



CLINICAL GUIDELINE

**Continuous Positive Airway Pressure (CPAP)**

<b>Scope (Staff):</b>	Nursing and Medical Staff
<b>Scope (Area):</b>	NICU KEMH, NICU PCH, NETS WA

This document should be read in conjunction with this [DISCLAIMER](#)

### When to Use CPAP

To maintain or increase functional residual capacity of the lungs, help prevent alveolar collapse, reduce the work of breathing and improve gas exchange in infants.

CPAP can be used to treat:

- Infants with clinical signs of respiratory distress.
- In the weaning process from ventilator support.
- Splinting of upper airway in infants with obstructive apnoea.
- Infants with apnoea of prematurity.

### Indications of CPAP Failure and the Need for Intubation

- A rising PaCO<sub>2</sub> to > 60mmHg and falling pH < 7.25 despite CPAP.
- Increasing FiO<sub>2</sub> and hypoxia.
- Recurrent apnoea requiring stimulation and resuscitation.
- Incipient collapse.
- Administration of surfactant replacement therapy.

**The requirement of intubation should be discussed with the SR or consultant.**

### Discontinuing CPAP

Weaning CPAP in an infant who is clinically stable

- Wean FiO<sub>2</sub> first then CPAP pressure.
- Cease CPAP completely without cycling when clinically stable, in CPAP of 5cmH<sub>2</sub>O and in air.

Re-establish CPAP at previous level or consider HHF if

- Requires oxygen.
- Worsening apnoea.
- Respiratory rate consistently over 60.
- Or increased work of breathing.

Or transition to HHF at 4L/min if clinically stable at CPAP of 5cmH<sub>2</sub>O

- If previous attempt(s) to cease CPAP unsuccessful.

- Or has persistent oxygen requirement on CPAP.

**Interval between attempts to wean should be 48 hours or greater.**

## Equipment

Bubble flow circuit and appropriate size Hudson CPAP prongs to achieve a snug fit.

Prongs:		<ul style="list-style-type: none"> <li>• Oxygen-air blender.</li> <li>• Oxygen high flow meter.</li> <li>• IV pole/stand.</li> <li>• Clear combi-stop for outlet port on prongs.</li> <li>• Humidifier base and temperature probe.</li> <li>• Sterile water for irrigation.</li> </ul>
• size 0	< 700 grams	
• size 1	700-1250 grams	
• size 2	1250-2000 grams	
• size 3	2000-3000 grams	
• size 4-5	> 3000 grams	



## Nursing Care and Application of CPAP

- Adjust the CPAP gauge to the pressure setting of 5-7 cm/H<sub>2</sub>O or as ordered.
- Adjust the oxygen flow to 5-8 L/min, occlude the prongs and observe the bubble chamber for bubbles (make sure combi-stop in place). Bubbling should be constant but not excessive.
- Insert and secure an orogastric tube (FG5 for infants < 1500 grams, FG6 for infants > 1501 grams) for gastric decompression. Decompression of the stomach and the removal of air must be performed 3-4 hourly.
- Too much space between prongs and nares will allow movement and cause trauma. Too little space between prongs and nares will cause blanching around the nostrils indicating too much pressure.
- CPAP pressure and flow rate should not be altered / increased without discussion with medical staff.
- CPAP delivery must be maintained at **ALL** times whenever the infant is handled e.g. cares, weighing and releasing of CPAP cap to avoid atelectasis in CPAP dependant infants. NB. Re-recruitment of alveoli may take up to 4 hours.
- Application of nasal comfeel is a 2 person procedure for CPAP dependent infants. One nurse correctly applies comfeel while the other holds prongs in position decreasing the risk of loss of CPAP delivery during application.
- Ear pads, which can be positioned around the pinna, may be applied if infant's ears appear to be excessively flattened. Assess and document with each hat release.

- Position the infant either prone, ¼ turn prone or side lying. A ¼ prone position is preferred for the preterm infant as it encourages optimal expansion of lungs whilst preventing positional deformities. Use appropriate positioning aids to ensure alignment of head and neck (to ensure a patent airway) and shoulder support to prevent pressure on the face from the circuit tubing.

### Methods of Securing CPAP Device

#### CPAP Cap System (never place woollen hats underneath CPAP Cap)

CPAP Cap system comprises of:

- CPAP Cap x1 (size appropriate).
  - Long Velcro strip x2.
  - Short Velcro strip x2.
  - Chin strap x1.
  - Self-adhesive Velcro wrap x2.
  - Securing device / toggle x1.
1. Select the appropriate CPAP Cap size. To determine the correct size - measure the circumference from the nape of the neck, across the ears to the middle of the forehead (like a turban). E.g. Not the same as a head circumference measurement.
  2. Place cap around the nape of the neck, over ears and across the middle of the forehead (turban style). Align the stitched marking on the cap to the tip of the left ear. Position overlap (at least 2 cm) of the cap in the middle of the forehead. No overlap means the cap is too small - use the next size up. Gather the top of cap together with a twist and use toggle creating a snug fitting cap.
  3. Place self-adhesive Velcro lengthwise around each corrugated CPAP tubing as close as possible to the nasal prongs connection.
  4. Position nasal prongs in nares, ensuring a downward arch. Secure the CPAP tubings in place with the CPAP Cap long Velcro strips.

