GUIDELINE

Humidified High Flow (HHF) Nasal Cannula Therapy

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NICU KEMH, NICU PCH, NETS WA

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this disclaimer

Aim

This clinical guideline serves as a practical resource for nursing and medical staff considering the use of Humified High Flow (HHF) in caring for infants in newborn intensive and special care unit.

Risk

There is a risk of potential missed opportunities for patients to receive this modality of respiratory support as part of their integrated care pathway. If guidelines and processes are not followed there is potential for patient risk in terms of reduced efficacy and safety.

Background

HHF therapy represents a means for providing humidified gas at a set flow rate (L/min) with an adjustable fractional inspired oxygen concentration (FiO_2). Mechanisms thought to improve respiratory function during HHF therapy include;

- Washout of naso-pharyngeal dead space thus improving CO_2 removal and oxygenation.
- Reduction of inspiratory resistance (work of breathing).
- Improved mechanics by supplying warmed and humidified gas (allows normal cilia action, decreases mucous viscosity, reduced tracheal inflammation).
- Provision of continuous distending pressure with prevention of atelectasis.

With HHF, the FiO_2 that the baby receives is the FiO_2 that is set.

Evidence for the efficacy of use of HHF in term and preterm infants, in a number of clinical scenarios are emerging, however remain imprecise. Utility of HHF as a modality for primary respiratory support & delivery room stabilisation, during and post-extubation and 'weaning' from Continuous Positive Airway Pressure (CPAP) continue to be a focus of research with inconsistent findings.

Indications for Use

- Delivery room stabilisation & primary respiratory support: There is insufficient evidence to support the use of HHF for delivery room stabilisation or primary respiratory support in term and preterm infants with Respiratory Distress, when efficacy is compared to delivery of CPAP continuous positive airway pressure.
- During intubation: The provision of HHF for delivery of respiratory support during emergency or elective intubation is not currently recommended due to lack of evidence base to inform clinical practice.
- Post-Extubation support: Current clinical practice is to use Continuous Positive Airway Pressure (CPAP) as the initial modality of respiratory support post-extubation. Recent metanalysis report that HHF may be an effective alternative to continuous positive airway pressure for post-extubation support of preterm infants >28 weeks' gestation, with similar efficacy in respect to rate of reintubation, death and BPD. However, the rate of treatment failure is considerably higher in infants <26 weeks' gestation. Following extubation, HHF is associated with less nasal trauma than CPAP.
- Availability of 'rescue" CPAP may be important for preventing extubation failure when using HHF and may be preferred as first-line therapy in the smallest infants.
- Currently, although there is a predominant and widespread practice in the use of HHF for weaning from CPAP, there is insufficient evidence to inform prescriptive recommendations. Four major RCTs report conflicting observations on the duration of supplemental oxygen and respiratory support by infants receiving HHF as an alternative wean compared to cycling/discontinuation of CPAP.
- Usage beyond these indications and recommendations must be led by a consultant neonatologist.

Perceived Advantages of HHF

- Simpler interface on the baby than CPAP.
- May aid in establishment of breast feeding due to the simpler interface.
- Studies have shown preference by nursing staff and parents.

Potential Complications of HHF Therapy

- Air leak
- Correct prong size (prongs approx. 50% of the diameter of the nares) is essential. There must be a leak around the nasal prongs. This leak is very important as there is no expiratory limb on the HHF circuit.
- Abdominal distension.

Commencement of HHF

- Infants typically should be over 28 weeks gestation.
- Starting flow is typically 4L/min.
- Flows may be adjusted up to 8L/min (providing the total flow is no more than approx. 2L/min/kg for that baby).
- FiO_2 adjusted as required to maintain oxygenation for gestational age.
- To reduce incidence of nasal trauma, ensure tubing is appropriately secured with clip.
- Ensure circuit connections and oxygen delivered are correct – see Setup

Nursing Care

- For repositioning of the infant on HHF, refer to the Developmental Positioning guideline.
- For detailed management of caring for infants with medical devices in-situ, refer to the Skin care guideline.

Transferring between nurseries

Please refer to Intrahospital transport of the Neonate guideline.

Weaning Strategies

There is no evidence from RCTs on specific weaning strategies. Due to the large prong size there is a potential concern that too low a flow will increase the work of breathing and thereby prolong the HHF requirement for an infant.

Recommendations:

- Wean FiO_2 first.
- Wean in increments of 1L/min.
- Flows of less than 3L/min should be used with care.
- Cease HHF (without cycling)
  - When in air and flow rates of 3-4L/min,
  - Or change to PBF for ongoing oxygen delivery in neonates in who require long term oxygen therapy. This would be typically in infants near term.

