BEST PRACTICE GUIDANCE FOR USING HEATED HUMIDIFIED HIGH FLOW THERAPY (HHHFT) IN CHILDREN & YOUNG PEOPLE: A PAN-LONDON AND SOUTH EAST ENGLAND APPROACH

Introduction:

Over the past few years the use of HHHFT has increased to support children with respiratory distress and those requiring oxygen therapy, particularly infants with bronchiolitis.

This guidance has been developed jointly, in consultation with colleagues from North and South Thames Paediatric Networks and retrieval services. The process collated available guidance documents from the Network regions, alongside the latest evidence base to produce and implement a guideline that will standardise practice across the Networks.

Please note that this guidance is to be used in all paediatric areas in conjunction with any condition specific guidance and local escalation policy that may be in place e.g. management of bronchiolitis, management of severe asthma.

The contents for the Guideline are as follows:

South Thames Paediatric Network

North Thames Paediatric Network
Connecting paediatric services

Heated Humidified High flow therapy (HHHFT) for children and young people

A Pan London and South East of England approach

Indications (not exhaustive)	Contraindications	Cautions
• High Oxygen requirement • Signs of respiratory distress • Post extubation if clinically indicated	• Nasal obstruction or craniofacial abnormalities • Trauma/Surgery to nasopharynx • Recurrent apnoea's • Respiratory arrest or peri-arrest state • Undrained pneumothorax	• Drained pneumothorax • Upper airway obstruction

Staffing ratios

Staff to patient ratio should be determined based on the assessment of the patient's overall condition. A validated Paediatric early warning score (PEWS) should be used and other critical care interventions considered. Patient ratios should be adjusted accordingly and flexibility required as condition may change rapidly.

Acuity	Low risk/long term use of HHHFT	Medium risk	High risk
Descriptor	Actively weaning HHHFT or established on HHHFT as a long term therapy Mild or no respiratory distress	Acute phase, some stability established but not able to wean FiO2 below 0.40 currently. Moderate respiratory distress.	Acute initiation phase, severe respiratory distress observing for responsiveness to HHHFT. High PEWS
Nurse ratio	1:4 (1:3 < 2yrs)	1:2 or 3	1:1

Isolation for HHHFT is unnecessary unless condition indicates otherwise. Use of NHSE Infection prevention and control guidance recommended.

Commencing treatment

1. **Select interface and equipment** based on local availability and patient age and weight
   Note: Interface size should not exceed 50% of nares. If flow rate below cannot be achieved on correct interface then use max flow for interface
2. **On initiation** a competent clinician should observe patient for comfort and compliance. If necessary the flow can be increased to reach recommended range below over a 5 minute period.
3. **Titrate FiO2** to maintain SpO2≥92 (or alternative patient range
4. **Escalate or wean**. To avoid rapid deterioration or unnecessary continuation on HHHFT review response to HHHFT and follow escalation or weaning criteria below

<12kg	2 l/min/kg
13-15kg	20-30 l/min
16-30kg	25-35 l/min
31-50kg	30-40 l/min
>50kg	40-50 l/min

Response to treatment

● Sustained response to HHHFT Nursing ratio 1:4 (1:3<2yrs)	● Response to HHHFT Nursing ratio 1:2 or 3 if cohort is ward level	● Unresponsive to treatment
Wean FiO2 to 0.3-0.4 (depending on patient)	Moderate respiratory distress continues and/or FiO2>0.40-0.6	**In 1st hour:** ⬇
⬇ Half the flow rate ⬇ If no clinical deterioration is seen after 4 hours HHHFT can be discontinued **(or as soon as 1 hour if paediatric consultant confirms)** ⬇ Restart at weaning flow rate if stopping HHHFT not tolerated	⬇ Re-assess ECC's** and continue on current HHHFT settings until ready to wean ⬇ Continue to observe for any deterioration or red flags*	• Re-assess ECC's** • Ensure paediatric consultant has reviewed • Discussion with retrieval service • Discussion/review with anaesthetic reg • Closely observe for any red flags* ⬇ **After 2nd hour or with any red flags:** •Consider NIV or IMV • Prepare patient, team and family for intubation

Patient transfer

If patient transfer is required then a suitable risk assessment tool such as the STOPP tool should be used. Where portable HHHFT is not available a senior clinician should assess the appropriate oxygen delivery based on direct patient assessment.

*Red Flags for immediate escalation

- Any apnoeic/bradycardic episodes
- Increasing respiratory distress after HHHFT commenced
- Clinically tiring
- PEWS indicates immediate escalation to resus team
- FiO2>0.60

Immediate escalation

- Increase FiO2 to max
- Call 2222
- Prepare for intubation
- Liaise with retrieval team or on site L3PCC
- Communicate with the family

Monitoring and patient management

Coloured dots refer to corresponding patient acuity

- Continuous oxygen saturations ● ● ●
- Observation frequency and escalation according to PEWS ●
- Min hourly observations and escalation according to PEWS● ●
- Consider continuous ECG if required ● ●
- 2 hrly mouth and nose care including pressure area check ● ● ●
- Hourly documentation of FiO2, flow rate, and temperature as well as equipment specific checks ● ● ●

**Essential Care Considerations (ECCs)

- Optimised positioning (e.g. head elevation)
- Consider referral for physiotherapy assessment
- Secretion clearance if indicated and safe to do so
- Consider feeding regime alteration according to risk and underlying disease.
  - ●High risk should be NBM with IV fluids
  - ● Med risk should be assessed before feeding and fed with caution
- Psychosocial support, clear communication, play and distraction
- Minimal handling/cluster cares
- Blood gas analysis not essential and acidosis a late sign of failure

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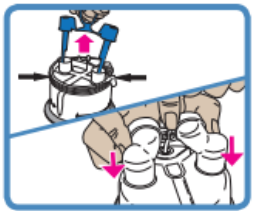
Heated Humidified High flow therapy (HHHFT) for children and young people

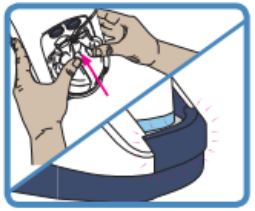
A Pan London and South East of England approach-Appendix 1 Set up guide for Fisher and Paykel Airvo 2



INSTALL WATER CHAMBER

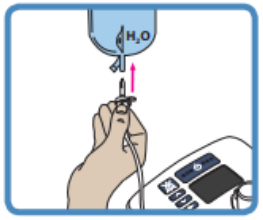
Remove the blue port caps from the chamber by pulling the blue tear tab upwards then remove the bracket holding the water supply tube.

