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## Care of the Patient Requiring Continuous Conventional Mechanical Ventilation

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### Practice

**Statement** The credentialed Registered Nurse will be assigned to infants requiring mechanical ventilation.

The provider shall order the initial ventilator settings and changes in ventilator settings.

The respiratory therapist is responsible for:

- Setting up the ventilator and performing ventilator checks.
- Programming the ventilator alarm limits and checking the alarm limits.
- Establishing and changing ventilator settings according to provider's orders.
- Setting up the pulse oximeter, attaching monitor to infant and setting appropriate limits per unit protocol and testing the audible alarm every shift.

The physician and registered nurse should not make changes with the ventilator unless in an emergent situation in the absence of a respiratory therapist. Exception: The nurse shall adjust the oxygen per procedure 2600.16 Pulse Oximetry and 2600.17 Oxygen Therapy.

The ventilator alarms will be on at all times. In response to an audible alarm the registered nurse may silence the alarm while troubleshooting. The alarm may never be disabled or turned off while the ventilator is in use. *Refer to Housewide Procedure 6011-25-23 Clinical Alarm Response.* Notify the respiratory therapist for troubleshooting ventilator alarms.

Refer to procedure # 2600.05 Assisting with Endotracheal Intubation.

Refer to procedure # 2600.15 Endotracheal Extubation.

Refer to procedure # 2600.16 Pulse Oximetry.

Refer to procedure # 2600.17 Oxygen Therapy.

Refer to procedure # 2600.18 High Frequency Ventilation and # 2600.19 Inhaled Nitric Oxide for infants requiring these ventilator strategies.

**Purpose** To provide correct alveolar ventilation and adequate tissue oxygenation.

**Equipment** Ventilator as ordered by provider

Compressed air and oxygen outlets  
Suction  
Suction catheter size appropriate  
Normal saline  
Extra endotracheal and/or tracheotomy tubes, same size  
Pulse oximeter  
Anesthesia bag with manometer  
Appropriate size face mask  
Pneumothorax kit

## **Procedure**

1. Refer to procedure Assisting with Endotracheal Intubation #2600.05 if applicable.
2. Notify the respiratory therapist who will obtain a pulse oximeter and ventilator. The Respiratory Therapist shall establish ventilatory settings according to the provider's order and program alarm limits on both the ventilator and pulse oximeter. Notify the respiratory therapist when receiving orders for ventilator changes per the provider. The respiratory therapist shall make the changes. The registered nurse shall document the changes on the flow sheet.
3. Provider orders for mechanical ventilation must be written with the following parameters defined. The assigned nurse shall at all times be aware of the ventilator parameters.
  - a. For Synchronized Intermittent Mandatory Ventilation (SIMV), Assist Control (AC) and Pressure Support (PS) Modes the provider order shall include:
    - Rate
    - Inspiratory Pressure (PIP)
    - Expiratory Pressure (PEEP)
    - Inspiratory Time
  - b. For SIMV, AC and PS with Volume Guarantee Mode the provider order shall include:
    - PIP Max
    - PEEP
    - Tidal Volume (Vt)
    - Rate
4. Record initial ventilator settings, Mean Airway Pressure (MAP), FiO<sub>2</sub> and O<sub>2</sub> Saturation on the flowsheet. Thereafter, the ventilator settings and MAP shall be documented on the flowsheet at least every 2 hours, with each ordered ventilator change and prior to blood gas analysis. The FiO<sub>2</sub> and O<sub>2</sub> saturation shall be documented on the flowsheet every hour, with each ordered ventilator change and prior to blood gas analysis.