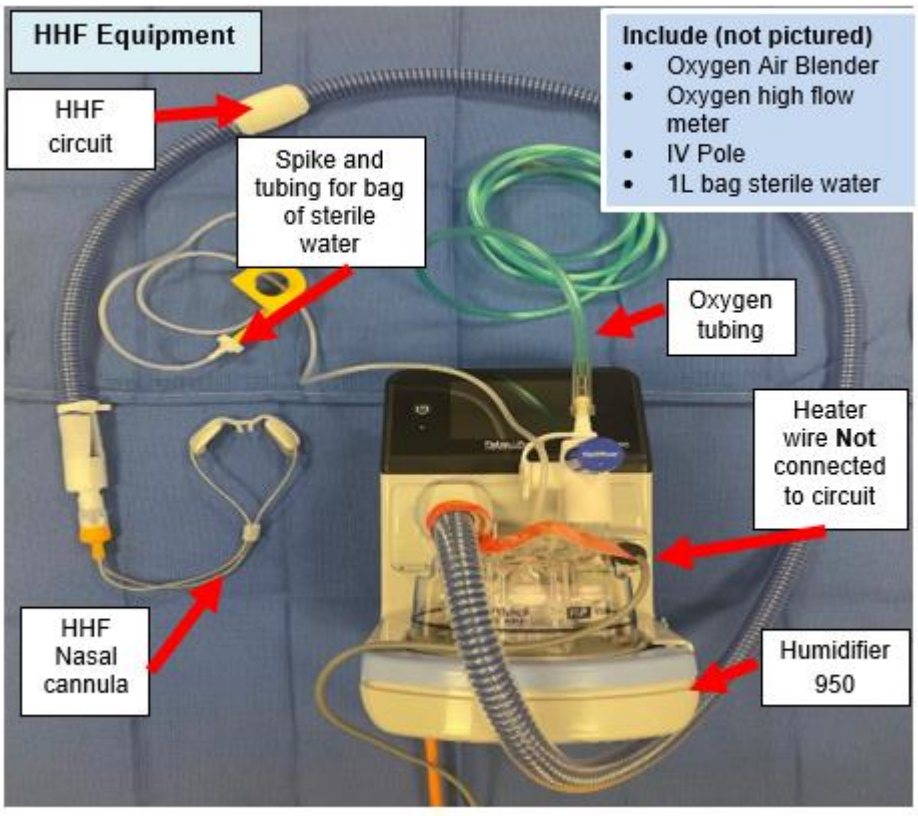
Failure of wean includes:

- Increasing oxygen requirements
- Increased work of breathing (tachypnoea, recession).
- Increasing frequency or severity of apnoeas and/or bradycardia and/or desaturations.

