Providence HEALTH CARE	**RESPIRATORY SERVICES**	DATE CREATED: October 2010 DATE REVIEWED/REVISED: **November 2014**
POLICY & PROCEDURE	TITLE: NEONATAL – Nasal CPAP (non-Invasive) for Neonates (Respiratory Therapy) NUMBER: B-00-12-12099	RELATED DOCUMENTS: Nasal CPAP Nasal/Oral Suctioning

SITE APPLICABILITY:

ST. PAUL'S HOSPITAL

POLICY STATEMENT:

Nasal continuous positive airway pressure (CPAP) therapy may be provided in the Neonatal Intensive Care Unit as a temporary measure for neonates requiring stabilization or awaiting transfer for further management via the Infant Transport Team. The application of nasal CPAP will only be initiated upon an order from the attending pediatrician.

Once CPAP has been initiated, the pediatrician should consult with a neonatologist at BC Women's Hospital. If it is anticipated that the baby will require CPAP beyond the first 2 to 3 hours after birth, arrangements should be made for transfer. The pediatrician is expected to remain in hospital while a baby is receiving CPAP."

GENERAL INFORMATION:

The use of CPAP in newborns increases the functional residual capacity (FRC) of the lung and improves static lung compliance. CPAP may also prevent upper airway obstruction and decrease airway resistance by stenting upper airway structures. Neonates are obligate nose-breathers, which easily facilitates application of nasal CPAP.

Nasal CPAP will be provided using the Draeger VN500 ventilator. If this ventilator is unavailable or out of service CPAP will be provided manually using the NEOpuff.

EXHIBITS:

A. Bonnet Sizing Chart

INDICATIONS:

- Increased work of breathing (+/- abnormal blood gas values) as indicated by:
  - Increase in respiratory rate, grunting or nasal flaring
  - Substernal or suprasternal retractions
- Poorly expanded and/or infiltrated lung fields on chest radiograph

- Presence of a condition thought to be responsive to CPAP and associated with one or more of the following clinical presentations:
  - Respiratory distress syndrome
  - Pulmonary edema
  - Atelectasis
  - Apnea of prematurity
  - Recent extubation
  - Tracheal malacia or other similar abnormality of the lower airways
  - Transient tachypnea of the newborn

CONTRAINDICATIONS:

- Any upper airway abnormalities that make CPAP ineffective or potentially dangerous such as choanal atresia, cleft palate, or tracheoesophageal fistula
- Unrepaired diaphragmatic hernia
- Necrotizing enterocolitis

CAUTION – POTENTIAL COMPLICATIONS:

- Lung over-distention leading to air leak syndromes
- Nasal excoriation, scarring, pressure necrosis, and septal distortion
- Gastric insufflation and abdominal distention

SPECIAL CONSIDERATIONS:

All ventilator alarms are INACTIVE in CPAP mode. Ensure alarms for respiratory rate, oxygen saturation, and heart rate are set appropriately on the bedside patient monitor.

REQUIRED SUPPLIES & EQUIPMENT:

- Draeger VN500 ventilator
- Appropriately sized bonnet
- Color-coded measuring tape
- Appropriately sized mask (small-med-large)
  - If unable to maintain seal with mask may consider nasal prongs (size S, M, L & XL)
- Luer adaptor
- Flow generator
- #5 or #8 Fr orogastric tube
- 5 mL syringe (for aspirating air from the stomach)
- Sterile water for lubrication

***NOTE:** The bonnets are color-coded according to size. Selecting the appropriately sized bonnet will be done by head circumference and baby weight.

EXHIBIT A. Bonnet Sizing Chart

Size	Color	Head Circumference (max. cm)	Weight (grams)
M	Red	26	1000 - 1300
L	Green	28	1300 - 1600
XL	Orange	30	1600 - 2400
XXL	Blue	33	2400 - 3000
XXXL	Black	36	> 3000

PREPARING FOR THERAPY:

The initiation of nasal CPAP is easiest accomplished with the help of an additional person, usually the nurse or a second therapist. The secondary person will be responsible for helping to stabilize and position the infant during the set-up procedure.

1. Measure the circumference of the baby's head using the color-coded tape provided. Select the appropriate bonnet using the bonnet-sizing chart.

2. Select the appropriate sized mask. Be sure that the mask is large enough to fit around the contours of the baby's nose and that it is not pressing up against the nares or the eyes.

3. Guide the Velcro straps through the slots on the side of the mask.

4. Place the bonnet gently over the baby's head such that the wide Velcro strap is positioned midline over the baby's forehead and the felt is positioned over the baby's ears. Ensure that the baby's ears are flat against the inside of the bonnet.

5. For warmth tie a bow at the top of the head with the material from the bonnet.

6. Attach the mask to the flow generator.

7. Suction the baby's nares as per NICU Oral/Nasal Suctioning.

PROTOCOL FOR VENTILATOR PARAMETERS AND SETTINGS:

1. Turn on the ventilator by pressing the green button located on the left bottom corner of the display screen. The start up and self-test will take approximately 45 seconds.

