



Humidified High Flow Nasal Cannula Therapy Paediatrics Procedure

Effective: 27 August 2019

1. Guiding Principles

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^[1] 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.

Indications for HHFNC therapy in Paediatric Patients:

- Respiratory distress from Bronchiolitis: Consider use of HHFNC if hypoxaemia and moderate to severe respiratory distress instead of 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

All Paediatrics HHFNC oxygen therapies are to be commenced in the Emergency department with the maximum allowable flow rates. Once stabilised only then the patients could be transferred to the ward for ongoing care and observation.

Prior to the prescription and commencing HHFNC oxygen therapy, the following needs to be taken into consideration:

- Patient status and potential for deterioration.
- Distances to the nearest regional hospital and to metropolitan tertiary hospital and time frame for transfer to occur due to availability of RFDS.
- Paediatrician is not always available on site and after hours.

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. The DMO, in the first instance must review the paediatric patient and discuss case management with the Paediatrician on duty or on call at the Regional Resource Centre – Hedland Health Campus on 9174 1000. The Paediatricians details and a clear management plan are to be documented in the patients' medical record.
- 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.
- HHFNC must be prescribed on MR PI 172 Paediatric Humidified High Flow Oxygen Therapy Prescription Chart.

2.2 Prescribing Guide

Commence HHFNC treatment initially with the maximum rate. For children up to 12kg, please use maximum rate of 2L/kg/min with maximum allowable flow volume of 25L/min in Airvo2 Junior Mode. For children weigh between 13kg to 15kg, please use Adult Mode with Adult circuit with maximum flow rate of 2L/kg/min and maximum volume of 30L/min. Any children weigh >16kg, maximum flow volumes are titrated according to weight as per the recommendation below:

Humidified High Flow Nasal Cannula Therapy Paediatrics Procedure - Karratha Health Campus

Child's weight	Max Flow Rate	Max Flow Volume	Airvo2 Mode	Circuit Required
0-12 kg	2L/kg/min	25L/min	Junior	Paeds circuit
13-15 kg	2L/kg/min*	30L/min	Adult	Adult circuit

Child's weight	Recommended Flow Volume	Max Flow Volume Allowed	Airvo2 Mode	Circuit Required
16-30 kg	35L/min*	40L/min*	Adult	Adult Circuit
31-50 kg	40L/min*	50L/min*	Adult	Adult Circuit
>50 kg	50L/min*	50L/min	Adult	Adult Circuit

* In the setting of using Adult Mode in Paediatric patients for any children > 13kg, in order to improve tolerance, gradually increase flow volume over two minutes to the prescribed level.

- For paediatric patients, all HHFNC treatment is to be commenced in Emergency Department.
- Medical review must occur within 1 hour following initial commencement of HHFNT and discuss progress with the Paediatrician on duty.
- If the patient showed no signs of improvement i.e. reductions in 20% from the worst recorded RR and PR after two hours of maximum allowed therapy or at any point during the course of treatment, if the patient requires FiO₂ >50% to keep oxygen saturation >92% then patient has to be transferred out to Perth Children Hospital for further treatment and management.
- Contact Perth Children Hospital TEL: 08-6456 2222 and to discuss case with PCH ED Consultant.
- HHC could not accommodate those patients that are deemed non-responder or needing FiO₂ >50%.
- After two hour of commencing maximum HHFNC treatment and the patient shows signs of improvement (achieved a reductions in 20% from the worst recorded RR and PR), then the prescription for titration for a responded and stable Paediatrics patient is as follows:
 - Prescription range for Paediatrics on the ward: 1 to 1.5L/kg/min; with FiO₂ 21% to 40%.
 - Improved but stable patient that still needs 1.5L to 2.0L/kg/min or if require FiO₂ > 40%, then the patient must remain in ED for close observation.
 - Every effort should be made to adjust to the lowest possible FiO₂ to achieve the target SpO₂ level.

2.3 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 two hours of commencing HHFNC with the maximum allowed flow volume to maintain Sats>92%.