Fit the supplied adapter over the two vertical ports on the chamber and push on fully then clip the water supply tube into position.



Fit the water chamber to the unit by pressing down the finger guard and sliding the chamber on, carefully aligning with the blue chamber port ends.

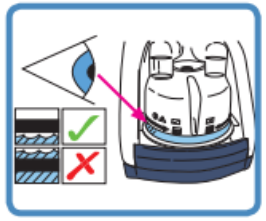
Push the chamber on firmly until the finger guard clicks into place.



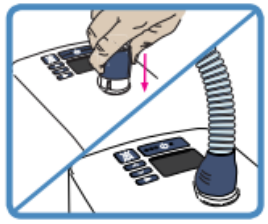
CONNECT WATER BAG

Attach the sterile water bag by pushing the bag spike into the fitting at the bottom of the bag, and attach to handing bracket above the unit. The chamber will now automatically fill to the required level and maintain that level unit the water bag is empty.

To ensure continual humidification, always ensure that the water camber and/or water bag are not allowed to run of water.



Check that water flows into the chamber and is maintained below the maximum water level line. If the water level rises above the maximum water level line, replace the chamber immediately.



INSTALL HEATED BREATHING TUBE

One end of the heated breathing tube has a blue plastic sleeve. Life the sleeve and slide the connector onto the unit. Push the sleeve down to lock.

SELECT PATIENT INTERFACE

The AIRVO 2 can be used with a variety of patient interfaces. Read the separate user instructions for the patient interface that will be used, including all warnings.

Adapted from AIRVO 2 Users Manual

SWITCH ON UNIT

Plug the unit's power cord into the mains power socket. The connector at the other end of the power cord should be well secured to the rear of the unit.

Switch on the unit by pressing the On/Off button for 5 seconds.

CHECK DISINFECTION STATUS

The unit will show you whether it is safe for use on a new patient.

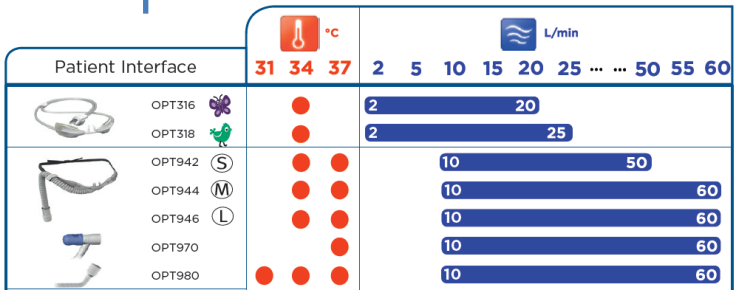
If disinfection is needed then attach supplied red disinfection tubing. This process will take 55 minutes.
To ensure machines are ready to use ensure internal processes encourage disinfection at the end of patient use.

WARM-UP

The unit will begin to warm up. You will see numbers showing the current output dew-point

JUNIOR MODE

If the patient will be using an Optiflow Jnr nasal cannula, you must activate Junior Mode. To activate, hold the Mode button for 5 seconds. The target settings will be changed automatically – shown by the colourful icons on the screen.
To deactivate repeat this process.



CONFIGURE TARGET SETTINGS

Press the Mode button to view target settings – these settings are locked by default. Press the Mode button to move on to the next screen.

****TO CHANGE LOCKED SETTINGS****

**Hold the Up and Down buttons for 3 seconds to "unlock" the setting.
The lock will disappear and be replaced by an arrow showing the minimum and maximum accessible settings. Press the Up and Down buttons to choose the new setting, and press the Mode button to confirm and "lock".**

TARGET FLOW

You can set the AIRVO2 to flows between 10L/min and 60L/min, in increments of 1L/min (10-25L/min) and 5L/min (25-60L/min.
Press the Mode button to move on to the next screen.

OXYGEN

You can connect up to 60L/min of supplementary oxygen from a regulated supply to the AIRVO2.

CONNECT OXYGEN

Connect the output from the oxygen source to the oxygen inlet port on the side of the unit. Make sure you push the oxygen tube firmly onto this connection port.

ADJUST OXYGEN

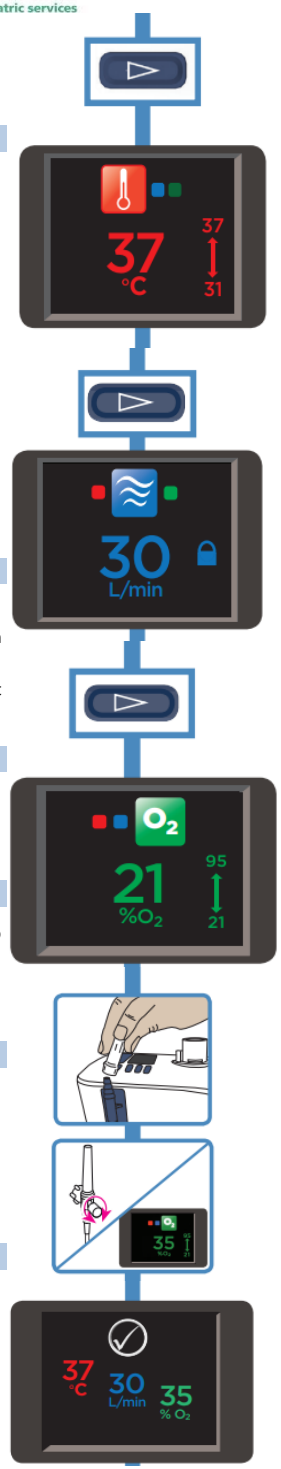
Adjust the level of oxygen from the oxygen source, until the desire oxygen fraction is displayed onscreen.

Press the Mode button to return to the Summary screen.

CONNECT YOUR PATIENT

Wait until the 'Ready for Use' symbol is displayed.

Remember to disinfect machine at end of patient treatment using red tubing provided.



Heated Humidified High flow therapy (HHHFT) for children and young people

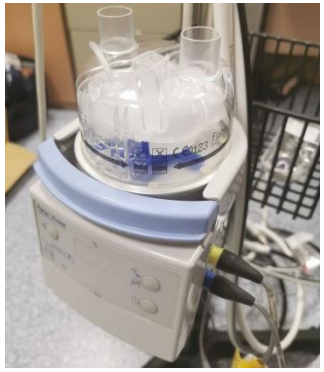
A Pan London and South East of England approach-Appendix 2 Set up guide for Inspiration Air/O_2 Blender

INSTALL WATER CHAMBER

Remove the blue port caps from the chamber by pulling the blue tear tab upwards then remove the bracket holding the water supply tube.

