Title:	Installation and Maintenance of Bubble Nasal Continuous Positive Airway Pressure (NCPAP) Therapy in the Neonatal Intensive Care Unit (NICU) and the Resuscitation room in the Birthing Center.

1. PURPOSE

- To assure proper installation and maintenance of bubble NCPAP interface and NCPAP system
- To harmonize routine care of a patient on NCPAP therapy

2. PROFESSIONALS AND PATIENT POPULATION

Professionals:

a. Registered Respiratory Therapists (RRT) who have successfully completed an orientation session for installation, routine care, wean, and discontinuation of NCPAP.

b. NICU nurses who have successfully completed an orientation session on routine care of a patient receiving NCPAP therapy.

c. Physicians and neonatal nurse practitioners (NNP) responsible to order the use of any non-invasive respiratory support should be familiar with indications, monitoring and complications of NCPAP therapy.

Patient Population:

In Resuscitation Room at the Glen

1. Spontaneously breathing premature infant less than 32 weeks
2. Any newborn showing signs of respiratory distress defined as:
   - Oxygen needs greater than 21% to maintain appropriate oxygen saturation as per NRP (Neonatal Resuscitation Program) and oxygen with love (OWL) protocol
   - Increased work of breathing defined as the presence of tachypnea, moderate sub-sternal and/or suprasternal retractions, grunting and / or nasal flaring
   - Apnea, bradycardia spells and / or cyanosis

If a CPAP is provided for 20-30 minutes in the delivery or resuscitation room, admission of the newborn to the NICU is strongly recommended as to be able to observe the newborn closely.

The success of CPAP depends on the gestational age, clinical status of the infant, CPAP devices used and the experience of the institution. It is important to keep in mind that preterm infants < 26 weeks of gestation have a higher failure rate.

In NICU:

1. Spontaneously breathing premature infant less than 32 weeks
2. Immediately post extubation, in premature infants or in full-term infants based on disease being treated.
3. Any newborn showing signs of respiratory distress defined as:

- Oxygen needs greater than 21% to maintain appropriate oxygen saturation as per NRP (Neonatal Resuscitation Program) and OWL protocol
- the presence of moderate sub-sternal and/or suprasternal retractions, grunting and / or nasal flaring
- Apnea, bradycardia spells and / or cyanosis
- Sustained increased in respiratory rate of 20% above normal

INDICATION and: CONTRAINDICATION

Any patient deemed eligible as per the Nasal Continuous Positive Airway Pressure (NCPAP) Therapy in the Neonatal Intensive Care Unit (NICU) and the Resuscitation room in the Birthing Center protocol.

INDICATION *conditions*:

- Diseases with low Functional Residual Capacity (FRC), such as Respiratory Distress Syndrome (RDS), Transient Tachypnea of the Newborn (TTN), Pulmonary Edema
- Respiratory support post extubation
- Atelectasis - prevention or treatment
- Apnea of prematurity
- Tracheomalacia, or other similar lower airway abnormalities
- Neuromuscular weakness with adequate respiratory efforts
- Phrenic nerve palsy

CONTRAINDICATION includes but is not limited to the following:

- Untreated congenital Diaphragmatic hernia
- Orofacial and upper airway abnormalities, such as choanal atresia, cleft palate, tracheo-esophangeal fistula
- Severe cardiovascular instability
- Relative contraindications include untreated GI pathologies such as : obstruction (atresias, malrotation, volvulus)

POSSIBLE COMPLICATIONS includes but are not limited to the following:

- Nasal mucosa: irritation, bleeding, infection or chronic inflammation
- Nasal obstruction from secretions or improper position of nasal prongs.
- Perinasal skin irritation and pressure necrosis
- Abdominal distension. Orogastric tube needs to be in place to decrease the risk of air in stomach, also known as CPAP belly.
- Feeding intolerance

- Progressive Respiratory Failure or CPAP failure defined as: consistent increase in oxygen requirement above 50 % (1-2h), or severe respiratory acidosis defined as PCO_2 above 65mmHg with a pH < 7.20 in two consecutive blood gases.
- Risk of pneumothorax especially with increased CPAP levels above 5 cmH_2O in extreme preterm infants during the acute phase of RDS.
- Misshaping of the head: Infants on NCPAP: Infants on NCPAP should have their positions changed q 3– 4 hours and proper installation and maintenance of CPAP followed.