Non-responder: Patient who does not demonstrates a reduction in either RR or HR or both by 20% of the initial worst recorded observation within two hours of commencing maximum allowed flow volume of HHFNC.

2.4 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 a 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 SpO₂ monitoring, documented 15 minutely.
- 15 minutely Pulse rate and Respiratory rate on commencement of therapy; and continue for at least two hours; hourly once stable.
- Hourly documentation of FiO₂, flow rate and circuit observations.
- Respiratory observations hourly (MR 142).
- Temperature 4 hourly unless indicated more frequently by ORC.
- BP daily unless indicated more frequently by ORC.
- Blood Glucose levels for the fasting paediatric patient.
- Consider use of capillary blood gas at commencement and after two hours of treatment.

2.5 Nursing Care and Management

- All patients commenced on HHFNC will need 1:1 nursing care for at least the first two hours to determine whether patient is a responder vs non-responder given that patient will require intense 15 minutely observation during this period.
- Following the initial phase of treatment and once patient stabilised, the need of 1:1 special whether in the ward or emergency will depend on the patient's condition, staff availability, location work load or with discussion amongst the treating MO/CNM/AHM.
- Check nasal prong position hourly as dislodgement may result in reduced respiratory support.
- 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 may continue to be fed depending on their respiratory status and the clinical situation.
- It is advisable that all infants on prolonged (>6 hours) HHFNC should have NGT in situ. Observe for an increased risk of gastric distension due to the high flow of gases.
- If the infant is too tired to feed, NGT or IVT should be considered (2/3 of maintenance is usually adequate due to respiratory humidification and risk of the syndrome of inappropriate antidiuretic hormone (SIADH).

2.6 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 SpO₂ 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 FiO₂ and work of breathing.

In addition, medical review is indicated prior to the changes of the HHFNC setting either in flow rates or FiO₂ or both, or prior to cessation of HHFNC.

Once patient is stable, ongoing medical review is to occur at a minimum 8 hourly for the first 24hrs.

Note:

1. Children who are palliative are exempted from this guideline, treating MO to discuss treatment plan with the specialist involve and liaise care with either ward/ED CNM or AHM.
2. Children who have chronic respiratory conditions may have existing management plan, they are also exempted from this guideline and treating MO to refer to the individual medical management plan for these patient.

2.7 Transferring patients on HHFNC

Caution: Ceasing HHFNC for transfer, places the patient at risk for clinical deterioration during the transfer

- HHFNC must not be ceased during procedures i.e. transferring to radiological department for medical imaging, transferring to ward or SJA to airport without prior consultation with the treating MO
- A Registered Nurse must accompany patients between clinical areas
- Patient must remain fully monitored
- High flows without humidification are usually tolerated for short periods, where possible, transfer the patient with the equipment in site

2.8 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 HFNC can be reinstated.

Cessation of HHFNC has to be ordered by MO after physically reviewing the patient.

3. Definitions

HHFNC	Humidified High Flow Nasal Cannula
CPAP	Continuous Positive Airways Pressure
RFDS	Royal Flying Doctor Service
DMO	Duty Medical Officer
FiO2	Fraction of inspired Oxygen

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 will occur via the Clinical Incident Management system.

7. Standards

[National Safety and Quality Healthcare Standards](#): 1,3,4,8

8. Policy Framework

[Public Health](#)

