

Local
Guideline

John Hunter
Children's Hospital
CHILDREN, YOUNG PEOPLE AND FAMILIES



Health
Hunter New England
Local Health District

CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) in NICU Using HUDSON PRONG

| | |
|-------------------------------------|--|
| Sites where Local Guideline applies | Neonatal Intensive Care Unit/Special Care Unit JHCH |
| This Local Guideline applies to: | |
| 1. Adults | No |
| 2. Children up to 16 years | No |
| 3. Neonates-less than 29 days | Yes |
| Target audience | Clinicians caring for neonates requiring CPAP |
| Description | Provides information to clinicians to provide safe work practice regarding delivery of CPAP. |

[Go to Guideline](#)

| | |
|---|---|
| Keywords | Alveoli, FRC (functional residual capacity), Hudson prong, pneumothorax, prematurity, Respiratory distress syndrome (RDS), NICU, JHCH |
| Document registration number | JHCH_NICU_12.02 |
| Replaces existing document? | Yes |
| Registration number and dates of superseded documents | JHCH_NICU_12.02 May 2013 |
| Related Legislation, Australian Standard, NSW Ministry of Health Policy Directive or Guideline, National Safety and Quality Health Service Standard (NSQHSS) and/or other, HNE Health Document, Professional Guideline, Code of Practice or Ethics: | <ul style="list-style-type: none"> • NSW health Policy Directive PD 2017_013 Infection Control and prevention Policy • NSW Health Policy Directive PD2017_032 Clinical Procedure Safety |
| Prerequisites (if required) | Not Applicable |
| Local Guideline note | This document reflects what is currently regarded as safe and appropriate practice. The guideline section does not replace the need for the application of clinical judgment in respect to each individual patient but the procedure/s require mandatory compliance . If staff believe that the procedure/s should not apply in a particular clinical situation they must seek advice from their unit manager/delegate and document the variance in the patients' health record. |
| Position responsible for the Local Guideline and authorised by | Pat Marks. General Manager / Director of Nursing CYPFS |
| Contact person | Jenny Ormsby Guideline Development Coordinator NICU JHCH |
| Contact details | Jennifer.Ormsby@hnehealth.nsw.gov.au |
| Date authorised | 10 January 2018 |
| This document contains advice on therapeutics | No |
| Issue date | 10 January 2018 |
| Review date | 10 January 2021 |

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PURPOSE AND RISKS

This local clinical procedure has been developed to provide instruction to the health clinician and to ensure that the risks of harm to the child associated with application of CPAP are prevented, identified and managed.

The risks are:

- *Gastric distension affecting respiratory and gastro-intestinal function*
- *Nasal septal erosion*
- *Pneumothorax*

The risks are minimised by:

- *Clinicians having knowledge of CPAP implementation and management*
- *Clinicians seeking assistance if caring for infants is outside their scope of practice*
- *Following the instructions set out in the clinical procedure*
- *Recognition of the common clinical signs of the complications of CPAP delivery*
- *Notification and management of the complications/ risks to the patient*

Risk Category *Clinical Care & Patient Safety*

GLOSSARY

| Acronym or Term | Definition |
|---------------------------------|---|
| CO ₂ /O ₂ | Carbon Dioxide/Oxygen |
| CPAP | Continuous Positive Pressure Ventilation |
| ELBW | Extremely Low Birthweight |
| FRC | Functional Residual Capacity |
| PDA | Patent Ductus Arteriosus |
| PEEP | Positive End Expiratory Pressure |
| NICU/SCN/HDU | Neonatal Intensive Care. Special Care Nursery/ High Dependency Unit |

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Rationale

Continuous positive airway pressure (CPAP) is a form of respiratory support that is used for spontaneously breathing infants with increased work of breathing and/or an increased oxygen requirement. A constant flow of gas and a constant positive distending pressure throughout the respiratory cycle establish and maintain a functional residual capacity (FRC), (Ahmuda C & Goldsmith J, 1996; Cloherty & Stark, 2010). This results in an overall decrease in the infant's work of breathing.

Continuous positive airway pressure:-

- Increases trans pulmonary pressure and FRC
- Prevents alveolar collapse, decreases intrapulmonary shunt and improves lung compliance
- Prevents pharyngeal collapse
- Stabilises the chest wall

- Increases airway diameter and splints the airways
- Splints the diaphragm
- Stimulates lung growth
- Conserves surfactant
- Prevents atelectatic trauma
- Has a potential high frequency effect/stochastic resonance (3)

Indications for use

Babies with impaired FRC will show signs of increased work of breathing such as:-

- Upper, lower chest and xiphoid retractions
- Nasal flaring
- Audible expiratory grunt (either to ear or on auscultation)
- Tachypnoea 60-80 breaths/min
- Hypoxia
- Bradycardia
- Apnoea

Examples of conditions that impair FRC and would benefit from CPAP are:-

- Respiratory Distress Syndrome
- Meconium Aspiration Syndrome
- Congenital or acquired pneumonia
- Persistent pulmonary hypertension of the newborn
- Pneumothorax
- Transient tachypnoea of the newborn
- Pulmonary haemorrhage
- Pulmonary oedema
- Pulmonary hypoplasia
- Chronic lung disease

