimize the risk for ventilator-associated pneumonia (VAP), implement best practices such as strict handwashing; aseptic technique with suctioning; elevating head of bed 30-45 degrees (unless contraindicated); providing sedation vacations and assessing patient's readiness to extubate; providing peptic ulcer disease prophylaxis; providing deep vein thrombosis prophylaxis; and performing oral care with chlorhexidine, per your facility policy.

VENTILATOR ALARMS		
Alarm	**Potential Causes**	**Interventions**
High peak inspiratory pressure (PIP)	• Blockage of ET tube (secretions, food, kinked tubing, patient biting on ET tube) • Coughing • Bronchospasm • Lower airway obstruction • Pulmonary edema • Pneumothorax	• Assess lung sounds. • Suction airway for secretions. • Insert bite block or administer sedation per orders if patient is agitated or biting on ET tube.

	• Ventilator/patient dyssynchrony	• Assess breath sounds for increased consolidation, wheezing, and bronchospasm; treat as ordered.
Low pressure alarm	• Air leak in ventilator circuit or in the ET tube cuff	• Locate leak in ventilator system. • Check pilot balloon as an indicator of ET tube cuff failure. • Replace tubing as needed, per policy.
Low minute ventilation (V_E)	• Low air exchange due to shallow breathing or too few respirations	• Check for disconnection or leak in the system. • Assess patient for decreased respiratory effort.
Low O_2 saturation (SpO_2)	• Pulse oximeter malpositioned • SpO_2 cable unplugged • Connective tissue disorder, such as Raynaud's disease or scleroderma	• Ensure ventilator oxygen supply is connected. • Observe pulse oximeter waveform on the monitor. • Ensure pulse oximeter is positioned correctly. • Verify all cables are plugged in. • Assess patient for respiratory distress.
Apnea	• Breaths are not being taken by the patient or triggered on the ventilator	• Assess patient effort. • Check system for disconnections.

COMPLICATIONS RELATED TO MECHANICAL VENTILATION		
Patient Complication	**Potential Causes**	**Interventions**
Cardiovascular issues	• Decrease in venous return to the heart due to positive pressure applied to the lungs.	• Assess for adequate volume status by checking heart rate, blood pressure, central venous pressure and urine output. • Assess patient for increasing autopeep, which can increase risk for cardiac tamponade.
Barotrauma/pneumothorax	• Positive pressure applied to lungs. • Elevated mean airway pressures may rupture alveoli.	• Notify healthcare provider. • Prepare patient for possible chest tube insertion. • Avoid high pressure settings for patients with chronic obstructive pulmonary disease (COPD), acute respiratory distress syndrome (ARDS), or history of pneumothorax.
Infection	• Breaks in ventilator circuit. • Decreased mobility. • Impaired cough reflex.	• Use aseptic technique. • Provide frequent mouth care. • Support proper nutritional status.

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