Note: Cap should not be tight as excessive moulding will result.

#### Bonnet with Ties

To be used if excessive moulding is observed in an infant < 30 weeks gestation and/or if nasal skin integrity is compromised.

Reassess in 72 hours and recommence CPAP Cap System if moulding/excoriation has resolved.

Equipment needed:

- Snug fitting woollen bonnet.
  - Blue ties (for securing CPAP tubings).
  - Velcro (hook and fastener).
  - Skin prep swab.
  - Comfeel.
1. Apply skin prep to cheeks. Cut 2 pieces of comfeel with round corners sized to fit cheeks.
  2. Apply hook Velcro cut into an oblong to each piece of comfeel on cheeks.

3. Apply fastener Velcro to prongs, ensuring it is wrapped all the way around the prongs TWICE to increase the distance between the nasal septum and prongs and reduce risk of trauma to nasal septum. Ensure the cut edge of the wrapped Velcro strips face away from the eyes.
4. Apply a well-fitting bonnet with ties. The ties are to be placed appropriately, (i.e. When the bonnet is in-situ, they are at the level of the tip of the ears) to facilitate securing of CPAP tubing with ties in the correct position.

### **CPAP Mask**

CPAP pressure delivery via mask may be alternated with nasal prongs 4 hourly when there is evidence of septal redness / trauma.

- Select the appropriate size mask for the infant. The mask is to be used in conjunction with a size 2 nasal prong to provide a tight seal with the mask.
- Adjust the gas flow rate between 7-10 L/m to achieve bubbling.

### **Nasal Comfeel Application**

- Application of nasal comfeel allows correct size nasal prong selection for weight to be used on infants despite the variance of individual nares size.
- It provides an effective seal around the nares which enhances effective bubbling.
- It helps protect the septal and intranasal area by keeping the nasal prongs positioned centrally and preventing excess movement side to side and in and out, it does not however prevent nasal trauma due to pressure on septum.

### **Method of Application**

1. Apply post admission to stabilised babies receiving CPAP therapy.
2. Comfeel must be checked at each hat release to ensure the punched holes have not enlarged allowing excessive movement.
3. Using plastic templates corresponding to weight range. Cut and customise to fit infants facial features.
4. For best results nasal comfeel holes should be punched smaller than prong diameter.
5. Keep backing of newly cut and customised nasal comfeel as the baby's personal template and return plastic template to resus trolley.
6. Apply to a clean and dry nasal area, consider using a barrier wipe (skin prep or convacare barrier wipe). Allow area to dry this facilitates better adhesion.
7. Align punched holes with centre of nares.
8. Gently press comfeel onto upper lip then using finger tips press comfeel upwards following contours of nose excluding any air.
9. Finally secure nasal comfeel at the bridge of nose either by overlapping edges or pinching edges together to ensure a seal.
10. After application closely monitor for signs of prolonged blanching (NB. Transient blanching may be observed but resolves spontaneously with return of circulation and capillary refill).
11. Nasal comfeel MUST be changed at least 24 hourly with daily hygiene regimen or as required when punched holes are no longer immobilising prongs.

12. If skin integrity is compromised i.e. inflamed or moist. It may be necessary to remove nasal comfeel for 24-48 hours to enable airing and healing and revert to bonnet and ties system to secure prongs.
13. Term babies may not require nasal comfeel to be applied if the prongs fit appropriately and effective bubbling is achieved.