Other conditions which require CPAP are

- Apnoea of prematurity,
- Bradycardia
- Bronchiolitis
- Obstructive apnoea
- Partial paralysis of diaphragm
- Tracheomalacia
- Patent Ductus Arteriosus (PDA)
- Respiratory support post extubation from positive pressure ventilation

A number of these babies may require re/intubation

Considerations for intubation/re-intubation

It is imperative that consultation with a **Neonatologist** take place if any of the parameters below exist

1. Ph. \leq 7.2 (based on arterial or capillary blood gas, not venous)
2. PCO₂ >70mmHg within 72 hours of birth (based on arterial or capillary blood gas, not venous)
3. FiO₂ \geq 0.4
4. Profound, recurrent apnoea requiring stimulation, defined as 3 episodes of apnoea requiring stimulation within a 2 hour period.
5. Haemodynamic instability e.g., shock and inotropic support.

Contraindications for use of CPAP

- Gastroschisis
- Exomphalos
- Diaphragmatic hernia
- Tracheo oesophageal fistula
- Choanal atresia
- Nasal trauma/deformity
- Bowel atresia/intestinal obstruction

Complications of CPAP

- Potential decrease in cardiac output can occur with inappropriately high CPAP pressures
- Increase in right to left pulmonary shunting
- Nasal obstruction either due to secretions or incorrect prong application
- Gastric distension
- Nasal septal erosion
- Pneumothorax

Babies > 36 weeks gestation and > 2500g with nasal flaring and/ or effortless tachypnoea alone with no other signs of diminished FRC, may be observed for up to an hour in delivery suite or in NICU (at the discretion of MO).

If in doubt discuss the need for CPAP with the team leader and medical officer

Method of CPAP Delivery

Nurse / patient ratios. It is preferable that:-

- <28 week gestation **and** < 1000grams in the first week of life are nursed 1:1
- Sick/ unstable 1:1
- >28 weeks and haemodynamically stable 1:2

The JHCH NICU currently uses the Fisher and Paykel™ humidity base MR850 and BC 151™ circuit to deliver warmed and humidified gas to the patient. The patient interface of choice is the short, wide binasal 'Hudson Prong'™, which have been shown to be most effective in the delivery of CPAP (De Paoli Ag et al 2008).

Hudson prong bubble CPAP requires the system to bubble when in use. Bubbling should be non- vigorous and informs us that the baby is receiving the set amount of PEEP. The level of the meniscus in the CPAP rod is the amount of peep the baby is receiving and if there is no bubbling then the required PEEP is not being met and CPAP is sub optimal. If the circuit bubbles vigorously the system is probably blocked and the baby is not receiving effective PEEP.

Effective CPAP ensures lung recruitment and FRC, and non-effective CPAP leads to derecruitment of alveoli and atelectatic trauma (Morley 1999).

Assembly for Circuit for HP CPAP

Bubble CPAP circuit BC 151™ is designed for use with the Fisher and Paykel MR 850™. (Please refer to user manuals)

Equipment

- BC 151 Circuit™
- MR850™ humidifier base
- Oxygen bubble tubing cut to desired length
- Double outlet gas blender
- Water for irrigation (Baxter™ 1000ml)
- Sterile water for injection (Baxter™ 1000ml)
- Small plastic bag
- Elastic band