Fit the water chamber to the unit by pressing down the finger guard and sliding the chamber on, carefully aligning with the blue chamber port ends.

Push the chamber on firmly until the finger guard clicks into place.



CONNECT WATER BAG

Attach the sterile water bag by pushing the bag spike into the fitting at the bottom of the bag, and attach to handing bracket above the unit.

The chamber will now automatically fill to the required level and maintain that level unit the water bag is empty.

To ensure continual humidification, always ensure that the water camber and/or water bag are not allowed to run of water.

Check that water flows into the chamber and is maintained below the maximum water level line. If the water level rises above the maximum water level line, replace the chamber immediately.

INSTALL BREATHING TUBE & OXYGEN DELIVERY PIECE

Place the wider bore end of the breathing tube into one side of the humidifier as pictured. Place the oxygen delivery piece in the other side of the humidifier as pictured.

INSTALL HUMIFICATION CABLES

The circuit requires 3 humidification points to be effective. The F&P humidifier has 2 cables – insert these into the colour-corresponding points on the humidifying. Connect the ends of these cables to the points as pictured.

Note: cables have appropriate length to connect to corresponding point. E.g. longest cable connects next to patient interface point, shortest connects closest to humidifier.

INSTALL OXYGEN TUBING

Attach one end of the oxygen tubing to the appropriate flow meter (dependant on prescribed L/min), and the other to the oxygen delivery piece.

SELECT PATIENT INTERFACE

Optiflow can be used with a variety of patient interfaces (F&P). Read the separate user instructions for the patient interface that will be used, including all warnings.

Connect the appropriate size nasal interface to the end of the breathing tube.

F&P OPTIFLOW JUNIOR

OPTIFLOW JUNIOR NASAL CANNULA	ITEM CODE	APPROX WEIGHT (KG) 2 4 6 8 10 12 14 16 18 20 22	SPARE WIGGLEPADS
Premature Size	OPT312	Max. flow 8 L/min	OPT010
Neonatal Size	OPT314	Max. flow 8 L/min	OPT012
Infant Size	OPT316	Max. flow 20 L/min	
Pediatric Size	OPT318	Max. flow 25 L/min	

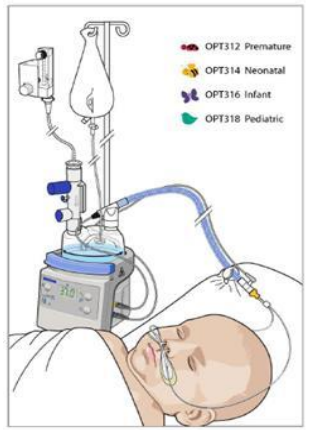
ATTACH OXYGEN AND AIR TUBING & SWITCH ON HUMIDIFIER

Ensure the correct mode of humidification is selected, as many humidifiers automatically set to invasive mode. Consult with humidifier user instructions for more details.

Note: cables have appropriate length to connect to corresponding point. E.g: longest cable connects next to patient interface point, shortest connects closest to humidifier.

PROGRAMME PRESCRIBED SETTINGS

Flow is programmed by the oxygen flow meter whilst oxygen (in %) is programmed by the dial as pictured.



CONNECT YOUR PATIENT

The system will automatically deliver prescribed treatment if programmed correctly.

Heated Humidified High flow therapy (HHHFT) for children and young people

Appendix 3- Delivering nebulisers to patients on HHHFT

For use with regular nebuliser kit

1. Place nebuliser face mask over the top of HHHFT nasal prongs for run at 6-8 litres of oxygen. You can choose to turn the Airvo machine off or reduce the flow whilst administering the nebuliser.
2. If administering a nebuliser to a child who is under 6 months of age or a predominant nasal breather you will need to remove the Airvo nasal prongs first to ensure adequate administration of the drug. You may wish to still keep the Airvo machine on during this time for ease of continuing HHHFT therapy once reconnected to the nasal prongs afterwards.

For use with Fisher and Paykel nebuliser adapter kit

1. Add nebuliser adapter between patient hose and interface.
2. Connect nebuliser pot and administer directly through the patient interface.
3. This is not licenced for use with Airvo.

For use with Aerogen nebuliser

1. Select the Airvo Tube and Chamber Kit with Nebulizer Adapter 900PT562.
2. Add in the Aerogen solo chamber into right side of humidification chamber.
3. Insert drug via the port
4. Insert electrical driver into rectangular socket below and once plugged into electrical supply press the blue button on the handset.

The Aerogen Solo chamber can be used on the same patient for up to 28 days.

HHHFT via a Tracheostomy Interface

Tracheostomy Interface

When using Airvo 2 via a tracheostomy the device should always be in **ADULT** mode and the temperature set at **37 C** unless this is uncomfortable for the patient in which it can be set at 34C. It is essential to ensure the expiration valve on the tracheostomy direct connector interface is always clear of obstruction. When delivering nebulised drugs you can deliver via this through the tracheostomy interface using the Airvo Tube and Chamber Kit with Nebuliser Adapter and Aerogen Solo Chamber (same as the steps outlined above) or simply remove Airvo and deliver the nebuliser via a regular nebuliser kit with a tracheostomy mask run via wall/cylinder oxygen.

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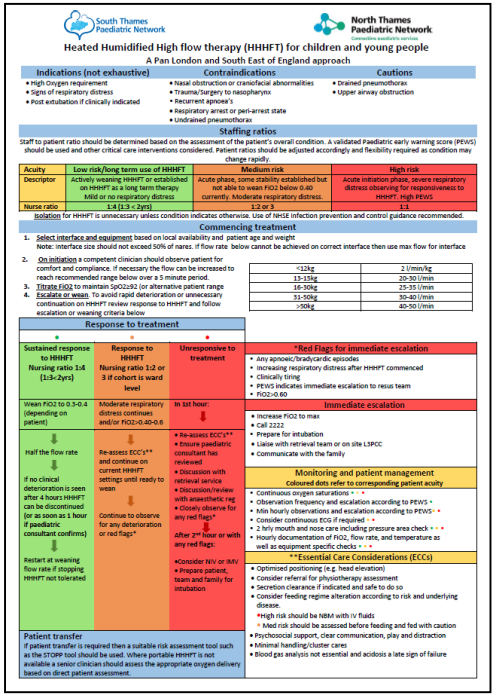

Heated Humidified High flow therapy (HHHFT) for children and young people

A Pan London and South East of England approach

Indications (not exhaustive)
- High Oxygen requirement
- Signs of respiratory distress
- Post extubation if clinically indicated

Contraindications
- Nasal obstruction or craniofacial abnormalities
- Trauma/Surgery to nasopharynx
- Recurrent apnoea's
- Respiratory arrest or peri-arrest state
- Undrained pneumothorax

Cautions
- Drained pneumothorax
- Upper airway obstruction

Staffing ratios

Staff to patient ratio should be determined based on the assessment of the patient's overall condition. A validated Paediatric early warning score (PEWS) should be used and other critical care interventions considered. Patient ratios should be adjusted accordingly and flexibility required as condition may change rapidly.

