Humidified High Flow Nasal Cannula Therapy PAEDIATRICS Procedure

Effective: 23 November 2018

1. Guiding Principles

This procedure excludes treatment related to neonates; refer to the endorsed King Edward Memorial Hospital (KEMH) Neonatology Clinical Practice Guideline - Humidified High Flow (HHF) Nasal Cannula Therapy.

Humidified High Flow Nasal Cannula (HHFNC) therapy is a simple to use system that delivers warm, moist gas from room air to variable oxygen concentrations at high flow rates that generate positive airway pressure. When used at flow rates of **1-2L/kg/min** it acts as a bridge between low flow oxygen therapies and Continuous Positive Airways Pressure (CPAP) and potentially reducing the need for further and more invasive therapies such as intubation.

The benefits of use of HHFNC include pharyngeal dead space washout, decreased resistance leading to improvement of pulmonary compliance and subsequently decrease in work of breathing. In addition, humidification also helps to assist in increased patient comfort, and may reduce bronchoconstriction from cold dry air and prevent epithelial injury.

Paediatric patients will always require transfer to the Broome Hospital Paediatric Unit or a tertiary centre for ongoing assessment and/or continuing HHFNC.

Indications for HHFNC therapy in paediatric patients:

- Respiratory distress from bronchiolitis: Consider use of HHFNC if hypoxemia and moderate to severe respiratory distress despite standard flow oxygen via nasal prongs or Hudson oxygen mask.
- Acute respiratory failure: In addition to bronchiolitis HHFNC may be considered in infants/children with acute respiratory failure from other causes; however there is little data to make evidenced based recommendations for its use in conditions other than bronchiolitis.

Contraindications for HHFNC therapy in paediatric patients:

- Blocked nasal airway (i.e. choanal atresia)
- Trauma or surgery to nasopharynx
- Pneumothorax
- Base of skull fractures
- Life threatening hypoxia / apnoeas / haemodynamic instability
- Foreign body aspirations.

Possible Complications for HHFNC therapy in Paediatric Patients:

- Gastric distension
- Pressures areas to the nostrils
- Blocked HHFC due to secretions
- Pneumothorax.

2. Procedure

HHFNC oxygen therapy can be administered in the Emergency Department only with nursing 1:1. **The medical officer must remain in the hospital**.
Prior to the prescription and commencing HHFNC oxygen therapy, the following needs to be taken into consideration:

- Consultation with Broome Hospital Paediatrician on-call
- Consultation with the Royal Flying Doctor Service (RFDS)
- Patient status and potential for deterioration
- Measure for appropriate size nasal prongs as per age and weight
- Ensure patient has an IVC
- Keep patient Nil By Mouth in case decision to intubate unless stated otherwise by DMO
- Consider NGT for in-flight care
- Check hospital oxygen supplies are adequate for requirements with HHFNC

Further information is also available from the endorsed Perth Children's Hospital Clinical Practice Manual:

- Humidified High Flow Nasal Cannula Therapy for Children
- Humidified High Flow Therapy Equipment Set-Up

2.1 Prescribing Principles

The following steps must be adhered to when prescribing HHFNC oxygen therapy to paediatric patients:

- The Duty Medical Officer (DMO) must be familiar with the prescribing and treatment of paediatric patients requiring HHFNC oxygen therapy. This decision should be made in conjunction with the Regional Paediatrician or Royal Darwin Hospital ED/ICU Consultant and RFDS. If urgent commencement is needed, treatment should be commenced and appropriate further management/transfer discussed thereafter.

- Obtain informed verbal consent from parents/ carers / guardian. Document verbal consent has been obtained in the medical record.

- The DMO must be present within the department when commencing a patient on HHFNC oxygen therapy. **At no point is a paediatric patient to be commenced on HHFNC oxygen therapy when there is not a doctor physically present.**

- HHFNC must be prescribed using an Oxygen Therapy label affixing it to the MR170D WACHS National Inpatient Medication Chart - Paediatric Short Stay.

- Flow rate prescription for paediatrics patient is based on L/kg/min. Prescription range for Paediatrics in the Emergency Department: 1-2L/kg/min with a maximum flow rate of 50L, maximum FiO_2 of 50%.
- Medical review must occur within one (1) hour following initial commencement of HHFNC and discuss progress with the paediatrician on duty.
- FiO_2 should be titrated to Spo_2 in Bronchiolitis especially. Patient may only require FiO_2 of 0.21 – 0.30.

2.2 Monitoring and Frequency of Observations

Clinical improvement is usually observed within one hour of initiating HHFNC therapy. Close observation, frequent reassessment and documentation of response to treatment are required by an appropriately trained registered nurse.