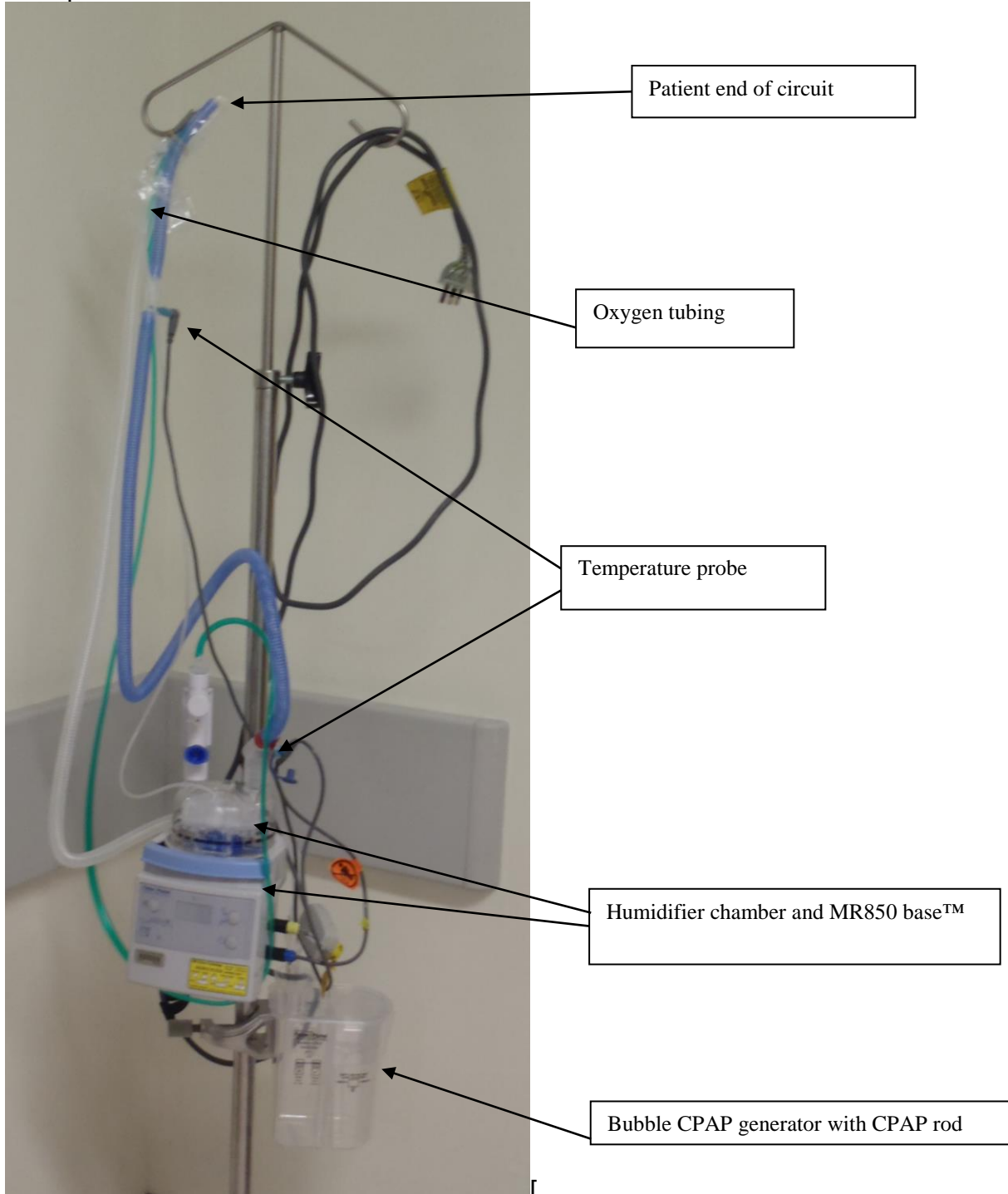
Procedure

- Open all packaging onto a clean trolley
- Place humidifier chamber to MR 850™ base
- Attach pressure manifold to humidity chamber (left hand inlet as you look at the base)
- Attach green Oxygen tubing to pressure manifold
- Connect blue inspiratory limb to right hand outlet of humidifier base
- Remove blue caps from inlets and attach temperature probe and heater wire adapter
- Ensure the heater wire is evenly distributed along the circuit length, not bunched or kinked
- Connect white expiratory limb to the CPAP rod and insert into plastic chamber.

Continuous Positive Airway Pressure JHCH_NICU_12.02

- Connect other end of white expiratory limb and blue inspiratory limb to elbow provided
- Place this elbow, and attached CPAP tubing, green oxygen tubing and water inlet tubing into clean small plastic bag and secure with elastic band, until needed.
- Keep yellow date labels with circuit

Set up CPAP circuit



A complete CPAP circuit should be assembled and ready for use at all times.

Infection control notice: If setting up a circuit in advance *do not attach prongs or add water until the circuit is required for use*. Ensure all ends of tubing are securely covered in plastic. Once in use the circuit should be dated and changed on a weekly basis

Ready for use:

- Hang the 1 litre water for injection bag, spike the bag with the water feed set. Check the humidification chamber for water flow from the bag
- If there's no water visible, check the bag is spiked correctly and the water feed tube is not kinked. Squeeze the bag gently to promote water flow
- Ensure that the water bag is 50 cms higher than humidification base
- Ensure the water level does not exceed the maximum level on the chamber. If it does the chamber may need to be discarded.
- Fill the bubble cpap generator with 'water for irrigation' up to the marked black line, any excess is automatically lost through the overflow.

SET flow Rate

Initially set the flow rate at 6 litres/minute. Adequate flow is important to prevent rebreathing of carbon dioxide (CO₂), to compensate for leaks and to generate the desired PEEP.

Set CPAP Level

Set CPAP rod to 6cms H₂O as a baseline. This level may be changed as per medical advice depending upon the infant's respiratory condition.

- Ensure there is airflow present by turning on the flow and then turn on the MR 850 humidity base. The base is servo controlled and will settle at approximately 37⁰ Centigrade. This provides optimum heating and humidification.
- Check the circuit is functional by attaching to the Hudson prongs and occluding the prongs with clean thumbs/fingers.
- Once you have confirmed the system is functional it is ready for use.

CPAP Application

On admission of an infant to Neonatal intensive care (NICU) or high dependency (HDU) the infant is assessed to determine appropriate respiratory support-

CPAP may be commenced as a **nurse initiated** treatment. CPAP application takes 2 nurses; one to ensure the CPAP is applied by face mask and Neopuff whilst the other staff member ensures the equipment is prepared. The secret to success of the HP system is attention to nursing detail.