Acuity	Low risk/long term use of HHHFT	Medium risk	High risk
Descriptor	Actively weaning HHHFT or established on HHHFT as a long term therapy Mild or no respiratory distress	Acute phase, some stability established but not able to wean FiO2 below 0.40 currently. Moderate respiratory distress.	Acute initiation phase, severe respiratory distress observing for responsiveness to HHHFT. High PEWS
Nurse ratio	1:4 (1:3 < 2yrs)	1:2 or 3	1:1

Isolation for HHHFT is unnecessary unless condition indicates otherwise. Use of NHSE Infection prevention and control guidance recommended.

Commencing treatment

1. Select interface and equipment based on local availability and patient age and weight
   Note: interface size should not exceed 50% of nares. If flow rate below cannot be achieved on correct interface then use max flow for interface
2. On initiation a competent clinician should observe patient for comfort and compliance. If necessary the flow can be increased to reach recommended range below over a 5 minute period.
3. Titrate FiO2 to maintain SpO2≥92 (or alternative patient range
4. Escalate or wean. To avoid rapid deterioration or unnecessary continuation on HHHFT review response to HHHFT and follow escalation or weaning criteria below

<12kg	2 l/min/kg
13-15kg	20-30 l/min
16-30kg	25-35 l/min
31-50kg	30-40 l/min
>50kg	40-50 l/min

Response to treatment

Sustained response to HHHFT Nursing ratio 1:4 (1:3<2yrs)	Response to HHHFT Nursing ratio 1:2 or 3 if cohort is ward level	Unresponsive to treatment
Wean FiO2 to 0.3-0.4 (depending on patient)	Moderate respiratory distress continues and/or FiO2>0.40-0.6	In 1st hour:
Half the flow rate If no clinical deterioration is seen after 4 hours HHHFT can be discontinued (or as soon as 1 hour if paediatric consultant confirms) Restart at weaning flow rate if stopping HHHFT not tolerated	Re-assess ECC's** and continue on current HHHFT settings until ready to wean Continue to observe for any deterioration or red flags*	• Re-assess ECC's** • Ensure paediatric consultant has reviewed • Discussion with retrieval service • Discussion/review with anaesthetic reg • Closely observe for any red flags* After 2nd hour or with any red flags: •Consider NIV or IMV • Prepare patient, team and family for intubation

Patient transfer

If patient transfer is required then a suitable risk assessment tool such as the STOPP tool should be used. Where portable HHHFT is not available a senior clinician should assess the appropriate oxygen delivery based on direct patient assessment.

***Red Flags for immediate escalation**
- Any apnoeic/brady/cardic episodes
- Increasing respiratory distress after HHHFT commenced
- Clinically tiring
- PEWS indicates immediate escalation to resus team
- FiO2>0.60

Immediate escalation
- Increase FiO2 to max
- Call 2222
- Prepare for intubation
- Liaise with retrieval team or on site L3PCC
- Communicate with the family

Monitoring and patient management

Coloured dots refer to corresponding patient acuity
- Continuous oxygen saturations • • •
- Observation frequency and escalation according to PEWS •
- Min hourly observations and escalation according to PEWS • •
- Consider continuous ECG if required • •
- 2 hrly mouth and nose care including pressure area check • • •
- Hourly documentation of FiO2, flow rate, and temperature as well as equipment specific checks • • •

****Essential Care Considerations (ECCs)**
- Optimized positioning (e.g. head elevation)
- Consider referral for physiotherapy assessment
- Secretion clearance if indicated and safe to do so
- Consider feeding regime alteration according to risk and underlying disease.
  - •High risk should be NBM with IV fluids
  - • Med risk should be assessed before feeding and fed with caution
- Psychosocial support, clear communication, play and distraction
- Minimal handling/cluster cares
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A Pan London and South East of England approach

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Overview

- This guidance document was developed following a review of available local guidelines from Trusts across London and South East England.
- A cross-network consultation with colleagues from critical care, retrieval services and general paediatrics also took place.
- The guideline is intended to reduce discrepancies by outlining best practice for delivering Humidified Heated High Flow Therapy (HHHFT) to children and young people.
- This presentation is aimed to provide a guide to using the guideline, not to educate on the pathophysiology of HHHFT.
- This presentation has been created to be delivered locally alongside any necessary HHHFT education.

Purpose

- Achieve better clinical outcomes
- Improve patient experience
- Improve cost effectiveness
- Increase productivity
- Streamline care
- Integrate services
- Reduce hospital length of stays

What is HHHFT

- This guideline refers to HHHFT as the delivery of humidified heated high flow therapy via Inspiration air/02 blender, Airvo² or Vapotherm.
- The use of HHHFT has become increasingly popular in the treatment of patients with acute respiratory failure through all age groups.
- Some of the recognised benefits of HHHFT are; decrease airway inflammation, promotes dead space wash out, maintains mucociliary function, improve mucous clearance and reduce the caloric expenditure in acute respiratory failure.

Evidence Based Practice

- There are very few randomised controlled trials evaluating HHHFT in the paediatric critical care setting. The evidence available does not yet definitively support the effectiveness of HHHFT in critically ill children.

- To align with current practice in Paediatric Critical Care, this guideline has been written in view of the FIRST-ABC RCT that is currently in progress Nationally.

Who can use this Guideline?

- This guideline can be used by any member of the MDT team within the North and South Thames Paediatric Networks (NTPN/STPN).
- We recommend all nursing and medical team members complete training (using this presentation) of how to use the guideline
- A competency framework has been provided to promote standardisation and transferable skills, however staff can use local competencies if deemed appropriate.

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Indications

Indications (not exhaustive)
• High Oxygen requirement • Signs of respiratory distress • Post extubation if clinically indicated

- Use the above list to guide the appropriate indications for the use of HHHFT.
- This list is not exhaustive, HHHFT can be used for a wide range of conditions in children of all ages.
- A decision to start HHHFT should be made in discussion with a senior Doctor (Registrar/Consultant).

Contraindications

Contraindications
• Nasal obstruction or craniofacial abnormalities • Trauma/Surgery to nasopharynx • Recurrent apnoea's • Respiratory arrest or peri-arrest state • Undrained pneumothorax

- Use the above list to guide the contraindications for the use of HHHFT.
- A decision to start/refute HHHFT should be made in discussion with a senior Doctor (Register/Consultant).