3. ELEMENTS OF CLINICAL ACTIVITY

Professionals are responsible to know the limits and extent of their practice as related to the particular protocol.

Equipment needed:

1. Bubble NCPAP system, set up and ready for use.
2. Accessories for nasal interface including bonnet chin strap, nasal prongs and adhesive upper lip protection (cannulaide), of all sizes.

Procedure:

The physician, neonatal nurse practitioner (NNP), nurse and RRT, will assess newborn for eligibility criteria. The physician/NNP will order the NCPAP level to be initiated. It is recommended to begin at 5cmH_2O. Most infants who respond to CPAP do so with this level. One can titrate the PEEP as high as 7cmH_2O if there is no improvement.

Adjust FiO_2 as per OWL protocol.

Recommended NCPAP device to use:

- The Baby Plus Bubble CPAP system is recommended as the first choice for newly born infants with gestational age less than 40 weeks,

  For < 37 weeks of gestation- 1st line of therapy for CPAP will be bubble CPAP unless a ventilator CPAP is required to provide NIPPV.

  For 37-40 weeks- 1st line of therapy for CPAP will be bubble CPAP for respiratory distress unless:

  a. A higher PEEP (>7cmH2O) is needed
  b. It is logistically difficult to keep the bubble CPAP in place as the baby is fighting and the RT is being constantly called often to fix it.
  c. There is concern with nasal breakdown

Which Nasal Interface to Use:

- Short binasal prongs recommended for the bubble CPAP and NIPPV unless nasal septal breakdown or nasal septal pathology necessitates mask

Interventions before and during NCPAP installation

In Resuscitation Room at the Birthing Center

The person at the head of the table will ensure suctioning of the nasopharynx and help maintain airway and respiration.

Physician or NNP will assess patient, give medical order to begin NCPAP, and give respiratory support to newborn as needed.

Nurse will assure oxygen saturation monitor is on patient, monitor and document heart rate, skin temperature and oxygen saturation,, and suction nasopharynx (as needed). The nurse will measure head circumference as that will help in getting the right size of cap for the NCPAP kit. The RT may also perform this task.

RRT will assist with respiratory support, prepare equipment needed, suction nasopharynx (if not already done), and install the nasal interface for the NCPAP. The RRT will then assure the nasal interface is on properly, and the level of CPAP ordered is achieved. RRT will document the installation and parameters on the Respiratory Therapy Non-Invasive Ventilation Order/Flowsheet.

The team will continuously monitor Heart Rate, Respiratory Rate, SpO2, air entry and work of breathing, and document as per NICU practice,

Once the NCPAP is installed, and newborn is showing adequate spontaneous breathing, the team will transfer newborn to the NICU.

In the NICU

Physician/NNP writes order to initiate NCPAP, specifying the level.

Nurse will:

1. Place a roll under infant's shoulder to slightly extend the neck of the infant.
2. Help RRT with positioning and fixation of the interface of the CPAP, and suction nasopharynx as needed
3. Pass an orogastric tube and keep the proximal end of tube open. If the infant is being fed while on NCPAP close end of the orogastric tube for an hour after giving feeds and keep it open before feeds.
4. Document orogastric tube placement.

RRT will:

1. Support and maintain airway as needed, and monitor heart rate and respiratory status (auscultation, work of breathing, RR, SpO_2),
2. Prepare equipment and supplies needed
3. Suction nasopharynx (if not already done)
4. Install the nasal interface for the NCPAP.
5. Assure the nasal interface is on properly, and the level of CPAP ordered is achieved.
6. Document the respiratory assessment, installation and parameters on the Respiratory Therapy Non-Invasive Ventilation Order/Flowsheet

PROCEDURE TO INSTALL Bubble NCPAP

RRT will choose the appropriate equipment according to medical order, equipment available, and indications for bubble NCPAP .