Hudson Prong fixation-fixing and maintaining the Hudson prongs in an anatomical position with minimal movement is the aim of the hat and Velcro fixation devise. The chin strap is used to minimise leak and enhance effective CPAP. (See Appendix 1)

- Position infant supine with head elevated 30 degrees
- Place an appropriate size neck roll in situ to facilitate a neutral/sniffing position
- Apply a pre ductal saturation monitor (right hand/arm)
- Measure head circumference

- Apply hat. On admission the Hudson hat that comes with the prongs can be used, a Canberra hat if baby is > 32 weeks or an appropriate sized tubigrip hat can be made.

Procedure for CPAP application:

Choose correct size prongs as per infant weight- important to select prong size from commencement of CPAP treatment. Replace pressure port elbow with standard elbow.

| Size prongs | Birth Weight |
|-------------|--------------|
| 0 | <700g |
| 1 | 1000g |
| 2 | 2000g |
| 3 | 3000g |
| 4 | 4000g |
| 5 | infant |

- **For ELBW infants where 0 size still too big, Parker™ prongs available.**
- Place prongs curved side down and directly into the nasal cavities, following the anatomical curve of the nares. The prongs should fit the nares comfortably; stretching and blanching suggest the prongs are too large. Prongs that are too small increase the risk of septal injury. Sit the prongs off the top lip and straight like ‘Cats Whiskers’
- Document prong size on flow chart and nursing record of line/tube/prong size change bedside chart
- Do not use creams or ointments as lubrication. If lubrication is required for insertion of the prongs use a small amount of saline.
- Set FiO₂ to target saturations 90-94(CPG 5.1.8)
- Place the white and blue tubing parallel to each other and at 90° to the prongs. Without bending the prongs secure the tubing on both sides of the hat with safety pins and rubber bands. Two sizes of safety pins are available for use. Smaller for smaller babies and larger for bigger babies to offer more stability. Don’t put the pins in place on the hat until the tubing is sitting correctly. Ensure the rubber bands have optimal elasticity. Consider using Transpore™ tape to secure tubing to the hat as an alternative in ELBW infants who are not too active. Position the open end of the pins away from the forehead and towards the crown and ensure pins are through all layers of hat. **Avoid pin stick injury to baby and /or staff.**
- Pulling the tubing to fit the position of the pins will cause distortion and possible nasal damage.
- Insert a size 8FG orogastric tube (OGT), to decompress the gut. If the baby is nil by mouth leave OGT on free drainage. If the baby is to be fed leave the tube attached to an open syringe barrel to vent.
- Apply the chinstrap. The chin strap offers chin support and must anchor to the hat See Appendix 1 for more detail.
- Complete all admission observations –temperature, oxygen saturation, heart rate, blood pressure and respiration, overall assessment
- Position the infant to facilitate comfort and optimize respiratory effort. The prone position has been demonstrated to optimize respiratory effort (McEvoy et al 1998).

Ensure head position in good body alignment to minimise extreme rotation and subsequent interference with cerebral blood flow.

- Place blue inspiratory tubing upper most if the baby is on the side, to prevent condensate spilling into the nares, ensure the temperature probe is positioned upright.
- A plastic tree may be utilised to assist with positioning of the inspiratory and expiratory limb however ensure correct prong position is maintained. Careful observations are required if a tree is used with an active baby as tubing is fixed in position. Tubing must be positioned ‘downhill from the baby’ to prevent condensate running into the nares.
- Allow the baby to settle, if possible until the next care time, before applying further fixation such as Duoderm™/ Velcro™. The fixation device is to ensure optimum prong placement is maintained. Refer to Appendix 1 for fixation device options.

Maintenance of CPAP

Observations for infants on CPAP

Care of babies on CPAP requires skill and organisation. PEEP must be maintained as much as possible, to facilitate continued lung recruitment

- Assess and document vital signs hourly. Report any deterioration in vital signs
- Observe for signs of increased work of breathing and discuss with MO/NNP
- Maintain saturations 90-94% (see CPG 5.1.8)
- Acid base homeostasis, blood sugar, and electrolyte levels should be monitored according to the baby’s condition. Check with the MO/NNP/Neonatologist what is required for the individual baby in your care and ensure it is documented.
- Observe activity and patient position (document patient position on flow chart i.e. prone etc.)
- Systematically check flow, FiO₂, bubbling, water overflow, inspired gas temperature and document hourly
- Assess clear tubing for water condensate at least hourly and clear as required (water in the tubing acts as a medium for infection and interferes with gas flow)
- If condensate builds up and enters the nares consider placing the blue inspiratory tubing uppermost.
- Empty overflow chamber of bubble CPAP generator as necessary-do not allow to pass black line
- Check anatomical prong placement and nasal septum at least hourly (septal trauma can occur quickly with devastating consequences to the baby)
- Check efficacy of Velcro and duoderm fixation device hourly
- Ensure hat and chin strap fit well, and that pins/tape and tubing are positioned correctly.
- Change chinstrap if ineffective
- Change hat and/or remove hat and examine head once per shift
- Assess head for moulding, pressure, bruising, oedema any signs of abnormality. Report to medical officer/NNP and consider physiotherapy referral.