Caution

Cautions
• Drained pneumothorax • Upper airway obstruction

- Not necessarily contraindications, rather a reminder to proceed with caution in the above conditions.
- A decision to start/refute HHHFT should be made in discussion with a senior Doctor (Register/Consultant).

Initiating HHHFT

1. **Decide as MDT that HHHFT is the most appropriate treatment** and timing is suitable.

Consider if patient is already too unwell (Requires CPAP/intubation) or if any other interventions take priority- i.e. transfer to ward, base line blood gas etc

2. **Select appropriate interface** based on nostril size/tracheostomy and target flow rate.

Prepare your patient beforehand to promote comfort and compliance e.g. refer to Essential Care Considerations.

3. **Titrate oxygen % to maintain saturations over 92%.**

You might consider starting on a reduced flow rate for the first few minutes to help the patient tolerate the device before reaching the target flow rate.

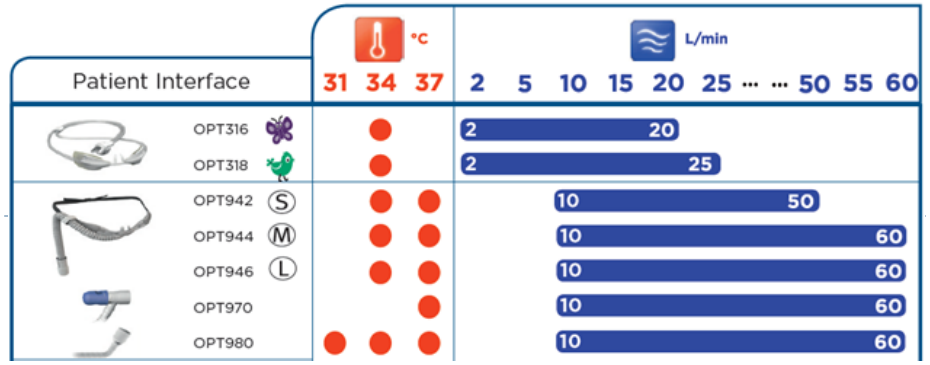
4. **Observe for compliance** (behavioural and physiological).

Maintain on continuous monitoring but allow period of rest. Observe vital signs, work of breathing, AVPU. Watch for RED FLAGS

5. **Assess patient response to treatment**

After 1 hour (or earlier if any Red Flags noted) and refer to Response tables for next steps.

Interfaces



- Select interface and equipment based on local availability and patient age and weight
- Interface size should not exceed 50% of nares.
- If recommended flow rate cannot be achieved on correct interface then use the max flow for the interface.
- Care must be taken when using HHFNC in infants with small nostrils as there is a risk of creating a closed circuit which can deliver unpredictable levels of positive pressure.

Flow Rates

<12kg	2 l/min/kg
13-15kg	20-30 l/min
16-30kg	25-35 l/min
31-50kg	30-40 l/min
>50kg	40-50 l/min

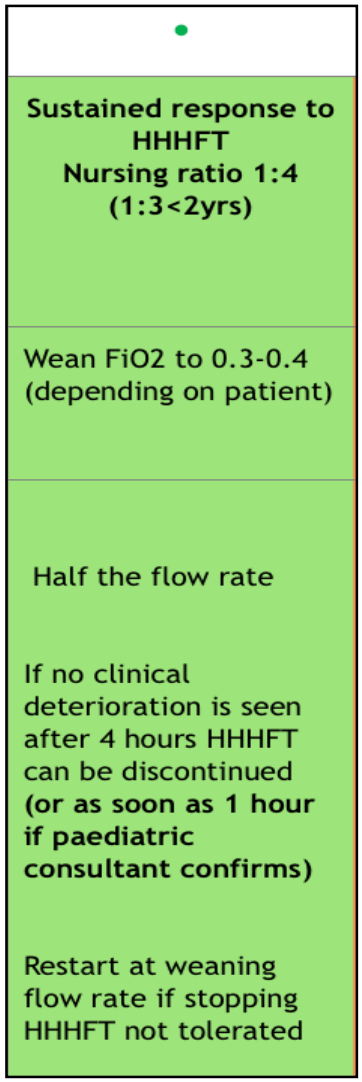
- Use recommended flow rates for patient's weight (or as interface allows)
- A competent clinician should observe for patient comfort and compliance during initiation.
- If required, the flows can be increased to reach target flow over a 5 minute period for patient comfort.
- FiO2 to be titrated to maintain oxygen saturations ≥92% or as required for patient individual needs

Staffing

- Staffing ratios should be based on the individual patient's condition
- The guideline provides guidance on ratio allocation based on the findings of the patient assessment
- This should be used alongside a validated PEWS score whilst considering any other critical care interventions, such as IV Bronchodilators
- The RAG (red, amber, green) colour system refers to the severity of illness and need for increased monitoring/likelihood of deterioration

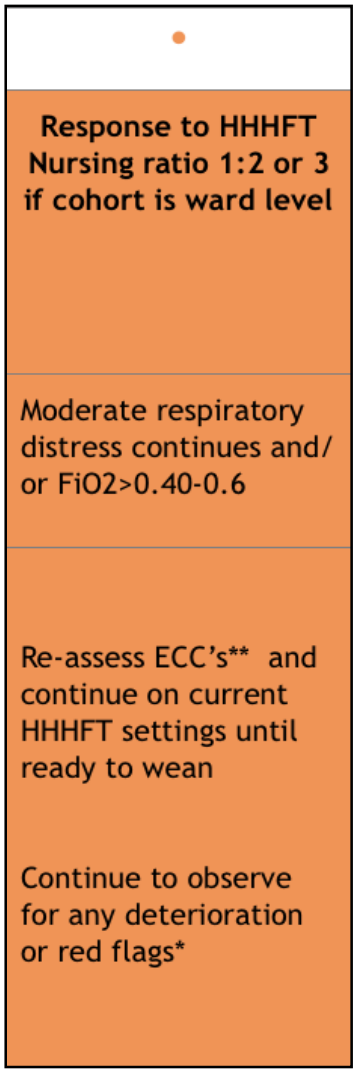
Staffing ratios			
Staff to patient ratio should be determined based on the assessment of the patient's overall condition. A validated Paediatric early warning score (PEWS) should be used and other critical care interventions considered. Patient ratios should be adjusted accordingly and flexibility required as condition may change rapidly.			
Acuity	**Low risk/long term use of HHHFT**	**Medium risk**	**High risk**
Descriptor	Actively weaning HHHFT or established on HHHFT as a long term therapy Mild or no respiratory distress	Acute phase, some stability established but not able to wean FiO2 below 0.40 currently. Moderate respiratory distress.	Acute initiation phase, severe respiratory distress observing for responsiveness to HHHFT. High PEWS
Nurse ratio	**1:4 (1:3 < 2yrs)**	**1:2 or 3**	**1:1**

Response to Treatment: Green (Weaning)



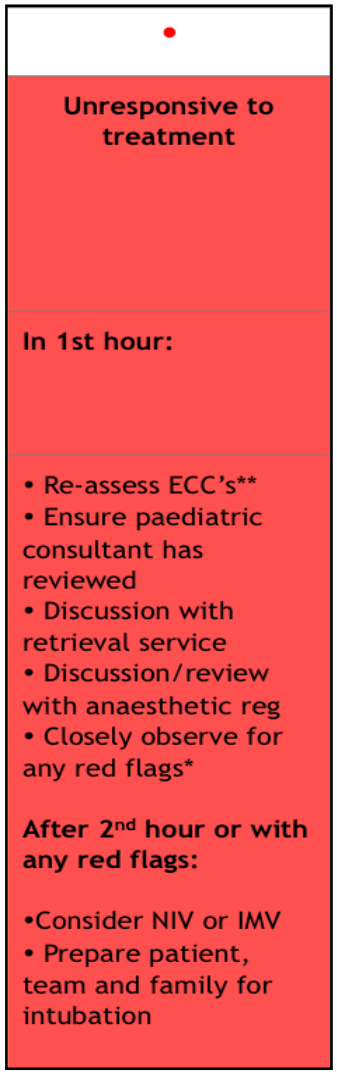
- Weaning therapy is encouraged when the patient is stable to do so.
- If the patient has a sustained response to treatment, follow the green guidance for weaning.
- A weaning patient (half flow rate & FiO2 0.3-0.4) can be nursed on a 1:3 or 1:4 ratio depending on age of patient, as per RCN safe staffing recommendations.
- If the patient has no clinical deterioration on weaned flow rate for 4 hours (or less on Consultants decision), stop HHHFT.
- If discontinuation not tolerated, restart HHHFT on weaning flow rate.

Response to Treatment – Amber (Close Monitoring)



- Children who continue to have moderate respiratory distress and/or FiO2 0.4-0.6 require close monitoring as are at higher risk of deterioration.
- They are not a candidate for weaning, continue on current settings until ready to wean or require escalation.
- Amber patients should be nursed on a 1:2 ratio (or 1:3 if cohorted with 2 ward level patients).

Response to Treatment – Red (Escalation)



- Patients with severe respiratory distress and/or FiO2 > 0.6 should be monitored continuously as are at risk of rapid deterioration.
- Refer to the guideline for actions required in the first hour of commencing treatment.
- Patients unresponsive to treatment require escalation using local PEWS guidance.
- If no sustained improvement observed within two hours or any red flags indicated at any time, immediate escalation is required

RED FLAGS and **Immediate escalation** explained further in next slide

Red Flags & Escalation

*Red Flags for immediate escalation

- Any apnoeic/bradycardic episodes
- Increasing respiratory distress after HHHFT commenced
- Clinically tiring
- PEWS indicates immediate escalation to resus team
- FiO2>0.60

Immediate escalation

- Increase FiO2 to max
- Call 2222
- Prepare for intubation
- Liaise with retrieval team or on site L3PCC
- Communicate with the family

Essential Care recommendations

- Essential Care Consideration (ECCs) provide a list of additional actions which may optimise the care of children on HHHFT
- There are some variations based on severity of illness - see RAG colour guide and link to recommendation. (*This list is not exhaustive or disease specific)*

**Essential Care Considerations (ECCs)
• Optimised positioning (e.g. head elevation) • Consider referral for physiotherapy assessment • Secretion clearance if indicated and safe to do so • Consider feeding regime alteration according to risk and underlying disease. •High risk should be NBM with IV fluids • Med risk should be assessed before feeding and fed with caution • Psychosocial support, clear communication, play and distraction • Minimal handling/cluster cares • Blood gas analysis not essential and acidosis a late sign of failure

Monitoring & Patient Management

- Refer to colour guide following each recommendation for specific guidance for severity.

Monitoring and patient management Coloured dots refer to corresponding patient acuity
• Continuous oxygen saturations • • • • Observation frequency and escalation according to PEWS • • Min hourly observations and escalation according to PEWS • • • Consider continuous ECG if required • • • 2 hrly mouth and nose care including pressure area check • • • • Hourly documentation of FiO2, flow rate, and temperature as well as equipment specific checks • • •

Nutrition

- If has sustained response or weaning (Green) feed orally as tolerated, this may require a reduction in volume of feed +/- increase frequency.
- In significant respiratory distress (Amber/Red) stop oral feeds and consider Nasogastric tube feeds or commence intravenous fluids upon medical advice.

Nutrition

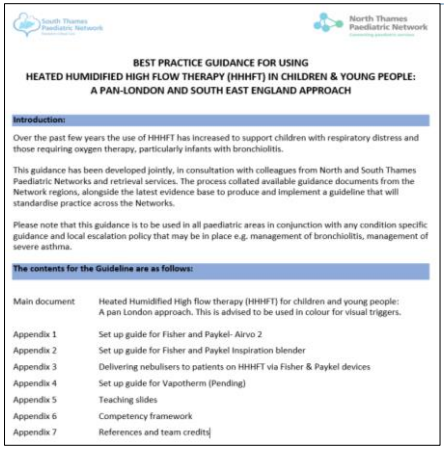
- Consider reducing daily intake as clinically directed
- Consider continuous nasogastric feeds if not tolerating boluses
- Aspirate nasogastric tube in the event of gastric distension and severe respiratory distress. Leave on free drainage and commence IV maintenance.

Transferring

Patient transfer

If patient transfer is required then a suitable risk assessment tool such as the STOPP tool should be used. Where portable HHHFT is not available a senior clinician should assess the appropriate oxygen delivery based on direct patient assessment.