The RRT will set up the correct NCPAP device according to the manufacturer's recommendations. RRT will do the initial installation, and document the size of cap and prongs on non-invasive flowsheet. Nurse and RRT will then maintain and do routine care of the NCPAP together.

Nurse and RRT will document infant tolerance in their respective documentation forms.

Nurse and RRT will refer to bubble CPAP maintenance checklist to assure proper placement and maintenance of NCPAP interface and bubbler. (refer to appendix A)

1. Use the correct size Baby Cap or Cap from the Babi Plus nCPAP kit.

Part Number	Cap Size	Weight	Head Circumference
30301	1	Up to 750 grams	12 – 18 cm
30302	2	650 to 900 grams	15 – 21 cm
30303	3	800 to 1600 grams	18 – 23 cm
30304	4	1500 to 2500 grams	22 – 28 cm

2. Select the Nasal Prongs (NP) Kit for the infant based upon approximate body weight.

Kit	NP Size	Approximate Body Weight	Kit	NP Size	Approximate Body Weight
Small	0	< 700 grams	Large	4	2000 to 3000 grams
Small	1	< 700 grams	Large	5	> 3000 grams
Small	2	700 to 1250 grams	Large	6	> 3000 grams
Small	3	1250 to 2000 grams	Large	7	> 3000 grams

3. Position CPAP set-up on infant according to the following instructions:
    a. Place the Baby Cap on the Infant, pulling it down over the ears (Figure 1) and positioned near the infant's eyebrows (Figure 2).

Figure 1

Figure 2

    b. Use the Nasal Sizing Guide to determine best size of Nasal Prong for infant (Figure 3). The nasal prongs should completely fill the nares.

Figure 3

    c. Connect short blue inspiratory circuit to one side of the Cannula Body (Figure 4).

    Connect short clear expiratory circuit to the other side of the Cannula Body.

Figure 4

    d. Place prongs curved side DOWN.
    e. Check for termination of pressure monitoring line at the Nasal Prong, adjust accordingly.
    f. Connect the dual- heated circuit, including temp probes and heated wire connectors to the prongs circuit ends with an adaptor. Connect the blue inspiratory circuit to the Nasal Prongs blue inspiratory circuit. Connect the clear color expiratory circuit to the clear color Nasal Prongs circuit limb. ***NOTE:*** Temp probes for infants on radiant warmers will be placed as close to the nasal prongs as possible to ensure adequate humidification and decrease "rain-out." Infants in isolette will have temp probes wrapped with foam tape. Connect the water bag to the heating chamber.
    g. Connect pressure monitoring device to the Pressure Monitoring Port.
    h. Add water to the heating chamber, turn the heater ON and verify that it is in correctly operating per manufacturer's instructions.
    i. Initiate flow at 5-8 liters/minute, but do not exceed 12 liters/ minute, or go below 5 liters/minute. Set the CPAP pressure to the prescribed pressure.

j. Set FiO2 as per OWL protocol.

NOTE

Increasing the flow in an attempt to compensate for leaks actually increases resistance and is not advised. Flows less than 5 liters/minute are not sufficient to blow off $C0_2$ in the circuit.

k. Occlude the prongs; ensure that bubbles are created in the Bubble PAP Valve jar to confirm no leaks in the delivery system. Check CPAP Pressure with an external pressure manometer to verify the CPAP level

4. Use Baby Nose Bumper and Circuit Bumpers for secure placement of nasal prongs and attachment of circuit to Baby Cap.

a. It is best to use the *Cannulaide*® instead of the RespiraGel Mustache found in package.It adheres best to warm, clean and oil free surfaces. Clean and dry patient skin around application area by using 2X2 gauze.. Be sure all skin oils, moisture and secretions are removed and skin and nasal prong area is clean and dry.

b. Remove the *Cannulaide*® from the package. If possible, warm faceplate between your hands prior to application on infant skin. remove release layer from *Cannulaide*® face plate. Center the faceplate on the upper lip below nasal septum and smooth face plate along upper lip area (Figure 5). Ensure that the *Cannulaide* ® is placed in such a way that the Velcro portion of the mustache is not in contact with the nasal septum. Apply gentle pressure with warm hands to upper lip and cheeks to initiate adhesion. Hold in place until tape adheres well. This may take up to thirty (30) seconds.

