

Respiratory Therapy - Unit Practice Manual
John Dempsey Hospital - Department of Nursing
The University of Connecticut Health Center

PROCEDURE FOR: Surfactant Replacement Therapy in the Neonate

OBJECTIVE: Two strategies for surfactant replacement therapy occur in the Neonatal Intensive Care Unit:

1. Prophylactic treatment in which surfactant is administered at the time of birth or shortly thereafter to infants who are at high risk for developing RDS; or
2. Rescue treatment in which surfactant is administered after the initiation of mechanical ventilation in infants with radiologically confirmed RDS.

RATIONALE: Pulmonary surfactant is a complex of several phospholipids, neutral lipids, and specific proteins synthesized and secreted into alveolar spaces by type II epithelial cells. The surfactant reduces alveolar collapse by decreasing surface tension within the alveoli. Surfactant deficiency is associated with the formation of hyaline membranes in the immature lung and the onset of respiratory distress syndrome (RDS). Without surfactant, alveoli may not inflate or may collapse and require inordinate force to re-expand on inspiration leading to the development of RDS.

PERSONNEL: Respiratory Therapist and Neonatal Nurse

- INDICATIONS:**
1. Infants at high risk of developing RDS due to short gestation (<32 weeks) or low birth weight which suggests lung immaturity.
 2. Infants in whom there is laboratory evidence of surfactant deficiency with lecithin/sphingomyelin ratio less than 2:1.
 3. Preterm or full term infants who require endotracheal intubation and mechanical ventilation due to respiratory failure.

EQUIPMENT: Administration Equipment:

1. syringe containing the ordered dose of surfactant (Curosurf), warmed to room temperature
2. endotracheal tube connector with delivery port (Trachcare MAC)
3. mechanical ventilator

Monitoring Equipment:

1. neonatal flow sensor to monitor tidal volume after administration of surfactant
2. airway pressure monitor
3. pulse oximeter
4. cardiorespiratory monitor

PROCEDURE:

1. Curosurf is warmed to room temperature by leaving the vial at room temperature for 20 minutes.

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2. The ventilator settings are to be adjusted by the respiratory therapist prior to dosing of surfactant to maximize dispersion.
 - a. The ventilator should be in the time cycled pressure limited mode (SIMV Bear cub or Babylog or EvitaXL PCV+).
 - b. The rate is set 40 breaths/min unless requiring a rate >40 breaths/min prior to dosing of surfactant.
 - c. The FiO₂ is set to maintain oxygen saturations \geq 92%.
 - d. The PIP and itime to remain the same.
 - e. Determine target tidal volume based on 4-7cc/kg.
3. Remove flow sensor prior to dosing.
4. Dosing is divided into two equal aliquots and administered by the RN or RRT through the Trach Care MAC catheter.
 - a. The infant is placed on a flat bed surface, positioned on the right side to receive one aliquot during a 2-3 second time period.
 - b. The infant remains on his right side for 30 seconds.
 - c. The infant is turned to his left side and the second aliquot is administered during a 2-3 second time period.
 - d. The infant remains on his left side for 30 seconds.
5. Place flow sensor back in line with the ventilator circuit and monitor tidal volumes closely since lung compliance will increase.
6. Suctioning of infant should not done for at least one hour following dosing unless patient conditions warrant it. eg. airway obstruction.

ASSESSMENT OF CUROSURF ADMINISTRATION:

Improvement in gas exchange is rapid and peak airway pressure and tidal volume must be monitored and adjusted to maintain the targeted tidal volume.

1. Notify advanced practitioner/physician when the tidal volume is consistently larger than the targeted tidal volume. The peak airway pressure can be manually decreased or the infant placed on volume targeted ventilation to target tidal volume and wean airway pressures automatically.
2. Monitor oximeter saturations to maintain saturations \geq 92%.
3. Monitor flow sensor for potential regurgitation of surfactant.
4. Replace flow sensor when regurgitation occurs. Recalibrate flow sensor as needed.
5. Monitor work of breathing.

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FREQUENCY:

Repeat dose of curosurf can be given 12 hours later if the PaO₂ <80 and the FiO₂ ≥ 30-40%.

BENEFITS:

1. There is a consistent 40% reduction in the odds of neonatal death after surfactant treatment administered as prophylactic or rescue treatment.
2. Both types of treatment strategies have resulted in a significant reduction in the risk for pulmonary airleaks.

COMPLICATIONS:

1. Procedural Complications:
 - a. Plugging of endotracheal tube (ETT) by surfactant.
 - b. Desaturations and increase need for supplemental oxygen.
 - c. Bradycardia due to hypoxia.
 - d. Tachycardia due to agitation with reflux of surfactant into the ETT.
 - e. Pharyngeal deposition of surfactant.
 - f. Administration of surfactant to one lung.
2. Physiologic Complications:
 - a. Apnea
 - b. Pulmonary hemorrhage
 - c. Mucus plugs
 - d. Increased necessity for treatment for PDA
 - e. Marginal increase in retinopathy of prematurity
 - f. Barotrauma resulting from increase in lung compliance following surfactant replacement and failure to adjust ventilator settings accordingly.

APPROVAL:

EFFECTIVE DATE: 5/31/07

REVISION DATES: