APPROVED DOCUMENT

Directorate of Anesthesia and ICU Department

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Acronyms

Non-Invasive	Nasal ventilation
CPAP	Continues Positive Airway Pressure
NCPAP	Nasal Continues Positive Airway Pressure

Policy and Procedure for Nasal CPAP Application for Neonates in NICU

Chapter One

1.Introduction:

Continuous positive airway pressure (CPAP) mode is a non-invasive respiratory support that is widely used in the respiratory management of newborns who requires nasal devices. A nasal trauma is a well-documented complication of non-invasive respiratory support. The lack of stabilization and excessive movement of the prongs could result in nasal injury, interface displacement, and loss of system pressure. The NCPAP devices should provide a good seal without causing skin excoriation, pressure necrosis of the nasal tissue or pain. Hence, NCPAP device should be carefully applied and monitored. The risk of nasal trauma can be minimized by adherence to the recommended fixation technique and close observation by care givers.

2. Purpose:

The purposes of this policy and procedure are to:

2.1 Assist the nurses, respiratory therapist and medical staffs in the determination of factors associated with skin injury during NCPAP devices application.

2.2 Identify early the signs of skin injury due to NCPAP devices.

2.3 Eliminate the incident of skin injury due to NCPAP devices.

3. Scope:

This policy and procedure is applied for all neonatologists/pediatricians, nurses and respiratory therapist involved in providing nasal CPAP for neonates.

4.Definition:

Continues Positive Airway Pressure (CPAP) – Positive pressure ventilation that is used to maintain or increase functional residual capacity of the lungs, help prevent alveolar collapse, reduce the work of breathing and improve gas exchange in neonates.

Chapter Two

5.Structure

It is the policy and procedure of Directorate General of Khoula Hospital (DGKH) to identify early the signs of skin injury due to NCPAP devices.

5.1 Before procedure:

a.A nurse should check the pediatrician's order for nasal ventilation device.

b. An equipment needed are: (see appendix (1) for Application of CPAP Interface Checklist):

i.The appropriate size bonnet/CPAP cap for the neonate.

ii. The appropriate size nasal prong or mask.

iii. The appropriate size NCPAP generator.

iv. Two pieces of comfeel/ duoderm with round corners sized to fit cheeks. One mustache shape duoderm for upper lip. To prevent pressure on the cheeks and upper lip due to the thread and interface.

v.Chinstrap needed, if mouth leak present.

5.2 During procedure:

a.Select the appropriate CPAP Cap/bonnet size. To determine the correct size, the nurse should measure the circumference from the nape of the neck, across the ears to the middle of the forehead (like a turban). It is same as a head circumference measurement. Cap should not be tight.

b. 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.

c.Measure for prong/mask size using the nose guide supplied in each packet. Connect the prong/mask to the generator tubing:

i.Prongs that are too large distend can distort the nares and cause pressure to the inner aspect of the nose leading to decreased perfusion and tissue necrosis.

ii.The prong size that is inappropriately small also leads to excessive damage with greater mobility in the nares causing friction and traumatic injury to the mucosal lining.

iii. Place the bonnet onto the neonate's head, checking that the ears are in a normal position. Ensure the bonnet is pulled well down over the ears and down to the nape of the neck.

iv. Place the generator on top of the bonnet above the central velcro strip. Then lift the generator from the top of the bonnet and bring towards the nose. Gently insert the nasal prongs/mask into position while supporting the generator:

- When inserting the prongs into neonates' nares, position the prongs in a downward arch position but not in contact with the nasal septum, and 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.

v. Apply skin prep to cheeks and upper lip. Cut 2 pieces of duoderm with round corners sized to fit cheeks and one mustache shape duoderm for upper lip.

vi. Secure the nasal/mask straps horizontally across the infant's cheeks. Do not over tighten. Then, secure all tubes from the generator with the central Velcro strip. Tie the open end of the bonnet if desired.