Cannulaide®

The *Cannulaide*® is a nasal seal for infant nasal CPAP. As an adjunct to this therapy, the *Cannulaide*® can improve the quality of CPAP seal and may help reduce irritation to your patients. It is sized to fit the all nasal cannulas and helps keep the prongs straight and positioned in the nares, away from the sides.

RT will inspect the C*annulaide* ® at every ventilatory check (q2h) for displacement as it may migrate into the nares and block the nose with prolonged use. *Cannulaide*® should be changed every 24 hours or sooner to check the skin integrity.

** In order to simplify the text, the term “mustache “ will be used to describe the Velcro portion of the *Cannulaide* ®

Size of cannulaide®	Description of weight of babies
0	< 700 g
1	700g- 1250 g
2	1250g-2000 g
3	2000g- 3000g
4	➢ 3000g

Figure 5

c. Remove Nose Bumper Pads from package. Place Nose Bumper Pad flat on clean surface with hook side of Velcro in upright position. Align holes of Nose Bumper Pad with nasal prongs. Thread Prongs through Nose Bumper Pad, bring base of Nose Bumper Pad up, tightly wrap around prong body and secure with hook part of Nose Bumper Pad (Figure 6 and 7). Change Nose Bumper Pad when soiled or as needed.

Figure 6

Figure 7

d. Place one Circuit Bumper Pad flat on clean surface with Hook part in upright position (Figure 8). Bring base of Circuit Bumper Pad up (Figure 9) and tightly wrap around inspiratory limb of circuit and secure with hook part of Circuit Bumper Pad. Secure additional Circuit Bumper to expiratory limb of circuit in same manner.

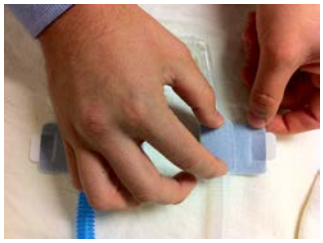

Figure 8 *Figure 9*

e. Place the Nasal Prongs in the infant's nose (Figure 10)

and Secure Baby Nose Bumper Pad to adhesive mustache (cannulaide) by gently pressing.

Figure 10 *Figure 11*

f. Attach Circuit Bumpers to side of Baby Cap with hook strip provided (Figure 11). Gently press Circuit Bumpers to the Baby Cap.

5. With infant in a supine position, head elevated about 30° and neck supported with a small roll, position the prongs gently into the nares so there is no upward pressure on the septum. You might need to to put 2-3 drop of normal saline on the prong in order to facilitate the insertion of the pong through the nare. Place prongs curved side DOWN, and connect them to the bubble nasal circuit. Adjust the angle at the corners, to curve the prongs slightly, matching the curved plane across the upper lip. The prongs should fill the nares completely.

   NOTE: Careful observation and positioning of the prongs is essential. Excessive blanching may injure the skin and internal structures of the nose. If blanching occurs, remove the prongs and gently dilate the nares, by placing one prong in one nare, and repeating with other nare, then attempting to re-insert both prongs. Initially, the prongs may not be inserted as deeply as desired, but the nares will dilate to accommodate the prongs over the next couple of hours.

   a. Secure prong assembly to moustache; by gently pressing together the Bumper to the center of the Mustache (refer to Figure 10).
   b. Place the Circuit Bumper on each side of the Cap. Gently press to the Cap and Repeat on other side (refer to Figure 11). Position infant and tubing so there is no pressure on the nose, adjusting tubing and connections as needed.
   c. Initiate NCPAP flow and oxygen. NCPAP is usually started at 5-8 liters/minute of flow. Adjust oxygen as per OWL protocol. Flow may be adjusted up to 12 Liters/minute, as needed, for a larger infant.

