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 the critical care transport 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	HHHFT Equipment QR codes
Appendix 2	References and team credits

Original date of completion	**2020**
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Version	**V2**

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 moderate or severe respiratory distress
- Post extubation if clinically indicated

Contraindications

- Nasal obstruction or craniofacial abnormalities
- Trauma/Surgery to nasopharynx
- Recurrent apnoeas
- 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), such as the national PEWS should be used, and other critical care interventions considered. Patient ratios should be adjusted accordingly, and flexibility is required as the child's 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 FiO_2 below 0.4. 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 the 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 over a 5 minute period.
3. **Titrate FiO_2** to maintain $SPO_2 \geq 92\%$ 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

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

Treatment guide

Sustained response to HHHFT Nursing ratio 1:4 (1:3<2yrs)

Sustained response to HHHFT confirmed.

Commence weaning below:

Wean FiO_2 to 0.3-0.4.

↓

If oxygen saturation remains in desired range, halve 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 discontinuing HHHFT not tolerated.

Response to HHHFT Nursing ratio 1:2 or 3 if cohort is ward level

Moderate respiratory distress continues and/or FiO2>0.4 - 0.6

↓

Re-assess ECC's** and continue on current HHHFT settings. Continue to observe for any deterioration or red flags*

↓

When ready to wean: **See weaning guidance in green box**

Unresponsive to treatment Nursing ratio 1:1

In 1st hour or with any red flags*:

↓

Re-assess ECC's**. Ensure paediatric consultant has reviewed the child.

Discussion with transport service. Discussion/review with anaesthetic team. Closely observe for any red flags*.

↓

After 2nd hour or with any red flags*:

Consider NIV. Prepare patient, team and family for intubation

*Red Flags for immediate escalation

- Any apnoeic/bradycardic episodes
- Increasing respiratory distress after HHHFT commenced
- Clinically tiring (raised pCO_2)
- PEWS indicates immediate escalation to resus team
- Significant concern from parent or carer
- $FiO_2 > 0.60$

Immediate escalation

- Increase FiO_2 to max
- Call 2222
- Prepare for intubation
- Liaise with transport team or on site L3PCC
- Communicate with the family

Monitoring and patient management

Coloured dots refer to corresponding patient acuity

- Continuous oxygen saturations • • •
- 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

For patient transfer considerations, please go to next page of the guideline.

Transfer Considerations

BCYP REQUIRES HEATED HUMIDIFIED HIGH FLOW THERAPY (HHHFT) AND REQUIRES INTRA-HOSPITAL TRANSFER
(E.G. EMERGENCY DEPARTMENT TO WARD, or BETWEEN HOSPITAL AREAS) ***Note: for inter-hospital transfer, call Retrieval Service for advice***
This guidance should be used in conjunction with the **full HHHFT guideline** and care should be escalated as appropriate

V2
08/24

North Thames Paediatric Network
Connecting paediatric services

South Thames Paediatric Network

STEP 1 – ASSESS RISK – Assessment by Senior Clinician to establish risk of deterioration during transfer

LOW RISK	MEDIUM RISK	HIGH RISK
Refer to HHHFT Guideline to establish risk and Acuity. Clinical Judgement should always be used and transfer of patient requires adequate risk assessment. Appropriate escalation of patients should always occur and the need for intubation of high risk patients should be assessed. Clinical condition change rapidly especially during initiation of treatment and transfer of any patient regardless of risk should be treated with caution. **HIGH RISK Group should only be moved if deemed appropriate by senior clinician with a consideration for intubation**		

Ensure Oxygen, Non Re-breath Mask and Bag-Valve-Mask (BVM) to hand for all transfers

STEP 2 – IS RELIABLE HHHFT / CPAP TRANSFER EQUIPMENT AVAILABLE?

YES – commence therapy prior to transfer

Should be transferred by a Nurse trained in Paediatric Basic Life support (BLS)
Should be transferred by a competent Health Care Professional and a Nurse trained in Paediatric ILS
Should be transferred by a Paediatric Airway Competent Health Care Professional and a nurse trained in Paediatric ILS. **If NO IMPROVEMENT is seen since commencing therapy consider further review and delaying of transfer**

STEP 3 – TRANSFER

Added in response to the National Patient safety alert on 1/04/20 reference NatPSA/2020/002/NHSPS Specifically in response to the action: Do NOT start HFNO in any emergency department or short stay without a plan for how to transfer the patient onwards

NO – ensure risk assessed as above and follow as below

DO NOT commence on HHHFT / CPAP prior to transfer. **Ensure therapy can commence immediately on arrival at destination**	**Commence therapy prior to transfer** and follow HHHFT guideline as appropriate. Senior clinician **must assess** patient prior to transfer to establish RISK OF DETERIORATION without HHHFT. If transfer deemed appropriate patient **should be transferred by a Paediatric Airway Competent Health Care Professional and a nurse trained in Paediatric Intermediate Life Support.** Oxygen delivery method during transfer should be 15L via Non Re-breath oxygen mask unless competent in delivering PEEP via mask and Ayres T-piece. Keep NBM, NG on free drainage, consider oxygen requirement to ensure adequate supply for entire journey. Consider static trial period to establish tolerance and stability. **HHHFT should be recommenced immediately on arrival at destination**
If transfer CAN occur within 30 minutes, do not commence on HHHFT / CPAP prior to transfer. Clinical team **must assess** patient prior to transfer to establish RISK OF DETERIORATION **Ensure therapy can commence immediately on arrival at destination.** Should be transferred by a competent Health Care Professional and a Nurse trained in Paediatric ILS **If transfer CANNOT occur within 30 minutes**, treat as per **HIGH RISK group →**	

Appendix 1: HHHFT equipment QR codes

VENTS

Airvo2 | Airvo3 | Hamilton C1 | Hamilton T1 | Vapotherm HVT 2.0 | Vapotherm Precision Flow

NEBULISATION OPTIONS

Aerogen Solo | Aerogen Solo: Set up Guide Multiple different interfaces | Hamilton | Vapotherm

CONSUMABLES

Airvo | Hamilton | Vapotherm

HUMIDIFIER

Fisher & Paykal | Education Videos

Appendix 2: References and team credits

With Special thanks to the Pan- London and South East England Heated Humidified High Flow Therapy original working group in 2020 to develop the guideline.

Feedback on the original guideline was collected from healthcare professionals Pan-London across the two Networks and a working group was set up. The following people worked collaboratively over several months to produce the new updated HHHFT Guidance for London and South East England.

Name	Role	Organisation/ Trust
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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
Great Ormond Street Hospital for Children

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South Thames Paediatric Network
Guidance and Pathway

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