Available Appendices



BEST PRACTICE GUIDANCE FOR USING
HEATED HUMIDIFIED HIGH FLOW THERAPY (HHHFT) IN CHILDREN & YOUNG PEOPLE:
A PAN-LONDON AND SOUTH EAST ENGLAND APPROACH

Introduction:

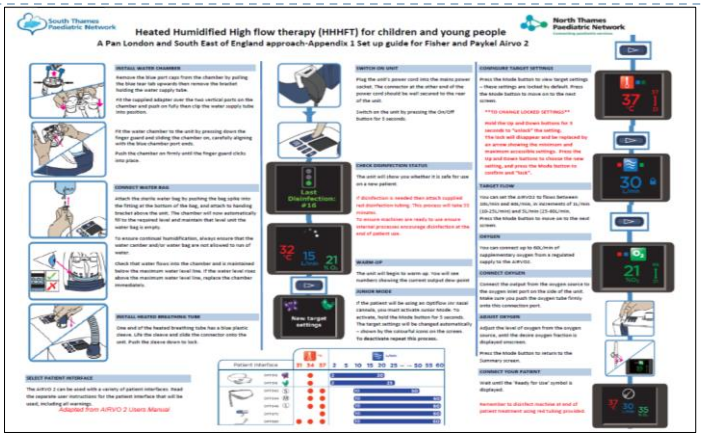
Over the past few years the use of HHHFT has increased to support children with respiratory distress and those requiring oxygen therapy, particularly infants with bronchiolitis.

This guidance has been developed jointly, in consultation with colleagues from North and South Thames Paediatric Networks and retrieval services. The process collated available guidance documents from the Network regions, alongside the latest evidence base to produce and implement a guideline that will standardise practice across the Networks.

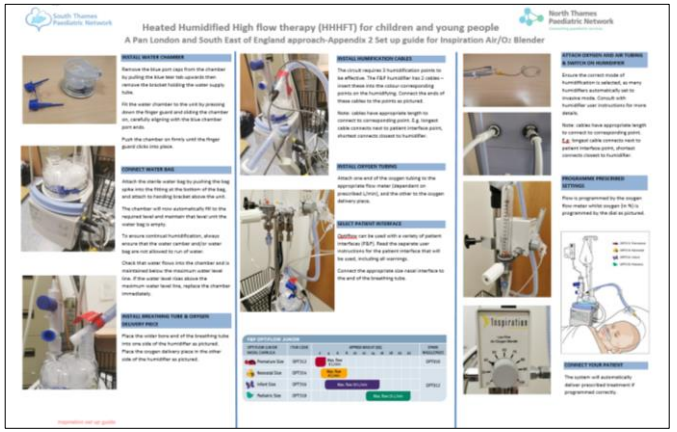
Please note that this guidance is to be used in all paediatric areas in conjunction with any condition specific guidance and local escalation policy that may be in place e.g. management of bronchiolitis, management of severe asthma.

The contents for the Guideline are as follows:

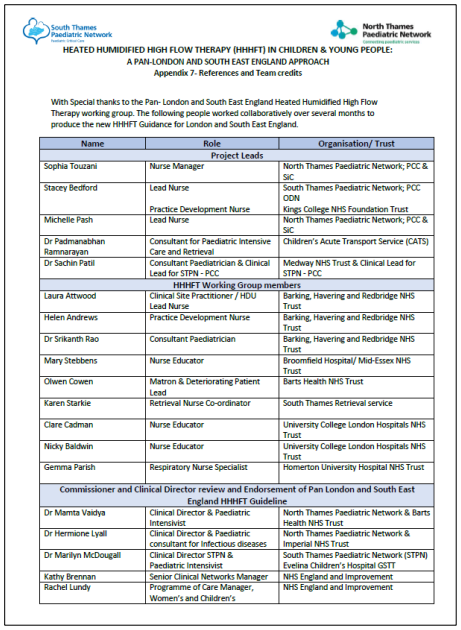
Main document	Heated Humidified High flow therapy (HHHFT) for children and young people: A pan London approach. This is advised to be used in colour for visual triggers.
Appendix 1	Set up guide for Fisher and Paykel- Airvo 2
Appendix 2	Set up guide for Fisher and Paykel Inspiration blender
Appendix 3	Delivering nebulisers to patients on HHHFT via Fisher & Paykel devices
Appendix 4	Set up guide for Vapotherm (Pending)
Appendix 5	Teaching slides
Appendix 6	Competency framework
Appendix 7	References and team credits



Heated Humidified High flow therapy (HHHFT) for children and young people
A Pan London and South East of England approach-Appendix 1 Set up guide for Fisher and Paykel Airvo 2



Heated Humidified High flow therapy (HHHFT) for children and young people
A Pan London and South East of England approach-Appendix 2 Set up guide for Inspiration Air/O2 Blender



HEATED HUMIDIFIED HIGH FLOW THERAPY (HHHFT) IN CHILDREN & YOUNG PEOPLE:
A PAN-LONDON AND SOUTH EAST ENGLAND APPROACH
Appendix 7- References and Team credits

With Special thanks to the Pan- London and South East England Heated Humidified High Flow Therapy working group. The following people worked collaboratively over several months to produce the new HHHFT Guidance for London and South East England.

Name	Role	Organisation/ Trust
Project Leads		
Sophia Touzani	Nurse Manager	North Thames Paediatric Network; PCC & SIC
Stacey Bedford	Lead Nurse Practice Development Nurse	South Thames Paediatric Network; PCC ODN Kings College NHS Foundation Trust
Michelle Pash	Lead Nurse	North Thames Paediatric Network; PCC & SIC
Dr Padmanabhan Ramnarayan	Consultant for Paediatric Intensive Care and Retrieval	Children's Acute Transport Service (CATS)
Dr Sachin Patil	Consultant Paediatrician & Clinical Lead for STPN - PCC	Medway NHS Trust & Clinical Lead for STPN - PCC
HHHFT Working Group members		
Laura Attwood	Clinical Site Practitioner / HDU Lead Nurse	Barking, Havering and Redbridge NHS Trust
Helen Andrews	Practice Development Nurse	Barking, Havering and Redbridge NHS Trust
Dr Srikanth Rao	Consultant Paediatrician	Barking, Havering and Redbridge NHS Trust
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Commissioner and Clinical Director review and Endorsement of Pan London and South East England HHHFT Guideline		
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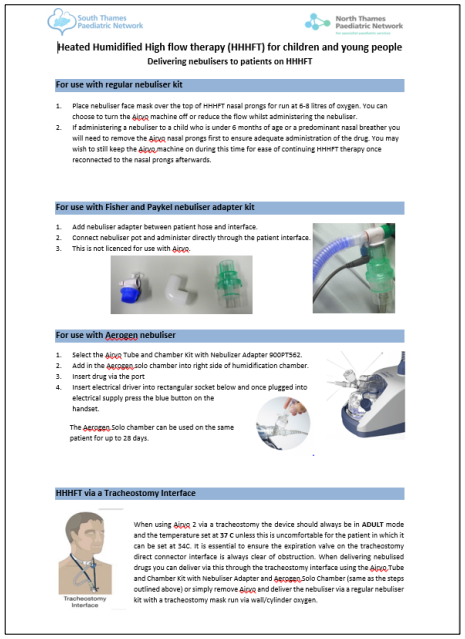


Heated Humidified High flow therapy (HHHFT) for children and young people
Delivering nebulisers to patients on HHHFT

For use with regular nebuliser kit

1. Place nebuliser face mask over the top of HHHFT nasal prongs for run at 6-8 litres of oxygen. You can choose to turn the Airvo machine off or reduce the flow whilst administering the nebuliser.
2. If administering a nebuliser to a child who is under 6 months of age or a predominant nasal breather you will need to remove the Airvo nasal prongs first to ensure adequate administration of the drug. You may wish to still keep the Airvo machine on during this time for ease of continuing HHHFT therapy once reconnected to the nasal prongs afterwards.