2. **Remove the flow sensor and wye piece connector from the circuit.** This component will not be used for the procedure.

3. From the **Standby Screen** access the **Tube/NIV** tab.

4. Select **NIV** and press the rotary knob to confirm.

   NOTE: Confirm activation of NIV by ensuring it's displayed in the header bar (orange box)
   NOTE: To return to invasive ventilation, place ventilator into **Standby** and repeat Step 3 and select "**Tube**".

5. Set CPAP to 5 cmH_2O by pressing **Ventilator Settings** and adjust the PEEP to 5 cmH20.

   NOTE: For CPAP greater than 5 cmH_2O a physician order is required.
   NOTE: Other settings such as $T_{manInsp}$ and $P_{manInsp}$ are only active when a manual inspiration is given. The slope setting can remain at the default value.

   Oxygenation Goals: Less than 36 weeks: SpO_2 = 88 – 92%. **Greater than 36 weeks:** SpO_2 = 90 – 94%

INITIATING THERAPY:

1. Apply the mask to the baby's face such that the generator hoses are pointed upwards towards the baby's head. Ensure adequate seal.

   NOTE: If unable to maintain seal with the mask interface, the nasal prongs interface may be considered (small and extra-large size only).

2. Secure the mask to the bonnet by guiding the Velcro straps over the baby's cheeks and adhering them to the pieces of felt on each side of the bonnet.

3. Secure the hoses to the bonnet using the Velcro strap that is positioned midline over the baby's forehead. (Figure 1.)

FIGURE 1.

4. Attach the luer adaptor to the end of the expiratory limb of the ventilator circuit and connect the circuit to the flow generator. (Figure 2.)

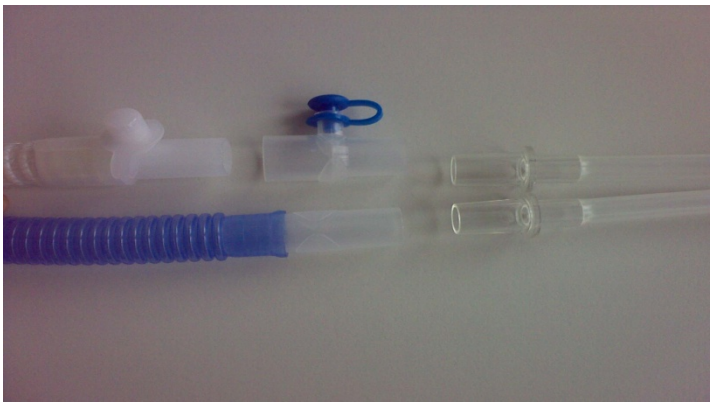

FIGURE 2.

FIGURE 3.

5. Adjust the ventilator tubing such that the tubing is not twisted or pulling in the opposite direction of the prongs, which may result in excessive pressure on the nares and septum. (Figure 3.)

WEANING & DISCONTINUATION OF THERAPY:

1. Wean oxygen as tolerated. Targeted goal is to be on Room Air with a SpO_2 88 – 92%.

2. Decrease CPAP by 1 cmH_2O as tolerated. Targeted goal is to be on CPAP 5 cmH_2O prior to discontinuing therapy.

3. Initiate a trial without CPAP. Assess every 30 minutes for the first 2 hours. Prone positioning may improve weaning success

4. Monitor and assess WOB, indrawing, tachypnea, apneas, bradycardias, desaturations as signs of tolerance/intolerance to the weaning process. Obtain capillary blood gas (CBG) if any of the listed signs are present or worsening.

   NOTE: If CBG results appear stable and tachypnea persists (RR 60-80) persists with mild to moderate indrawing, consider resuming CPAP therapy.

DOCUMENTATION, COMMUNICATION, EDUCATION:

Record ventilator settings on the Respiratory Critical Care Flowsheet. Ensure all assessments, interventions, and response to therapies is documented.

Provide bedside education as required to relevant team members. If unable to remain with the patient confirm with unit staff most appropriate pager number for means of contact.

REFERENCES:

1. Bonner KM, Mainous RO (2008). Nursing care of the infant receiving bubble CPAP therapy. *Advances in neonatal care,* 8(2), 78-95.
2. McCoskey L (2008). Nursing care guidelines for prevention of nasal breakdown in neonates receiving nasal CPAP. *Advances in Neonatal Care. 8*(2). 116-124.
3. Cartwright D & Beaumont T (2011). Queensland Maternity and Neonatal Clinical Guideline: Management of neonatal respiratory distress incorporating the administration of continuous positive airway pressure (CPAP). Queensland Maternity and Neonatal Clinical Guidlelines Program.
4. Guidelines for Maintaining Non Invasive Respiratory Support (2012). Neonatal Program, BCWH, NICU.

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