

Name of Policy: <u>Adverse reaction to mechanical ventilation</u> Policy Number: 3364-136-05-01 Department: Pulmonary Services Approving Officer: Senior Hospital Administrator Responsible Agent: Director, Pulmonary Services Scope: The University of Toledo Medical Center Pulmonary Services Department	
Effective Date: June 1, 2023 Initial Effective Date: July 1, 1979	
<input type="checkbox"/> New policy proposal <input type="checkbox"/> Major revision of existing policy	
<input type="checkbox"/> Minor/technical revision of existing policy <input checked="" type="checkbox"/> Reaffirmation of existing policy	

(A) Policy Statement

All persons in the Respiratory Care Department who are responsible for the operation and monitoring of mechanical ventilators shall adhere to established criteria for identification and treatment of adverse reactions such as: pneumothorax, hyperventilation, hypoventilation, and hypotension associated with mechanical ventilation. If any adverse reactions do occur, the responsible physician must be notified, and physician orders appropriately given to make the changes recommended in this policy.

(B) Purpose of Policy

To ensure the proper and safe use of mechanical ventilation.

(C) Procedure

I. Pulmonary Barotrauma:

A. A mechanically ventilated patient with barotrauma may be identified by one or more of the following signs:

1. An abnormal increase in peak airway pressure.
2. A drop in PaO₂ and an increase in PaCO₂ in arterial blood gases.
3. An insufficient chest rising with each positive pressure breath accompanied by diminished breath sounds.
4. Increased radiolucent areas in the chest x-ray.
5. A significant decrease in oxygen saturation via pulse oximetry.

B. The procedure by the practitioner for a patient suspected of having a pneumothorax while receiving mechanical ventilation is:

1. Notify the responsible physician and assigned nurse.
2. Monitor peak airway pressures and the return volumes closely until the pneumothorax is corrected.
3. Manually ventilate the patient until the pneumothorax is corrected, or until the physician requests that the patient be mechanically ventilated again.
4. Monitor oxygen saturation by pulse oximetry.

II. Hyperventilation and Respiratory alkalosis:

A. The mechanically ventilated patient experiencing hyperventilation may be identified by one or more of the following signs:

1. A decrease in the PaCO₂ in the arterial blood gases accompanied by an increase in pH.
2. The exhaled minute volume is abnormally larger than either the predicted or the set minute volume for that patient.

3. The exhaled tidal volume is abnormally larger than either the predicted or the set tidal volume (TV) for that patient.
4. The measured end-tidal CO₂ is abnormally low.

B. The procedure by the practitioner for a patient experiencing hyperventilation due to mechanical ventilation is:

1. Notify the responsible physician and assigned nurse.
2. Recommend a decrease in the minute volume by either decreasing the respiratory rate, decreasing the tidal volume, or decreasing the flow rate, if appropriate.
3. Monitor arterial blood gases.
4. Monitor end-tidal CO₂.
5. Decrease the sensitivity on the ventilator.

III. Hypoventilation:

A. The mechanically ventilated patient experiencing hypoventilation may be identified by one or more of the following signs:

1. A decrease in PaO₂ and/or increase in the PaCO₂ accompanied by a decrease in arterial pH.
2. The exhaled minute volume is abnormally smaller than either the predicted or the set minute volume for that patient.
3. The exhaled tidal volume is abnormally smaller than either the predicted or the set tidal volume for that patient.
4. A significant increase in measured end-tidal CO₂.
5. A significant decrease in peak airway pressures.
6. An insufficient rise in the patient's chest with each positive pressure breath accompanied by diminished breath sounds.
7. Low volume or low-pressure alarm on ventilator sounds due to a leak in the ventilator circuit.
8. Bradycardia.

B. The procedure by the practitioner for patients experiencing hypoventilation due to mechanical ventilation is:

1. If patient is experiencing bradycardia, cyanosis, or any other signs of respiratory distress, immediately disconnect from ventilator and manually ventilate.
2. Notify the responsible physician and assigned nurse.
3. Recommend an increase in minute volume by increasing respiratory rate or increasing TV, if appropriate.
4. Monitor arterial blood gases, and oxygen saturation.
5. Correct all leaks that may be present in the ventilator circuit

IV. Hypotension:

A. The mechanically ventilated patient experiencing hypotension may be identified by one or more of the following signs:

1. A decrease in systolic blood pressure.
2. A decrease in heart rate.
3. A decrease in arterial PaO₂.
4. A decrease in oxygen saturation.