- Pain score assessment should be completed prior to and post painful procedures
- Change complete circuit weekly and date
- Change water feed bag as needed, check new bag with RN

IMPORTANT - if the baby has oxygen requirement whilst on CPAP “blow over” oxygen must be provided whenever the baby is off CPAP for any reason.

Suction procedure

Babies are nose breathers and require a patent airway, free of secretions for optimal CPAP to occur

Suctioning should be done 3-4 hourly or more frequently if required. The need to increase suction frequency is based on an assessment of increased work of breathing, FiO₂ requirements and activity levels.

Once CPAP has ceased patency of the airway is maintained by 4-6 hourly or more frequently if required, for 12-24 hours.

A size 8 FG suction catheter should be used for naso-pharyngeal suction. If there is resistance advancing the catheter use a 6 FG catheter. If resistance is met with the smallest catheter notify the TL and MO.

Measure the suction catheter from the tip of the infant's nose to the lobe of the ear and half the distance again to provide the total distance the suction catheter will be inserted into the nose. The aim is for deep naso-pharyngeal suctioning.

- The suction should be set at 80-100 mmHg.
- Remove the nasal prongs. Apply ‘blow over’ oxygen using flow driver device (Neopuff™) if required. Insert the suction catheter along the floor of the nose to required depth and suction secretions, apply suction on the way out only. The nares should be cleared by the second pass of the suction catheter, numerous passes are unnecessary, if secretions are thick or tenacious frequency of suctioning should be increased. Also ensure adequate humidification is being delivered to the inspired gas.
- Suctioning should be carried out effectively and efficiently minimising the time the infant is off CPAP to avoid alveolar collapse. If the infant is not tolerating the procedure (bradycardia, desaturation and/or apnoea,) stop and resume CPAP. Allow the infant to recover then recommence procedure.
- When the naso-pharynx has been cleared of secretions gently suction the mouth. **Oral secretions should be cleared with shallow suctioning only**, no further than the back of the tongue. A gag should be avoided. *The mouth is not an airway except in Choanal Atresia.*
- Clean the suction tubing with bottled distilled water following the procedure
- Change bottle of distilled water daily. Date and name the bottle
- Document findings and report any concerns to MO/NNP

Resuscitation

- Ensure Neopuff flow and pressures checked at commencement of shift according to ARC guidelines (2010)
- Have Neopuff™ readied for use when attending to cares
- If condition deteriorates and the baby requires resuscitation remove **ALL** fixations around the nose and mouth, including Duoderm™, Velcro™ and orogastric tube, to ensure good mask seal

Feeding

- Infants on CPAP may continue to be fed, depending on the infant's respiratory status.
- It is recommended that the infant on CPAP should be fed by oro gastric tube.
- If respiratory rate exceeds 70 bpm with obvious sternal and subcostal recession medical advice should be sought prior to feeding.
- Please keep in mind that the baby has a size FG 8 oro gastric tube in situ and the feed will go faster than a size FG 6 if kept at the normal height-therefore lower the height the tube is held to slow down the rate of the feed.
- Infants >34 weeks on full 3rd hourly enteral feeds, and no other abdominal complications may have a gastric tube inserted for the feed alone. Aspirate the gut and check gastric pH before giving the feed. Assess the infant regularly for signs of abdominal complications and replace indwelling O/G tube if symptoms arise.
- Infants > than 34 weeks may also start sucking feeds. Consultation is needed with neonatologist.

Hygiene

- Throughout cares ensure that PEEP is maintained
- Check patency of prongs and clean prongs with sterile gauze and sterile water with cares if necessary
- May require a 2nd set of prongs in trolley drawer the same size if baby does not tolerate having prongs removed for cleaning
- Change chin strap if dirty or moist.
- Change neck roll if soiled, misshapen or incorrect size
- Remove hat once per shift(more if needed) and change if baggy or soiled
- Bath/sponge bath and weigh as per Skin CPG -5.3.9

Positioning

- In the acute phase of the infant's respiratory care, it's paramount to consider prone positioning for respiratory support (Lund, 2011).
- Developmental positioning, including supine and lateral can then be considered
- Document position and best tolerated position on flow chart
- Minimal handling is needed for sick or fragile infants
- To settle the baby provide containment boundaries, swaddling, pacifiers (if consented)

Parental Involvement

- Encourage family centred care
- The benefits of Kangaroo care in infants are well documented –see NICU CPG: [‘Kangaroo Care in NICU’](#)
- Facilitate kangaroo care whilst on CPAP, assistance may be required from 2nd nurse.
- If CPAP has been ceased in the previous 12-24 hours please discuss kangaroo care with TL, NNP or MO.