   NOTE:
   Assess infant carefully for increased work of breathing, when increasing flow. Increased rainout in the circuit can inadvertently cause an increase in the water level in the system.

   IMPORTANT NOTE: Consistent bubbling is important in order for the infant to "recruit" alveoli, maintain functional residual capacity (FRC) and decrease airway resistance and the work of breathing. If the "bottle" is not bubbling, then the infant is not receiving effective bubble nasal CPAP. A system which is not bubbling has a pressure leak, which must be resolved. A chin-strap can be utilized to keep the infant's mouth closed at rest. It should not be so tight that it prevents the infant from yawning or crying, but tight enough to prevent an air leak at rest. See below for chin-strap application direction. If a different head position, adjustment of the nasal prongs, or chin-strap does not solve the air leak, a change to larger prongs may be necessary. Also, infants on

bubble nasal CPAP will have their nares dilated by the prongs, and may require an increase in prong size over time.

6. If chin-strap indicated to maintain mouth closure, RRT or nurse will apply the Baby Chin Strap.
   Apply according to the following instructions:

   a. Place *Baby Chin Strap* below base of chin with cut out centered at midline base of chin (Figure 12).
   b. Secure to Cap or Cut section of adhesive backed Hook or Loop Tape. Remove backing and place small strip of Hook or Loop material on the Cap to secure the *Baby Chin Strap*.
   c. Ensure that straps are not too tight, pressing on ears or interfering with NCPAP delivery circuit.

Figure 12

NOTE: The chinstrap must be placed forward over the chin, in order not to restrict the infant's airway. An oro-gastric tube may need to be placed to vent in order to diminish gastric distention.

If you're having trouble getting the baby to bubble despite adjusting the circuit and/or applying a chin strap, you can try pressing down on the nose bumper/nasal prongs so that it is touching above the lip. If the baby begins to bubble, you can secure it in this fashion with a chin strap (if the baby's head is small enough) or with a foam Posey trach tie (babies with larger heads) by tying it behind the baby's neck and attached around the side tubing by using velcro. See figure 13

Figure 13

Interventions during bubble nCPAP treatment:

The best way to prevent the complications explained above is for the NICU team to work together to assure the interface is properly placed at all times. Failure to do so will cause nasal skin breakdown.

NOTE

Disconnecting infants from NCPAP should be kept to a minimum and, if necessary, for the shortest period of time.

When repositioning the baby, RT or RN should disconnect the circuit first, position the baby and reconnect the circuit. This procedure avoids circuit displacement and pressure point on baby's nose.

RRT will:

- Perform an equipment and pressure check and document every 2 hours. RRT will check CPAP Pressure with an external airway pressure manometer to verify the proper CPAP level. The pressure should be measured from the pressure monitoring port.

- RRT will check the Bubble PAP Valve jar every 2 hours for increase in water from rain out or for evaporation that can cause a loss of fluid. The Bubble PAP Valve jar must be checked and excess water removed immediately or fluid added to maintain the fluid level as per manufacturer recommendation.

- Check the bag and mask are readily available and working properly.
- Do a respiratory assessment including air entry, work of breathing, SpO2, TcPCO2 (if available) and respiratory rate, suctioning and secretions and document on Respiratory Therapy Non-Invasive Ventilation Order/ Flowsheet. RRT will check for blood gases and chest x-ray as needed.
- RRT will change the dual-heated circuit every 28 days and the bubbler every 7 days. The interface should be changed every 7 days, but bumper and prongs must be changed when dirty.

The nurse will-

- The nurse will do routine skin care of the NCPAP therapy as stated below, and bundle it with the routine care of the infant, according to the NICU nursing protocol.
- Position infant with every care every 3 to 4 hours as per NICU nursing protocol. When in a supine position, place a roll behind the infant's neck to keep it extended in order to keep airway open.
- Ensure the weight of the circuit is gently supported to reduce the tension on the nasal tubing.
- Aspirate orogastric tube q 2-3 hours prior to feeds and leave it vented at least an hour in between feeds to avoid abdominal distention.
- Nurse will document all care in nursing flowsheet and progress notes.