The following observations are to be recorded on the MR140 WACHS Age Appropriate Paediatric Observation and Response Chart and MR142 WACHS Neonatal/Paediatric Respiratory Observation Chart:

- Continuous SpO_2, respiratory rate monitoring, documented 15 minutely
- Continuous cardiac monitoring to look for bradycardia in the especially young infant
- Hourly documentation of Fi O_2, flow rate and circuit observations (inclusive humidifier temperature)
- Respiratory observations 15 minutely (MR 142)
- Temperature hourly unless indicated more frequently by ORC
- BP pre-commencement and post commencement unless indicated more frequently by ORC
- Blood Glucose levels for the fasting paediatric patient
- Consider use of capillary blood gas at commencement and after 1 hour of treatment.

2.3 Nursing Care and Management

- Patient must be nurse specialled 1:1
- Ensure Wigglepad applied correctly
- Check nasal prong position hourly as dislodgement may result in reduced respiratory support.
- Nasal Cannula should not occlude more than 50% of each nare.
- Ensure that a leak is present, as obstruction of nasal passages will create high pressure and may lead to barotrauma.
- Check pressure areas to nasal nares.
- Check that oxygen is flowing freely and that the tubing/nasal cannula is not blocked at least hourly.
- Replace the nasal cannula if it becomes blocked with secretions/milk.

- Check for condensation in tubing/nasal cannula at least hourly to two hourly and empty as necessary by draining back into the humidifier - water in tubing/nasal cannula may lead to aspiration.
- Provide nasal suctioning if required.
- Infant on HHFNC therapy should remain Nil By Mouth until stable in case of decision to intubate
- It is advisable that all infants on prolonged (>6 hours) HHFNC should have NGT in situ. NGT should not be capped; it should be open to air and kept above shoulder tip height. Observe for an increased risk of gastric distension due to the high flow of gases
- Weigh patient before commencement and maintain fluid balance chart MR144P.
  - All components are single patient use and the Airvo 2 thermal disinfection must be completed after use as per manual instructions. Leave red thermal hose attached to unit after use to indicate machine has been cleaned.

2.4 Medical Care and Management

Medical review is indicated routinely one hour after commencement of HHFNC or sooner if there is:

- increase in respiratory distress
- a rapid deterioration of SpO_2 or marked increase in work of breathing (consider Barotrauma / Pneumothorax)
- frequent apnoea's or bradycardia
- persisting hypoxemia with oxygen saturations < 92% despite high gas flows
- no response to treatment as evidenced by decrease in FiO_2 and work of breathing.

In addition, medical review is indicated prior to the changes of the HHFNC setting either in flow rates or FiO_2 or both, or prior to cessation of HHFNC.

2.5 Assessing the paediatric patients response to HHFNC oxygen therapy

Responder: Patient who demonstrates a reduction in either RR or HR or both by 20% of the initial worst recorded observation within one hour of commencing HHFNC (1-2L/kg/min) to maintain Sats >92%.

Non-responder: Patient who does not demonstrate a reduction in either RR or HR or both by 20% of the initial worst recorded observation within one hour of commencing maximum 1-2L/kg/min of HHFNC.

2.6 Weaning the paediatric patient from HHFNC oxygen therapy

On demonstration of clinical recovery, HHFNC should not be set, or recorded as being delivered, at flow rates < 1L/kg/min. Children who are in low levels of blended oxygen with minimal work of breathing on HHFNC should be given a trial off HHFNC and on normal low flow oxygen therapy. If unsuccessful, then HHFNC can be reinstituted.

Cessation of HHFNC has to be ordered by the medical officer after physically reviewing the patient and consulting the Paediatrician and RFDS.

3. Definitions

HHFNC	Humidified High Flow Nasal Cannula
CPAP	Continuous Positive Airways Pressure
RFDS	Royal Flying Doctor Service
DMO	Duty Medical Officer
FiO_2	Fraction of inspired Oxygen
IVC	Intravenous Cannula

4. Roles and Responsibilities

The **DMO** is responsible for assessment, diagnosis and ongoing management of the paediatric patient requiring HHFNC oxygen as outlined within this procedure.

The **Registered Nurse** is responsible for the nursing care and management of the paediatric patient requiring HHFNC oxygen as outlined within this procedure.

5. Compliance

Failure to comply with this procedure may constitute a breach of the WA Health Code of Conduct (Code). The Code is part of the Employment Policy Framework issued pursuant to section 26 of the *Health Services Act 2016* (HSA) and is binding on all WACHS staff which for this purpose includes trainees, students, volunteers, researchers, contractors for service (including all visiting health professionals and agency staff) and persons delivering training or education within WACHS.

WACHS staff are reminded that compliance with all policies is mandatory.

6. Evaluation

Monitoring of compliance with this procedure is to occur via the Clinical Incident Management system.