## CPAP Nursing Care

- It is preferable that all infants use the CPAP Cap System.
- The CPAP Cap must be released for several minutes with routine handling and cares to minimise moulding of the head and pressure areas occurring. Strictly 3-4 hourly for infant's < 34 weeks and 3-6 hourly for all other infants. Document on MR489 chart and score the presence of scaphocephaly according to the **'Scaphocephaly Rating Scale', appendix 1**. (Note: preterm infants with a history of excessive moulding may need to maintain 3-4 hourly hat release past 34 weeks CGA).
- When inserting the prongs into infant's nares, position the prongs in a downward arch position but not in contact with the nasal septum, then secure them to prevent distortion of the nares and compression of the septum. Ensure there is always a minimum 2 mm gap between prongs and septum.
- Observe the bubble chamber for bubbling, this ensures positive pressure is being delivered. Bubbling assists recruitment of alveoli and gas exchange.
- Removal of nasal comfeel must only be done using an adhesive removal wipe to reduce trauma to facial skin and aid quicker removal. When removed inspect skin integrity (nares, septum and nose), document any apparent redness or ulceration.
- Babies who are very active may cause the holes in the comfeel to rapidly enlarge and ineffectively hold the prongs in place. These babies will require a soft Velcro bolster wrapped around either side of the actual prongs to physically prevent the prongs touching the septum. Ensure that the Velcro bolster is positioned so that the cut edge is placed near the baby's cheek well away from the baby's eyes.
- To help prevent the weight of the CPAP tubing dislodging the prongs from the infant's face during weighing, repositioning or cuddles with parents - wrap a strappit around both tubes approx. 20 cms above the infant's head.
- Document the following on the MR489, current CPAP nursing check sheet and/or progress notes:
  - Nasal comfeel last changed.
  - Condition of septum and nares.
  - Evidence of head moulding. (see Appendix 1)
  - Infant's position.
  - CPAP effectiveness.
  - Date of CPAP cap change (weekly).

## Developmental Positioning for Stable CPAP Babies

Once an infant is stable on CPAP then rotation through different positions including supine will contribute to infants developmental care, both physical and neurological. There is no specified gestational age or weight criteria and nutrition via continuous milk feeds (CMF) does not preclude the use of a supine position.

Stable is defined as:

- Stable O<sub>2</sub> requirements for 48 hours.
- Minimal sternal recession when in supine position.
- Respiratory Rate < 80 breaths per minute with minimum work of breathing (e.g. no increase in use of intercostals/accessory muscles and no rising CO<sub>2</sub>).
- Occasional desaturation episodes and self-resolving bradycardias.
- No apnoeas.
- Tolerating 75% full intermittent tube feeds or CMF.
- Minimal OGT aspirates 4 hourly.
- No vomiting.
- Infant must be able to maintain appropriate temperature for gestation and weight.
- Utilise position chart below to select sequence of positions. This sequence should be customised to suit each individual infant. Any position that affects the stability of infants condition should be avoided until the infant's condition is stable enough to tolerate it.

**Stable baby**

C1 ¼ turn Supine on Rt / C2 ¼ turn supine on Lt side



Front view



Back view

D1 Supine facing Lt / D2 Supine facing Rt



CPAP babies In white cot swaddled to contain A1 & A2 C1 & C2



**Stable baby:**

- Minimal respiratory assistance CPAP=5-6cm
- FiO<sub>2</sub> = 30%
- No need for inotropes, colloid support to maintain BP
- No sepsis or respiratory or haemodynamic instability
- Tolerating 75% full enteral feeds

**Unstable baby**

**A1 Prone facing Lt /A2 Prone facing Rt**



Front view



Top view

**B1 ¼ turn Prone facing Lt/ B2 ¼ turn facing Rt**



Front view



Back view


CPAP babies who only tolerate ¼ turn prone - when cycling off CPAP please place prone.

**Check with coordinator or CNC before implementing Stable baby position changes**

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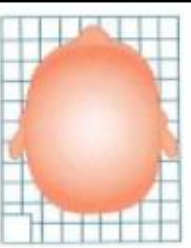
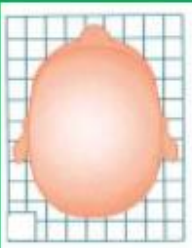



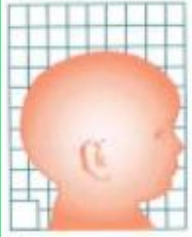






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Appendix 1:

Scaphocephaly Rating Scale

Pre Term infants are at risk of altered skull shape called Scaphocephaly. This is due to the altered external environment during a time of rapid brain growth.

	Nil	Minimal	Moderate	Severe	
Top View					Posterior bulging
Side View					Frontal bossing
Front View					Temporal narrowing
	<p><b>Nil:</b></p> <ul style="list-style-type: none"> <li>• Regular position changes</li> </ul>	<p><b>Minimal:</b></p> <ul style="list-style-type: none"> <li>• Regular position changes as appropriate/ tolerated</li> </ul>	<p><b>Moderate:</b></p> <ul style="list-style-type: none"> <li>• Regular position changes - progress to side lying</li> <li>• Use peanut pillow for cares</li> <li>• Alert Physio</li> <li>• Check for head turn preference</li> </ul>	<p><b>Severe:</b></p> <ul style="list-style-type: none"> <li>• Regular position changes - progress to side lying</li> <li>• Use peanut pillow for cares</li> <li>• Contact CNC to consider soft CPAP beanie</li> <li>• Consider using supine positioning</li> </ul>	