Nurse and RRT will assure proper skin care:

- Keep all face tubing/apparatus and nose dry.
- A quick visual check of the nose/septum must be done every two (2) hours at minimum
- Removal of the prongs to perform a thorough check of the patient's nose/septum every four (4) hours.
- Use penlight to assess inside condition of nares. Redness can become skin breakdown /septal necrosis in a matter of hours and it is caused by inadvertent pressure on the septum. Ensure the nasal prongs/cannula are off the nasal septum and maintain a "cushion" of air (2-3 mm) between the bridge of the prongs and the septum at all times.

If redness or breakdown noted, consult MD/NNP for treatment order. You may consider protective ointment barriers if indicated. Always apply to a clean, dry nose. In addition, reposition the prongs off the septum and allow the area to recover.

- Before reinstalling the prongs, make sure the circuits are drained, and clean the prongs with NS and 2 x 2 gauze.
- Remove infant's Cap once a shift, inspect entire head for breakdown, massage gently. Check behind the ears for wetness, irritation or breakdown. Make sure area is dry and free of compromise before reapplying Cap and prong apparatus. If breakdown is noted, consult with MD/NNP. If Cap is too small, change to larger size.
- Change adhesive mustache (cannulaide) PRN if it becomes wet, begins to "lift up" and/or no longer adheres to infant's skin. Assess nose, nares and upper lip for breakdown or compromise when changing adhesive mustache (cannulaide) Always replace adhesive mustache (cannulaide) on clean, dry skin.

NOTE: if infant is placed on nasal CPAP right after birth, be diligent in placing eye ointment, as ointment and get on cheeks and make adherence of mustache very difficult.

Routine Care for suctioning

Nurse and RRT will performed nasopharyngeal suction:

Suctioning is required every 3-4 hours and may be necessary more frequently if the infant is requiring an increasing oxygen concentration, experiencing an increasing work of breathing and/or secretions are impeding airflow. Follow the suctioning guidelines below, unless otherwise ordered.

- Maintaining aseptic technique, set suction pressure to 80-100mm Hg.
- To be effective the naso/oro pharynx must be suctioned.
- Use 2-3 drops of normal saline for each nare, just enough to moisten and provide lubrication.
- Use an 8 Fr. catheter. Only use a 6 Fr. catheter if unable to pass an 8 Fr. catheter. A 6 Fr. may pass/ slide more easily, but is less effective at removing secretions and will require more passes.
    i. Measure distance from same-side tragus of the ear to nare and multiply by 1.5 to obtain length of catheter required to suction the patient.
    ii. Place 2-3 drops of N/S as indicted above, and insert catheter toward same-side ear as nare being suctioned. Do not suction just the nose, effective removal of secretions must include suctioning the nasal/oro-pharynx. Point the tip of the catheter toward the tragus of the ear, pass catheter to required suction depth.
    iii. Suction for 2-3 seconds, and slowly remove the catheter for a count of 3-4 seconds, until out of the nose.
    iv. To avoid irritation, bleeding or trauma, avoid rapid, short catheter insertions and pass catheter only once down in each nare.

Holding the Newborn:

An infant on NCPAP therapy may be held by a parent as long as they show no signs of respiratory distress and require more than 30% oxygen. It is recommended to have two (2) members of the NICU team to transfer to arms of seated individual.

- Be as gentle as possible to avoid undue trauma or irritation to nose/face of infant.
- In order to minimize possibility of trauma, circuit should be disconnecting prior to transfert the baby then reconnect as soon as possible.

- Ensure the weight of the circuit is gently supported to reduce the tension on the nasal tubing.