5.3 After procedure:

a. After initial application, the nurse has to check for the following:

i. Bonnet is well down over the neonate's head.

ii. Ears well covered and flat against head.

iii. Prongs/mask correctly positioned.

iv. Nose in normal position not squashed or pulled upwards.

v. Eyes clearly visible.

vi. Generator is stable and secure.

vii. Neonates receiving required level of NCPAP.

viii. Adequate humidification.

b. Every hourly to 2 hourly of ongoing assessment is required if redness or ulceration in the skin observed (see appendix (2) for assessment documentation flow chart) ; the a singed nurse need to:

i. Check for septum redness or trauma with penlight.

ii. Document any apparent redness or ulceration; according to the following:

- Stage 0 – normal skin.
- Stage I (mild) – hyperemia.
- Stage II (moderate) – disruption of skin integrity and the onset of bleeding and ulcerated lesion.
- Stage III (sever) – lesion in the subcutaneous tissue without involvement of tendons and muscles.

iii. If neonate has blanching erythema, change interface from prong to mask or mask to prong (if the mask is available). Note how long since last change and plan to change earlier next time.

iv. Note how long since last change and plan to change earlier next time.

v. If blanching erythema seen after 4 hours then alternate between prong and mask 3 hourly. If neonate has non-blanching erythema, no further pressure should be placed on that area until it has recovered.

vi. Check for space between the prongs and nares:

- A minimum 2 mm gap between prongs and septum.
- Too much space between prongs and nares will allow movement and not causing trauma.
- Too little space between prongs and nares will cause blanching around the nostrils indicating too much pressure.

vii. Check upper lip and cheeks for duoderm; replace duoderm with daily hygiene or immediately if soiled or wet. Removal of duoderm must only be done using an adhesive removal wipe to reduce trauma to facial skin and aid quicker removal.

viii. Check for a well-fitting bonnet with ties at the level of the tip of the ears.

ix. Check for mouth leak, if present apply chinstrap.

x. Check the CPAP tubing is supported appropriately. Inaddition, check for adequate humidification. Optimal humidity maintains the natural balance of heat and moisture in

the neonate's mucocilliary airway. This helps prevent blockage of the airways by mucus and reduce the infection rate.

xi. Ensure the infant has a clean airway, do suction as needed. Moreover, ensure that nasal prongs or mask is not occluded with mucus or water droplets. Wash in warm soapy sterile water as required.

xii. Strictly check every 3-6 hourly for all neonates and when indicated; release bonnet or CPAP cap for several minutes with routine handling and cares to minimize moulding of the head and pressure areas occurring.

xiii. Reassess bonnet and nasal prong/mask every 7days; and change them when indicated.

Chapter Three

6. Responsibilities

6.1 Head of the Departments (Neonatology/Nursing In-charges/ Respiratory Care) shall:

6.1.1 Emphasize the importance of following this policy and procedure.

6.1.2 Reinforce to all staff the importance of this policy and procedure regarding nursing care and the application of the NCPAP interface to neonates on CPAP, as well as reporting any adverse events for the neonate's safety.

6.2 Neonatologists shall:

6.2.1 Adhere to this policy and procedure.

6.2.2 Keep up-to-date with current evidence based research related to clinical practice.

6.3 Nurses shall:

6.3.1 Adhere to this policy and procedure.

6.3.2 Reassess the neonate's nares every two hourly.

6.3.3 Contact assigned pediatrician or neonatologist & discuss for any unsuspected failure.

6.3.4 Document any areas of redness or breaks in the nasal skin.

7.Document History and Version Control Table:

Version	Description	Name of Authors	Review Date
1	Initial release	Ms. Ruqaiya Abdullah Al-Harthi	2020
2	Second version	Ms. Ruqaiya Abdullah Al-Harthi	2028

8. References:

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9. Annexes

9.1 Appendix (1): Application of CPAP Interface Checklist

A. Initial Application

What I need:

- ☑ Select the **appropriate size** Bonnet/CPAP cap for the infant.
- ☑ Select the **appropriate size** nasal prong or mask.
- ☑ Select the **appropriate size** NCPAP generator.
- ☑ Chinstrap needed if mouth leak present.
- ☑ Two pieces of tagederm / duoderm with round corners sized to fit cheeks. One mustache shape duoderm for upper lip.
    - ✓ To prevent pressure on the cheeks due to the thread and interface.