Bedside Documentation

- Time CPAP commenced and ceased
- Respiratory support modality
- Prong type
- FiO₂ concentration and signature
- PEEP
- Flow
- Airway temperature
- Vital signs
- Prong size
- Change of hat, chin strap, prongs, fixation device
- Status of nasal septum
- Response to CPAP
- **NICUS**- Infants who require CPAP for 4 hours or longer will be recorded in NICUS

Ceasing CPAP

Infants 34 – 40+ corrected gestational age

If a baby has been placed on CPAP soon after birth and has settled within 6 hours, the baby can be taken off CPAP after discussion with the medical officer. The baby’s respiratory status and work of breathing must continue to be monitored hourly to ensure the baby does not need to go back onto CPAP. Perform blood gas analysis as indicated

Infant 32-33⁶ weeks corrected gestational age-

Decisions on ceasing CPAP may be nurse initiated if the infant meets all of the criteria listed below

- Has been in FiO₂ 0.21 for at least 24 hours with saturations 90%-94%
- Is > 72 hours post extubation
- Respiratory rate 40-60 and no increased work of breathing
- No apnoea/ bradycardia requiring stimulation

However

- If the infant deteriorates or has an oxygen requirement the nurse will recommence CPAP.
- The Neonatologist will then decide further respiratory management on medical rounds

Infants <32 weeks corrected gestational age –

Decisions about ceasing CPAP must be made in consultation with the Neonatologist

Infants may be considered ready for trial off CPAP if stable during cares, with no increased work of breathing, no apnoea, no bradycardia and in 0.21 FiO₂ for at least 48 hours (and > 7 days of life for infants born at <29 week gestation)

All gestations

- The nurse must ensure a clear airway is maintained, nasopharyngeal and oral suctioning performed 4-6 hourly or more frequently if required for the first 12-24 hours off CPAP. (*Remember secretions narrow the airways*).
- Record vital signs hourly for as long as deemed medically necessary
- Check blood gas 4 hours after discontinuing CPAP. Assess the need for further monitoring with MO/NNP/neonatologist

Recommencing CPAP

It is expected that the infant's respiratory rate may temporarily increase. If the tachypnoea does not settle an assessment of work of breathing should be made and a decision to return the infant to CPAP. In most instances the decision to recommence CPAP is nurse initiated however in an infant who has been off CPAP for a period of 24 hours or longer should be reviewed by a medical office/NNP prior to re-initiating CPAP. The observation flow chart and medical records must clearly identify the rationale for the decision to resume CPAP.

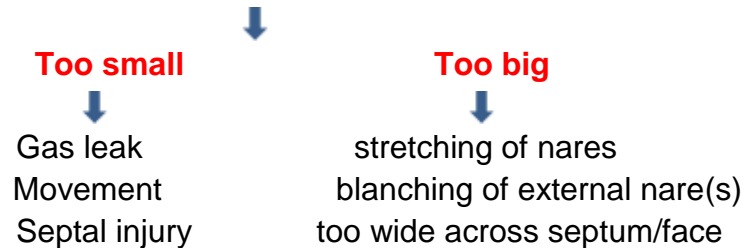
Trouble shooting

The main issue requiring trouble shooting is Bubbling

1 Equipment

- Check circuit for leaks, tighten connections
- Assess prong size in relation to weight. They should be a snug fit.
- NEVER CUT PRONGS

2 Prong size: Are the prongs the correct size?



Check anatomical position of the prongs. The prongs should follow the anatomical curve of the floor of the nose and sit like “Snake fangs”

Not anatomically placed

Ensure tubing at right angle to prongs

Ensure prongs sitting like “cats Whiskers” (not bent around face)

3 Hat, chin strap:

Assess efficacy of hat, velcro fixation device and chin strap, change if sub optimal

4 Attachment:

Consider the ‘hudson™ CPAP wrap’ or ‘breathe right’ strip, particularly if the next size prongs are too big

5 Flow:

Increase flow in increments of 1litre/min from 6 -10litres/minute. Increasing flow will compensate for any leak around the prongs

6 Position:

A change in infant position may increase effective CPAP by decreasing the leak, if this occurs the flow may then need to be reduced in increments

7 Other actions:

Utilise pacifier (if parental consent given)

If all of the above fail to produce effective bubbling of the system **ONLY THEN:**

- **Consider applying an appropriately sized Neoguard™ or a “piggy nose”.**
The nose is not protected and it is difficult to assess prong placement
- Discuss with NNP/MO if ineffective bubbling continues

Document: all troubleshooting and changes on L3 flow chart, and in the progress notes.

AUTHOR: Vivienne Whitehead CNE NICU
Jenny Ormsby (Updated 2017)

REVIEWED BY: Javeed Travadi Neonatologist NICU JHCH
Joanne McIntosh Neonatologist NICU JHCH
Julie Gregory CNE NICU JHCH
Ruth Wootton CNS NICU JHCH
Danni Hanna CNS NICU JHCH
Amy Shaw RN NICU JHCH
Koert de Waal Neonatologist NICU JHCH
Sinead Redman Acting Nurse Manager NICU JHCH

APPROVED BY: NICU Operational, Planning & Management 18/12/2017
JHCH Clinical Quality & Patient Care Committee 19/12/2017

Appendix 1

Hudson Prong fixation

Attention to nursing detail is the key to effective CPAP and potential improved outcome for the patient. Fixing and maintaining the Hudson prongs in an anatomical position with minimal movement is the aim of the hat and velcro fixation devise. The chin strap is used to minimise leak and enhance effective CPAP.