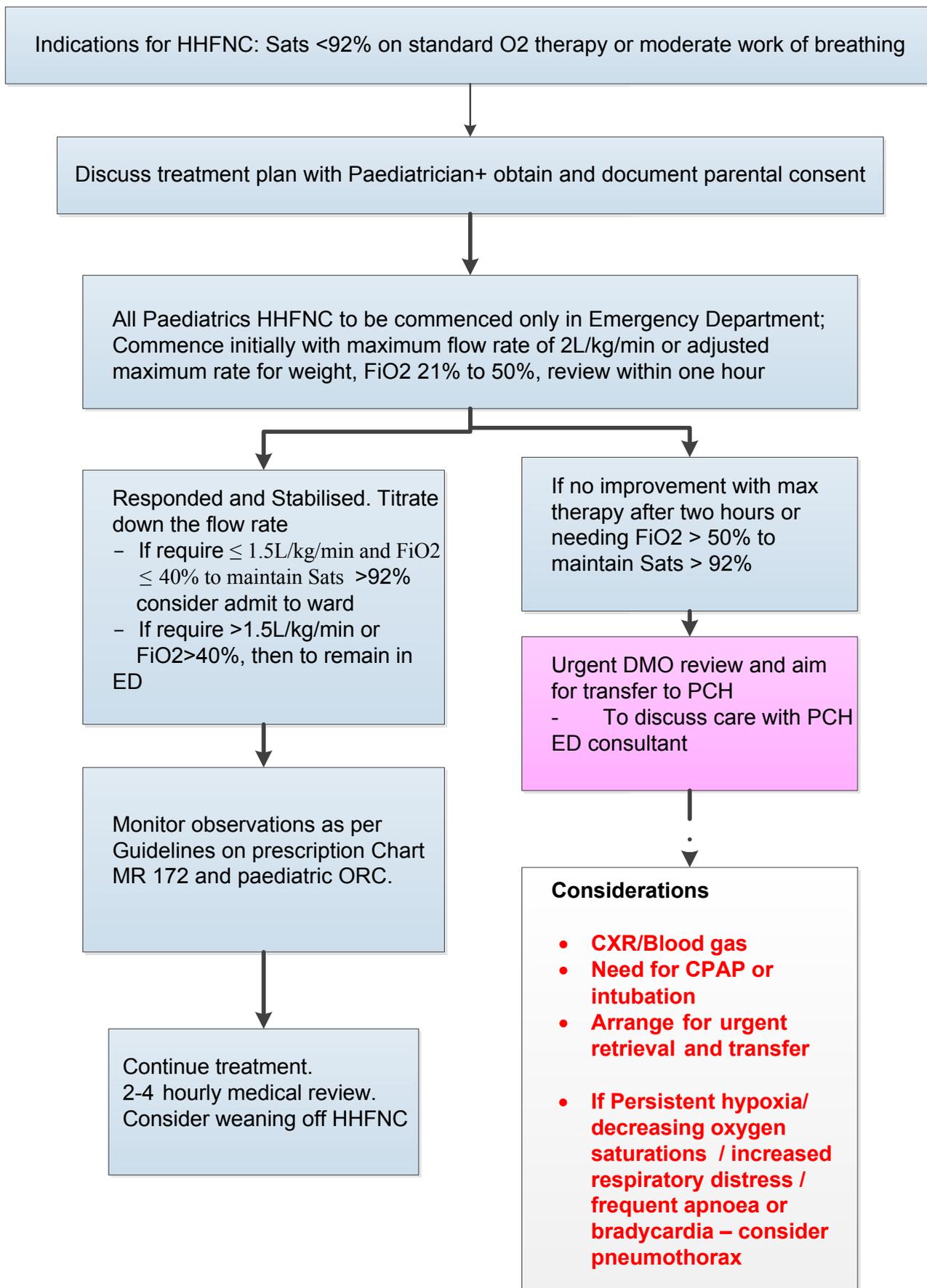
**This document can be made available in alternative formats
on request for a person with a disability**

Contact:	Medical Officer (Dr K. Koay)	EDRMS Record #	ED-CO-17-23152
Directorate:	Medical Services	Date Published:	27 August 2019
Version:	3.00		

Copyright to this material is vested in the State of Western Australia unless otherwise indicated. Apart from any fair dealing for the purposes of private study, research, criticism or review, as permitted under the provisions of the *Copyright Act 1968*, no part may be reproduced or re-used for any purposes whatsoever without written permission of the State of Western Australia.

Humidified High Flow Nasal Cannula Therapy Paediatrics Procedure

- Karratha Health Campus



Printed or saved electronic copies of this policy document are considered uncontrolled.
Always source the current version from [WACHS HealthPoint Policies](#).