7. Standards

National Safety and Quality Healthcare Standards (Second edition 2017) - 1, 4, 5, 8

8. References

1. Arora B., Mahajan P., Zidan M., Sethuraman U., 2012, Nasopharyngeal Airway pressures in Bronchiolitis Patients Treated with High Flow Nasal Cannula Oxygen Therapy, Paediatric Emergency Care, Vol 28, No 11, November 2012.
2. Mckiernan C., Chadrick C., Visintainer P. F., Allen H., 2010, High Flow Nasal Cannulae Therapy in Infants Bronchiolitis, The journal of Paediatrics, Nov; 37 (4): 446-450.
3. Clinical Guideline for Humidified High Flow Nasal Cannula Therapy for Children, Perth Children's Hospital, Clinical Practice Manual.
4. Humidified High Flow Nasal Cannula Oxygen Guideline for Metropolitan Paediatric Wards and EDs 1st edition, NSW Health Guidelines, 29 JAN 2016List source documents (hyperlinked to associated web pages where applicable).

9. Related Forms

MR140e Paediatric Observation and Response Chart (P-ORC Under 3 months)
MR140f Paediatric Observation and Response Chart (P-ORC 3-12 months)
MR140g Paediatric Observation and Response Chart (P-ORC 1-4 years)
MR140h Paediatric Observation and Response Chart (P-ORC 5-11 years)
MR140i Paediatric Observation and Response Chart (P-ORC 12+ years)
MR142 WACHS Neonatal – Paediatric Respiratory Observation Chart
MR170D WACHS National Inpatient Medication Chart - Paediatric Short Stay

10. WA Health Policy Framework

Public Health Policy Framework.

11. Appendices

Appendix 1 - Oxygen Therapy Sticker

Appendix 2 - Fisher and Paykel Optiflow Junior Nasal Cannula

Appendix 3 - Airvo Table taken from RFDS Guide dated 11.01.2018

Appendix 4 - Education Resources

Appendix 5 - HHFNC Flowchart

This document can be made available in alternative formats on request for a person with a disability

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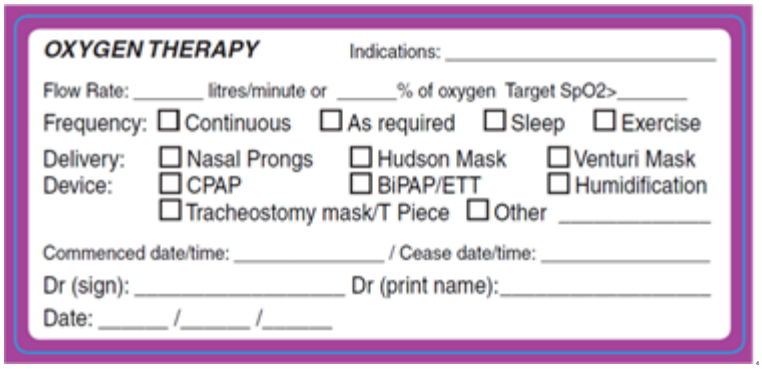
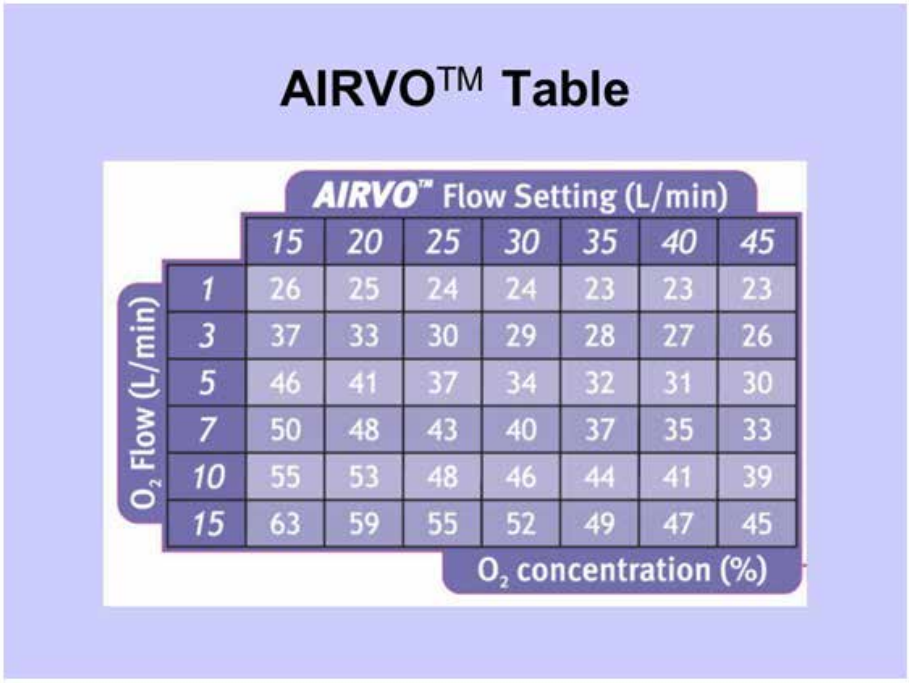
Appendix 2 - Oxygen Therapy Sticker



Appendix 3 - Fisher and Paykel Optiflow Junior Nasal Cannula

Appendix 4 - Airvo Table taken from RFDS Guide dated 11.01.2018



Appendix 6 - HHFNC Flowchart