Please remember that excellent nursing care and attention to detail is the absolute KEY to effective CPAP

HAT -a number of hats are available for use.

The principle of the hat is that it is secure, not loose and not too tight. A loose hat will not act as an anchor for the prongs and they will move, potentially causing damage to the nose and septum, a tight hat will cause moulding of the baby's head. Irrespective of hat choice the hat must sit just above the level of the eyebrows, covering at least $\frac{3}{4}$ of the ears and pulled down to the nape of the neck.

- **The Hudson hat** - comes as part of the prong set .These hats are useful on admission as they are the correct size to match the prong size. These hats tend to become loose and need to be changed to a more secure hat with the first set of cares, if not before. They are useful for the bigger baby who may be on CPAP for a short period of time.
- **Canberra hats** - used generally for the transport of babies between neonatal units and for babies on continuous bedside aEEG monitoring (BRAINZ monitoring). They can however be used on the NICU in babies >32 week gestation. In babies <32 weeks these hats can cause head moulding and therefore are not used. If using the Canberra hat 2 pieces of prickly Velcro are required around the blue/white circuit ends to secure straps to hat



Canberra Hat

- **Tubigrip stockinet hat** -can be made once the head size of the baby is known. Tubigrip stockinet comes in 3 sizes. Two types of hat can be made. Type A hat tends to be thicker, so watch for head moulding and correct prong placement. Consider Type B hat in ELBW infants and or babies with head moulding/ orbital oedema



Stockinette hat



Double length stockinette & twisted

A) Measure from the crown of the head to the ear lobe (finished length). A double length of stockinette is then required, twist in the middle and fold back over upon its self. Fold the edge up TWICE to form a wide brim (approximately half the length of the hat from crown to eyebrow). The brim distributes the pressure more evenly around the head. More than two folds for the brim will increase the risk of head moulding and distort prong position.

-Note that the hat fits the baby's head with no excess material at the crown. Excess material at the crown reduces the stability of the prongs and increases the risk of nasal/septal damage



Neat fitted hat

B) measure from the crown of the head top ear lobe, use this distance and half again. Fold one end of the stockinette twice to form the wide brim. Place on baby and tie at crown with white tracheostomy tape. The tape is to secure the hat but must not be too tight to produce downward pressure on the crown of the head.



Stockinette hat tied with tracheostomy tape

Velcro and duoderm

The purpose of this fixation device is to maintain the position of the prongs. The prongs must follow the natural curve of the nasal passage and be held in place to reduce the risk of septal injury. The prongs must sit off the top lip and sit straight like 'cats whiskers'. Good anchoring is essential however vigilant nursing observation of the baby and prongs for movement and pressure areas is imperative.

A few alternatives are available for use. Consider which would work best. A baby who has lots of oral secretions will benefit from option 2 rather than option 1. In all instances the duoderm sticks to the skin and the prickly Velcro to the duoderm. The duoderm/Velcro device should sit as close to the nose as possible, without irritation to the nose. If the device sits on the cheeks, the prongs are likely to move due to increased mobility of the cheeks. The device should be changed when it is seen to be lifting from the baby's face.

- Option 1: Cut a thin piece of duoderm in the shape of a barbell. Care must be taken to cut appropriate sized rounded ends to ensure correct placement close to the nose and away from the eyes. Cut 2 circles (to sit on the rounded end of the duoderm). The duoderm does not protect the top lip



Option 1 Velcro & Duoderm Barbell



Option 2 Circles of Duoderm & Velcro



Option 2- in position on doll



Soft velcro on Hudson Prong

- Option 2: Cut 2 circles/rectangles of duoderm and prickly Velcro. Place close to nose. This also allows for taping of gastric tube to the top lip and reduces the need for repeat OGT insertions.
- With both options two thin strips of soft Velcro are needed and placed on to the Hudson prongs, on either side of the nasal prongs.
- Once anatomical prong placement has been achieved attach the soft Velcro top the prickly Velcro.

Chinstrap

The purpose of which is to minimise air leak from the mouth and to ensure effective CPAP. The chin must be cupped by the chinstrap and the tape anchored to the hat not the tubing. Ensure the chin strap is not too tight allowing the infant to yawn and use a dummy if required.

Consider the size of the baby, and make the chin strap to fit accordingly. The gauze should extend from the brim on one side to the brim on the other. The tape must be secured to the body of the hat not just to the brim. (As shown)



Gauze chin strap & transpore™ tape to secure tubing to hat for preterm infant



Canberra™ hat with chin strap

Making a chin strap

- The Canberra hat™ comes with its own chin strap and is secured with Velcro™, which also provided with the hat
- Take a pack of sterile gauze. Use either one or two pieces of gauze. Fold into thirds length wise. Measure from edge of hat on one side to the other and cut to size. For bigger babies, elongate using more gauze and consider using non stretch leucoplast™ wider tape.
- To secure the gauze. Cut 3 small pieces of narrow non-stretch leucoplast™ tape. Place tape around ends of gauze and one piece around the centre.
- Cut longer piece of tape to extend along the length of the gauze and to extend up the sides of the hat. Remember the tape needs to anchor to the body of the hat not just the brim.