Monitoring While On CPAP:

- Continuous monitoring of respiratory rate, heart rate and oxygen saturation. Transcutaneous monitoring is optional, depending on equipment availability and status of patient.
- Obtain Chest x-ray if an infant is requiring CPAP for the first time. Further need for CXR based on the disease being treated.
- Obtain a Blood gas after initiating CPAP, then as per progress of disease being treated, as per physician or NNP order, or follow transcutaneous monitor if available.
- Nurse will monitor and document capillary refill, blood pressure, peripheral pulses and urine output as per NICU nursing protocol.
- Nurse will measure and document abdominal girth as per NICU nursing protocol.
- Nurse and RRT will adjust FiO_2 as per target oxygen saturation (OWL protocol).
- NICU team will assess whether patient can be weaned from NCPAP at daily rounds.

INDICATIONS FOR NCPAP FAILURE requiring NIPPV (Nasal Intermittent Positive Pressure Ventilation) or intubation:

1. Progressive respiratory failure defined by a consistent increase (1-2h) in oxygen requirement above 50 % or severe respiratory acidosis - PCO_2 retention trend above 65 with a pH < 7.20 in two consecutive blood gases.
2. Episode of apnea requiring bag/mask ventilation due to failure to resume spontaneous breathing
3. Frequent episodes of apnea and/or bradycardia (more than 6 episodes in 6 hours). Apnea will be defined as a respiratory pause longer than 20 seconds, or less than that but associated with desaturation (SpO_2 < 88%) and/or bradycardia. Bradycardia will be defined as heart rate less than 100 bpm.
4. Increased subcostal and intercostal retraction, tachypnea more than 80 per minute with increased oxygen requirement and or persistent apnea or bradycardia

INDICATIONS TO DISCONTINUE NCPAP:

The primary determinant in deciding to implement weaning strategy is the status of the patient being treated.

1. Preterm infants need to be on room air, not showing evidence of increased work of breathing, having a good weight gain with no apnea or bradycardia for the preceding 24 hours prior to weaning. In addition, lower BPD rates have been documented when NCPAP is left in place until the preterm infants are close to 32 weeks of corrected gestational age and in room air.
2. For those preterm infants who have BPD and require bubble CPAP until 34-36 weeks of gestation, alternative mode such as high-flow needs to be entertained so bottle feeding can be initiated. Even though babies on CPAP can be successfully bottle fed with no risk of aspiration, historically at MUHC, babies on CPAP have not been fed.

3. The optimal method of weaning an infant off CPAP remains uncertain. Few suggestions include:

- Wean FiO_2 to 0.21 prior to weaning CPAP (to reduce the risk of oxygen exposure in premature infants).
- It is not necessary to wean pressures below 5 cmH_2O prior to removal. If the pressure is higher than 5 cmH_2O, the level needs to be weaned to 5 cmH_2O prior to weaning.
- In cases of nasal septal breakdown, either try other types of interfaces.
- It is not necessary to cycle on or off CPAP since this was associated with worse outcomes. Attempt to wean off CPAP once the baby is considered ready given the resolution of the initial pathology process and the tolerance of the baby off the CPAP during the care. Baby will remain off CPAP unless significant retractions, apnea, bradycardia and increased oxygen requirement is noted. CPAP should remain at the bediside for 24 hours until the trial off is considered successful.

EMERGENCY MEASURES

In case of desaturation less than 85 % or a heart rate drop below 100 bpm- while stimulating the infant and increasing the Fio2,

1- Evaluate if the CPAP is bubbling or not. If the CPAP is not bubbling, there is a leak in the system - Check if the prongs are in place or if the prongs need to be repositioned? If there is a significant leak from the mouth or if the flow is on. Is there a chest movement? Provide tactile stimulation, readjust the prongs to get the CPAP to bubble or minimize the leaks by closing the mouth

2- If the infant does not respond to above, call for help and remove the nasal interface and mask/bag infant.

3- Consider suctioning in case there is a plug or reflux. If the baby recovers and has good spontaneous effort, place back on NCPAP. Decompress the stomach after bagging. If apnea persists despite mask/bag, consider NIPPV or intubation.

5. REVIEW DATE

To be updated in maximum of 5 years or sooner if presence of new evidence or need for practice change.

6. REFERENCES

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