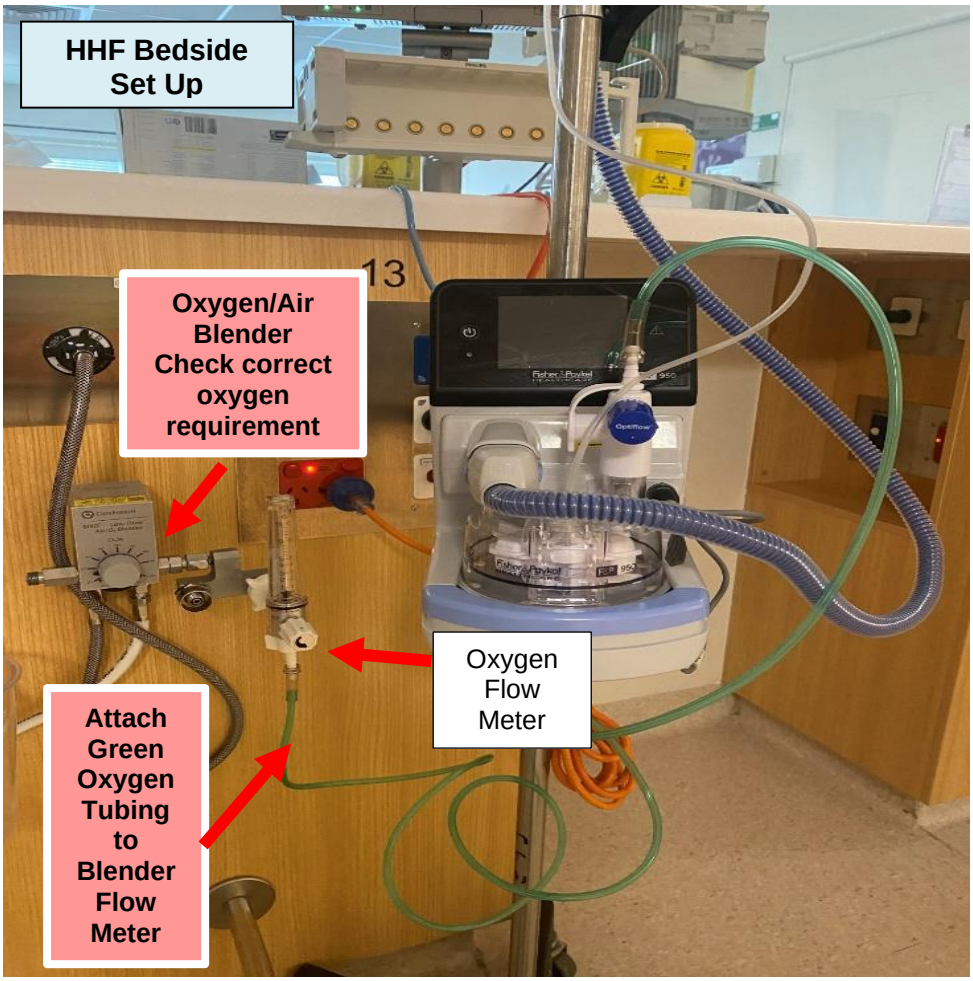
If an infant meets these requirements, urgent medical review should occur (Recognising and Responding to Clinical Deterioration) and consideration given to increasing the HHF flow or changing modality to Continuous Positive Airway Pressure (CPAP) or low-flow oxygen therapy, depending on the clinical scenario.

HHF Equipment and Setup

- Appropriately sized nasal prongs - OPT312 (Prem < 2 kg) or OPT314 (Neonatal 1-8 kg).
- Blender transition kit if transitioning from CPAP
- HHF Circuit.
- Air/oxygen blender and oxygen flow meter (1-10 L/min).
- Humidifier chamber MR950 – **NB** Heater wire **not** required to be attached to circuit
- Water for irrigation (1 litre bag).
- Oxygen tubing.



Setup at Bedside



NB when transferring between nurseries, ensure that on arrival to the receiving nursery, the respiratory support circuit and oxygen requirement is checked by the receiving nurse and coordinator at handover to ensure respiratory support circuit connections are correct. Refer to Intrahospital transport of the Neonate guideline.

Documentation

- Oxygen, flow, temperature settings hourly on MR489.
- Observe correct positioning of nasal cannula hourly on MR489.

Related CAHS internal policies, procedures and guidelines

Continuous Positive Airway Pressure (CPAP)
Developmental Positioning
Intrahospital transport of the Neonate
Recognising and Responding to Clinical Deterioration
Skin care guideline

References and related external legislation, policies, and guidelines

1. High flow nasal cannula for respiratory support in preterm infants. Wilkinson D, Andersen C, O'Donnell CP, De Paoli AG, Manley BJ. Cochrane Database Syst Rev. 2016 Feb 22;2:
2. High-flow nasal cannula: Mechanisms, evidence and recommendations. Manley BJ, Owen LS. Semin Fetal Neonatal Med. 2016 Jun;21(3):139-45.
3. Nasal high flow therapy for neonates: Current evidence and future directions. Hodgson KA, Davis PG, Owen LS. J Paediatr Child Health. 2019 Mar;55(3):285-290. doi: 10.1111/jpc.14374. Epub 2019 Jan 7. PMID: 30614098
4. Abdel-Hady H, Shouman B, Aly H. Early weaning from CPAP to high flow nasal cannula in preterm infants is associated with prolonged oxygen requirement. Early Hum. Dev. 2011; 87: 205– 8.
5. Badiee Z, Eshghi A, Mohammadizadeh M. High flow nasal cannula as a method for rapid weaning from nasal continuous positive airway pressure. Int. J. Prev. Med. 2015; 6: 33.
6. Tang J, Reid S, Lutz T, Malcolm G, Oliver S, Osborn DA. Randomised controlled trial of weaning strategies for preterm infants on nasal continuous positive airway pressure. BMC Pediatr. 2015; 15: 147.
7. Soonsawad S, Tongsawang N, Nuntnarumit P. Heated humidified high-flow nasal cannula for weaning from continuous positive airway pressure in preterm infants: A randomized controlled trial. Neonatology 2016; 110: 204– 9.

This document can be made available in alternative formats on request.

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