NOTE do not place chin strap tape around the blue and white tubing as this can potentially distort the position of the prongs

Appendix 2

Nose wrap. This wrap is made from thin Duoderm™ and does not cover the nasal septum



The nose wrap applied to the infant's nose and upper lip

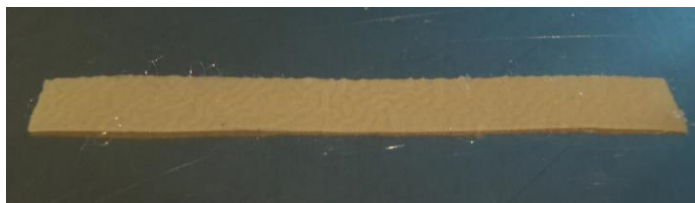
Cut the Duoderm™ where indicated (not continuous over nose)



An example of how to cut a nose wrap from Duoderm™

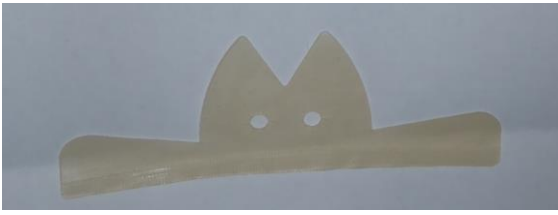


The breathe right strip extends across the bridge of the nose



Appendix 3

Apply the Neoguard™ with caution and document why it is being used
 Instructions for applying the Neoguard™ are available in each Neoguard™ box



HeadShield
 32 Fortien Building
 475 Castle Peak Road
 Cheung Sha Wan
 Kowloon, Hong Kong

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Instructions for Applying the Neo-Guard

Using the Neo-Guard Sizing Guide below, select the size that most suits your patient.

| Babies weight (approximate) | Neo-Guard size |
|-----------------------------|----------------|
| < 700g | 0 |
| 700g to 1250g | 1 |
| 1250g to 2000g | 2 |
| 2000g to 3000g | 3 |
| > 3000g | 4 |

1. Ensure the baby's nose area is totally clean and dry by washing gently with water. This will aid the adhesion of the Neo-Guard.

2. Gently remove the Neo-Guard from the packaging, trying not to stretch the hydrocolloid material.

3. Fold both the top and bottom halves to ensure that the pre-cuts are separated.

4. Place the Neo-Guard over the baby's nose, ensuring that the holes line up with the Nares.

5. Gently smooth out the Neo-Guard petals over each side of the nose ensuring that there are no creases or lumps that may cause a pressure area.

6. Wed the Velcro material over the NCPAP tube to ensure adhesion to the Neo-Guard.

7. Gently insert the NCPAP prongs into the holes in the Neo-Guard material.

Notes:
 The hole size of the Neo-Guard may appear smaller than the prongs that need inserting. The notes have pre-cuts to enable them to flare out and hold the NCPAP prongs in position. This will ensure that the prongs will be gripped by the Neo-Guard, so keeping them in position, minimising leakage and maintaining positive pressure.

Helpful Hints:
 Two Velcro strips are included with each Neo-Guard. These can be used to assist in the securing of the prongs of the NCPAP to the Neo-Guard by wrapping around the tube on each side of the prongs and attaching to the hooks on the Neo-Guard strip.

Warm the Neo-Guard before use. (leave inside Incubator for short periods)

Do not try and stretch the Neo-Guard material, as the Hydrocolloid will try and re-assume its original shape / length after a short period of time. This may then cause the material to pull away from the babies skin or will cause the babies skin to pull together.

Guideline does not replace the need for the application of clinical judgment in respect to each individual patient.

Staff Preparation

It is mandatory for staff to follow relevant: "Five moments of hand hygiene", infection control, moving safely/safe manual handling, documentation practices and to use HAIDET for patient/carer communication: **H**and hygiene **A**cknowledge, **I**ntroduce, **D**uration, **E**xplanation, **T**hank you or closing comment.

IMPLEMENTATION, MONITORING COMPLIANCE AND AUDIT

1. Approved clinical guideline will be uploaded to the PPG and communication of updated "Continuous Positive Airway Pressure" clinical guideline to NICU staff will be via email and message on the HUB.
2. Incident investigations associated with this Guideline and Procedure will include a review of process.
3. The Guideline and Procedure will be amended in line with the recommendations.
4. The person or leadership team who has approved the Guideline and Procedure is responsible for ensuring timely and effective review of the Guideline and Procedure.
5. Evaluation will include a review of the most current evidence as well as a consideration of the experience of Neonatal staff at JHCH in the implementation of the Guideline and Procedure.

References

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FEEDBACK

Any feedback on this document should be sent to the Contact Officer listed on the front page.