B. After Initial Application

I checked the following:

- ☑ Bonnet well down over the infant's head
- ☑ Ears well covered and flat against head
- ☑ Prongs/mask correctly positioned
- ☑ Nose in normal position not squashed or pulled upwards.
- ☑ Eyes clearly visible
- ☑ Generator is stable and secure
- ☑ Infant receiving required level of NCPAP
- ☑ Adequate humidification.

Remember:

- ❖ Strictly every 3-6 hourly for all other infants and when indicated; **Release** Bonnet/CPAP cap for several minutes with routine handling and cares to minimize moulding of the head and pressure areas occurring.
- ❖ When there is evidence of septum redness / trauma CPAP pressure delivery **via nasal prong** may be alternated with nasal mask **4 hourly (if the mask is available).**
- ❖ Removal of duoderm 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.
- ❖ Reassess the bonnet and nasal prong/mask every 7 days.

Ongoing Assessment:

Every two hours check for:

- ☑ Septum redness or trauma with penlight.
  - ✓ Document any apparent redness or ulceration.
- ☑ Document the stages of nasal injury according to the following:
  - ✓ **Stage 0** – normal skin.
  - ✓ **Stage I (mild)** – hyperemia.
  - ✓ **Stage II (moderate)** – disruption of skin integrity and the onset of bleeding and ulcerated lesion.
  - ✓ **Stage III (sever)** – lesion in the subcutaneous tissue without involvement of tendons and muscles
- ☑ Space between the prongs and nares.
  - ✓ A minimum 2 mm gap between prongs and septum. 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.
- ☑ Cheeks and upper lip duoderm.
  - ✓ Replace tagederm / duoderm with daily hygiene or immediately if soiled or wet.
- ☑ Well-fitting bonnet with ties at the level of the tip of the ears
- ☑ CPAP tubing is supported appropriately.
  - ✓ To avoid weight falling on to the nostrils.
- ☑ The infant has a clean airway, suction as needed.
- ☑ That nasal prongs or mask is not occluded with mucus or water droplets. Wash in warm soapy sterile distilled water as required.
- ☑ Mouth leak, apply chinstrap.
- ☑ Adequate humidification.
  - ✓ Optimal humidity maintains the natural balance of heat and moisture in the infant's mucocilliary airway. This helps prevent blockage of the airways by mucus and reduce the infection rate.

9.2 Appendix (2): Application of CPAP Interface Checklist

Assessment Documentation Flow Chart

Bonnet/CPAP cap size: Nasal mask/prong size:

Baby Label

DATE:								
Time/ Check For	**Septum Redness /Trauma Stage**	**Space Between the Prongs & Nares**	**Duoderm/ Tagederm**	**CPAP Tubing Support**	**Clean Airway**	**Mouth Leak**	**Adequate Humidification**	**Checked By:**
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	

	III							
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	
	0 I II III	Y /N	Y /N	Y /N	Y /N	Y /N	Y /N	

9.3 Appendix (3): Recommendation for using CPAP devices

a) NCPAP tubing should be positioned on the hat following the manufacturer's recommendations. It should not press against the skin or pull upwards on the nasal septum.

b) If infant has blanching erythema, change generator from prong to mask or mask to prong (if the mask is available).

c) Do not apply creams, oil or ointments to the nasal area as there are risks of inhaling lotion and cream products, increase skin breakdown, blocking the nares and may lead to excessive moisture and undermine the skin integrity.

d) The humidifier should be adjusted at a temperature of 37°C to provide a gas that is 100% saturated. Inadequate humidification can lead to nasal mucosal damage, thickened secretions and mucus plugs.

e) Removal of duoderm must be done using an adhesive removal wipe to reduce trauma to facial skin and aid quicker removal.

f) It is also important to drain the CPAP circuit before repositioning the neonate to prevent condensate draining into the generator.

g) Ongoing assessment must be done two hours and hourly if redness or ulceration in the skin observed.

h) Any areas of redness or ulceration in the skin should be documented according to the following:

   i. **Stage 0** – normal skin.
   ii. **Stage I** (mild) – hyperemia.
   iii. **Stage II** (moderate) – disruption of skin integrity and the onset of bleeding and ulcerated lesion.
   iv. **Stage III** (sever) – lesion in the subcutaneous tissue without involvement of tendons and muscles.

i) Bonnet and nasal prong/mask sizes must be reassess every 7 days.