5. A blood gas shall be ordered to evaluate the effectiveness of ventilation 15-30 minutes after initiation of mechanical ventilation. Document results on flowsheet and report results to the provider. Thereafter, obtain blood gases as ordered by the provider. Be sure to wait at least 15-30 minutes after a ventilator change to obtain a blood gas. Document results on flowsheet and report results to the provider.
6. The ventilator alarms shall be on at all times and verified by the respiratory therapist every shift.
7. The respiratory therapist will verify ventilator parameters every 2 hours.
8. A respiratory assessment shall be done at least every 2-4 hours based upon the stability of the patient and documented on the flowsheet (typically performed with vital signs). This includes auscultation of breath sounds and evaluation of respiratory quality (work of breathing, chest wall compliance, and the presence of retractions). Evaluate the effectiveness of pulmonary care and determine the need for suctioning. Refer to procedure #2600.06 for suctioning. Document assessment and suctioning on the flowsheet.
9. The endotracheal tube shall be secured to the face with adhesive tape and shall be changed when loose to prevent accidental extubation. The position of the endotracheal tube shall be continuously monitored and assessed when ventilator settings are checked to ensure proper alignment and prevent tube migration. Document on kardex the proper placement (the measured mark) of the endotracheal tube in relationship to the infant's gumline. Document the measured marking on the flowsheet every shift i.e., 6.5 cm at the gumline.
10. Document on flowsheet the infant's head position and measurement of ETT at the gumline when CXR is performed.
10. An anesthesia bag with manometer and facemask shall be kept at the infant's bedside connected to an additional oxygen source. The bag shall be tested each shift to ensure proper functioning.
11. A pneumothorax kit shall be kept at the infant's bedside readily available in the event of a pneumothorax.
12. Monitor ventilator tubing frequently for accumulated moisture and drain as necessary. Drain into a separate receptacle, not back to cascade.
13. Reposition infant every 2-4 hours as condition allows. Assess condition of skin, pressure points, and implement measures to prevent skin breakdown. When turning the infant, take precautions against accidental extubation or disconnection from the machine.
14. Provide mouth care at least every shift and prn.
15. Evaluate the need for restraints. Implement restraint protocol if restraints are used.

16. Suction the ETT only as needed utilizing sterile technique. Refer to procedure Suctioning of the Endotracheal Tube # 2600.06.
17. If respiratory failure continues or develops after initiation of mechanical ventilation (the infant is agitated, fighting the ventilator, triggering the machine at a rapid rate, or initiating a new respiration before the prescribed tidal volume is reached) the following steps should be taken:
- a. Evaluate ventilator settings to determine that the desired pressures, rate, and FiO<sub>2</sub> are being delivered. Check for kinking of the endotracheal tube or the ventilator tubing. Assess position of endotracheal tube.
  - b. Evaluate breath sounds and assess if the infant's chest moves with the ventilator. If the ventilator is functioning, lack of chest movement may indicate plugging, malposition of the endotracheal tube, or pneumothorax. Auscultate the stomach for breath sounds. If the ventilator is functioning and there is chest wall movement have the provider determine the need for increased ventilator support.
  - c. Transilluminate chest for pneumothorax.
  - d. Assist the provider with direct visualization of the endotracheal tube by laryngoscopy to confirm the tube is in the trachea. Chest wall movement and apparent breath sounds may be observed in some infants when the tube is in the esophagus.
  - e. Have the provider order a stat chest x-ray to rule out pneumothorax.
  - f. If the infant is not responding to increase ventilation with increased FiO<sub>2</sub> and there is question about the placement or patency of the tube remove the tube and begin bag mask ventilation. Assist the provider in re-intubation.
18. If no mechanical reason is found consult the provider regarding the need for sedation.

## COMPLICATIONS AND/OR PROBLEMS

1. The possibility of a power failure must be kept in mind when caring for patients on continuous ventilation. All ventilators should be plugged into the red power outlet. Should a power failure occur, the FIRST step is to obtain an ambu bag and manually ventilate the patient. PAGE ENGINEERING AND RESPIRATORY STAT. Continue to manually ventilate the patient until power is restored.
2. Pneumothorax is a major complication of mechanical ventilation. Supplies should be readily available for insertion of chest tubes.

3. Other potential complications include, but are not limited to Nosocomial pneumonia, stress ulcers, hemodynamic compromise and ICP.
4. POTENTIAL OF ENDOTRACHEAL TUBE KINKING and obstructing airway can occur at any time; during an arrest, while manually ventilating the patient, turning the patient, repositioning the patient's head, etc.
5. Equipment must be readily available to reintubate in situations where the patient is inadvertently extubated.