SUBJECT: Neopuff IPPV through Hudson Prong CPAP circuit in NICU

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KEYWORDS: apnoea, CPAP(Continuous Positive Airway Pressure), Hudson Prong, IPPV (Intermittent Positive Pressure Ventilation), Neopuff, Preterm,
ASSUMED KNOWLEDGE:
Anatomy and physiology of the respiratory system
Anatomy and physiology of the cardiovascular system
Completion of the CPAP self-directed learning package
Universal Infection Control procedures
Ventilation self-directed learning package completed or currently being undertaken.

Rationale
When infants are on CPAP (Continuous Positive Airway Pressure) and have a prolonged apnoea and/or bradycardia not responsive to stimulation, intermittent positive pressure ventilation (IPPV) is provided utilising the Neopuff and a face mask. To provide IPPV to the extremely small (approximately 500g) and premature infant in this way there is a risk of skin tearing when the CPAP set up is removed from the face. There is also a risk of excessive handling of the fragile neonate whilst the CPAP equipment is replaced. An alternative to this is to provide IPPV via the Neopuff attached to the CPAP Circuit.

Outcomes
- Practice is safe.
- Minimal handling of baby.
- Reduced risk of skin breakdown.
- Minimal interruption to CPAP circuit.

Background
Apnoea of prematurity can be a result of hypoxaemia, infection, anaemia, thermal instability, metabolic derangements, drugs, intracranial disease and/or prematurity (Cifuentes & Carlo 2007). All apnoeas requiring stimulation are recorded on the infant’s observations record. If an infant is prone to apnoeas, ensure adequate methylxanthines are prescribed, airway is clear from secretions, CPAP is properly and effectively positioned (See CPG JHCH_NICU_12.02 Continuous Positive Airways Pressure (CPAP)) and the infant has been reviewed by the medical staff.

Nasal CPAP is effective in preventing intubation and failure of extubation in preterm infants (Davis & Henderson-Smart2003, Jobe et.al 2002). However its effectiveness depends on a spontaneously breathing infant. Positive pressure ventilation is an invasive procedure, with the goal to optimise both gas exchange and clinical condition at minimum oxygen requirements and ventilator pressures. The ventilator strategy used to achieve this goal depends on the infant’s disease process. (See CPG Assisted Ventilation of the Newborn 5.1.4 (a)). In this instance IPPV is used to correct apnoea and support the infant until normal respirations are resumed (Gardner et.al 2011).
Providing IPPV via Hudson Prong CPAP

In preventing the need for intubation and ventilation and thus lung disease associated with this the infant who has apnoeas of prematurity may have the apnoeas supported by IPPV via the Neopuff™ and Hudson Prong™ CPAP.

**Indications for use**

- Extremely premature infant of ≤26 week’s gestation and experiencing frequent apnoeas and bradycardias despite appropriate CPAP.

If an infant requires increased respiratory support it is necessary for the infant to be reviewed prior to commencing Neopuff IPPV through the CPAP circuit.

Important to note that this system is
  - **Never** to be used as first line management of apnoeas- the nurse must ensure appropriate CPAP first.
  - **Never** to be used without documented approval by the Neonatologist.

The practice outlined below provides a solution to providing IPPV using the Neopuff™ and Hudson Prong™ CPAP circuit.

- **Display 1**

- **Display No 2**
  - Attach CPAP white tubing from pressure indicator in water bath to Neopuff™
2. Prepare Neopuff as described above (have a face mask of suitable size ready for use)
3. Aspirate the stomach contents and suction the nasopharynx and mouth if necessary.
4. Position infant on a flat surface, with head at the midline and neck slightly extended. Ensure appropriate CPAP is being provided (*See CPG 5. 1. 23 Continuous Positive Airways Pressure (CPAP)*)
5. Attach Neopuff™ to Hudson prong™ set up (white tubing) as shown in Display No 1 & 2.
6. Attach silicone extension and clamp as shown in Display No 3. (Metal clamp or Plastic Scissor forceps and extension pack are available from storage cupboard with respiratory equipment).
7. Provide IPPV through the CPAP circuit and continue until the infant is stable with a normal heart rate and SaO2 >90.
8. Remove scissor clamp (store in infant’s trolley).
9. Leave silicone extension piece in circuit for next time.

As the clamp is removed the baby will now receive CPAP via the CPAP circuit.

**Assessment of IPPV**

The effectiveness of IPPV is assessed by the observation of:

- Chest wall movement
- Infant’s response
- Improvement in saturations
Observations

All infants should be closely and continuously monitored following IPPV

- All monitors to have alarm limits set as per unit procedures.
- Physical assessment
- Observe respiratory rate, effort and rhythm
- Document and report to medical officer
- Maintain a size 8FG oro-gastric tube on free drainage and aspirate six hourly (to prevent the stomach becoming distended which may compromise lung expansion), and document on infant’s flow chart.
- At the commencement of each shift, check and test the infant’s Neopuff™ ensuring appropriate pressure settings and that an appropriate size face mask is attached.
- Also check suction equipment. Check the scissor clamp is in the infant’s bedside trolley and the extension piece is on the CPAP circuit. Ensure you are familiar with the location of the resuscitation trolley and pneumothorax trolley.

Observations of respiratory rate, heart rate, oxygen requirements, and oximetry and CPAP settings are all recorded hourly. Check settings and document them hourly. Suctioning should be performed and recorded as it is required. The acid base homeostasis should be monitored as required by medical staff by capillary or arterial blood gas measurements. Always check with the Neonatologist what is required for the individual infant in your care and ensure it is documented. (See CPG 5. 1. 23 Continuous Positive Airways Pressure (CPAP))

REFERENCES:


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