For use with Fisher and Paykel nebuliser adapter kit

1. Add nebuliser adapter between patient hose and interface.
2. Connect nebuliser pot and administer directly through the patient interface.
3. This is not licenced for use with Airvo.

For use with Aerogen nebuliser

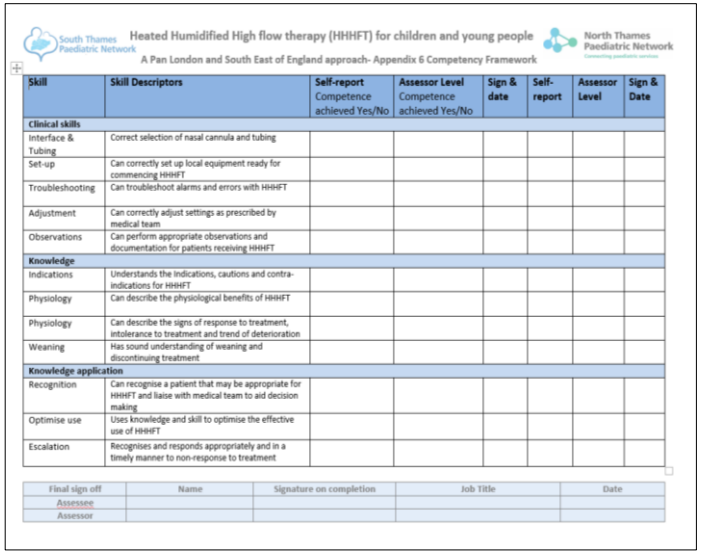
1. Select the Airvo Tube and Chamber Kit with Nebuliser Adapter 900PT562.
2. Add in the Aerogen solo chamber into right side of humidification chamber.
3. Insert drug via the port
4. Insert electrical driver into rectangular socket below and once plugged into electrical supply press the blue button on the handset.

The Aerogen Solo chamber can be used on the same patient for up to 28 days.

HHHFT via a Tracheostomy Interface

Tracheostomy Interface

When using Airvo 2 via a tracheostomy the device should always be in **ADULT** mode and the temperature set at **37 C** unless this is uncomfortable for the patient in which it can be set at 34C. It is essential to ensure the expiration valve on the tracheostomy direct connector interface is always clear of obstruction. When delivering nebulised drugs you can deliver via this through the tracheostomy interface using the Airvo Tube and Chamber Kit with Nebuliser Adapter and Aerogen Solo Chamber (same as the steps outlined above) or simply remove Airvo and deliver the nebuliser via a regular nebuliser kit with a tracheostomy mask run via wall/cylinder oxygen.



Heated Humidified High flow therapy (HHHFT) for children and young people
A Pan London and South East of England approach- Appendix 6 Competency Framework

Skill	Skill Descriptors	Self-report Competence achieved Yes/No	Assessor Level Competence achieved Yes/No	Sign & date	Self-report	Assessor Level	Sign & Date
Clinical skills							
Interface & Tubing	Correct selection of nasal cannula and tubing						
Set-up	Can correctly set up local equipment ready for commencing HHHFT						
Troubleshooting	Can troubleshoot alarms and errors with HHHFT						
Adjustment	Can correctly adjust settings as prescribed by medical team						
Observations	Can perform appropriate observations and documentation for patients receiving HHHFT						
Knowledge							
Indications	Understands the Indications, cautions and contra-indications for HHHFT						
Physiology	Can describe the physiological benefits of HHHFT						
Physiology	Can describe the signs of response to treatment, intolerance to treatment and trend of deterioration						
Weaning	Has sound understanding of weaning and discontinuing treatment						
Knowledge application							
Recognition	Can recognise a patient that may be appropriate for HHHFT and liaise with medical team to aid decision making						
Optimise use	Uses knowledge and skill to optimise the effective use of HHHFT						
Escalation	Recognises and responds appropriately and in a timely manner to non-response to treatment						

Final sign off	Name	Signature on completion	Job Title	Date
Assessee				
Assessor				

South Thames Paediatric Network

Heated Humidified High flow therapy (HHHFT) for children and young people

A Pan London and South East of England approach- Appendix 6 Competency Framework

North Thames Paediatric Network
Connecting paediatric services

Skill	Skill Descriptors	Self-report Competence achieved Yes/No	Assessor Level Competence achieved Yes/No	Sign & date	Self-report	Assessor Level	Sign & Date
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Assessor				

HEATED HUMIDIFIED HIGH FLOW THERAPY (HHHFT) IN CHILDREN & YOUNG PEOPLE:
A PAN-LONDON AND SOUTH EAST ENGLAND APPROACH
Appendix 7- References and Team credits

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Kathy Brennan	Senior Clinical Networks Manager	NHS England and Improvement
Rachel Lundy	Programme of Care Manager, Women's and Children's	NHS England and Improvement

Policies/ Guidelines/ SOP's for HHHFT from the following Hospitals/ Trusts were reviewed along with the most up to date national and international research and literature during the creation of the Pan London and South East England HHHFT Guidance document to ensure continued promotion of best available evidence and standardisation of practice.

Trust / Organisation
Barts Health NHS Trust
University College London Hospital NHS Trust
Kings College NHS Foundation Trust NHS Trust
Medway NHS Foundation Trust
Homerton University Hospital NHS Trust
Hillingdon Hospital NHS Foundation Trust
Imperial College Healthcare NHS Trust
Barking, Havering and Redbridge NHS Trust
East of England Paediatric ODN
Basildon Hospital - Mid Essex NHS Trust
Chelsea & Westminster NHS Foundation Trust
West Hertfordshire Hospital NHS Trust
Evelina Children's Hospital NHS

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