

Clinical Guideline: Heated Humidified High Flow Nasal Cannula (HHHFNC) Guideline

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For use in: EoE Neonatal Units
Guidance specific to the care of neonatal patients.

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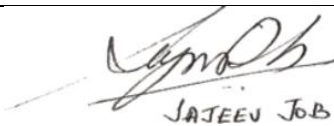
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Approved by:

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Audit Standards:

1. Documentation of indication of HHHFNC
2. Record of clinical assessment after commencing HHHFNC
3. Blood gas analysis within 2 hours of starting HHHFNC
4. Documentation of decision to discontinue HHHFNC

Heated Humidified High Flow Nasal Cannula (HHHFNC) Guideline

This guideline outlines the use of humidified high flow nasal cannula (HHHFNC) for non-invasive ventilation support in infants on the neonatal unit.

There are various manufacturers of HHHFNC devices including VapoTherm (VapoTherm Inc) Optiflow (Fisher-Paykel) and Fabian Therapy evolution. Setting up HHHFNC will depend on which device is used in each neonatal unit and relies on the correct choice of nasal cannula size.

There is considerable difference in experience in the use of this relatively new modality of non-invasive respiratory support in neonates.

Some neonatal units in the region have used this modality of non-invasive ventilation since 2008 and it is often their routine first-line tool for non-invasive support. Others have just started using it bigger babies while they continue to gain confidence.

The aim should be to use the least invasive respiratory support possible that permits stabilisation and minimises adverse outcomes.

Introduction:

- Humidified high flow nasal cannula (HHHFNC) delivers non-invasive respiratory support in neonates in the form of oxygen or a mixture of oxygen and air at flow rates $\geq 1\text{L}/\text{min}$. Delivery of high flow rates via standard nasal cannula is not possible due to the negative impact on the respiratory mucosa with delivery of cold and non-humidified gases. For this reason, nasal cannulae are only used at low flow- rates (generally $<0.5\text{L}/\text{min}$) to deliver supplemental oxygen and maintain saturations. Flow rates vary from 1-6L/min, up to a maximum of 8L/min.
- HHHFNC offers an alternative option to low-flow nasal cannula, head box oxygen and nasal continuous positive airway pressure (nCPAP).
- It may be used as primary therapy, step down care from mechanical ventilation or weaning from nCPAP. Early initiation of non-invasive ventilation is advocated to prevent prolonged use of endotracheal ventilation, which increases the risk of bronchopulmonary dysplasia (BPD), air leak and lung injury (Lee et al., 2020).

- HHHFNC can be used for non-invasive ventilation support in both term and premature infants.
- It is recommended that small calibre nasal cannulae are used for HHHFNC, obstructing <50% of the nares to allow for leakage of air around the cannulae to ensure effective CO₂ flushing and prevent high pressures in the nasal airways. Therefore, it is difficult to predict or measure the level of pressure generated in HHHFNC.

Background & Rationale:

- HHHFNC allows the delivery of oxygen or a mixture of oxygen and air at flow rates greater than the inspiratory flow rate possible for a neonate to achieve (Kugelman et al 2014)
- Entrainment of room air is reduced as the flow-rate increases and hence HHHFNC therapy can deliver oxygen at higher concentrations than is possible by low flow therapy or head box oxygen.
- This can be achieved by flows greater than 2L/min; however, the American Academy of Respiratory Clinicians advocates a flow of at least 3L/min to define high flow therapy.

Non-invasive delivery of gases by other modes has different benefits and complications.

- Face masks / standard low flow intranasal cannula are uncomfortable and can cause irritation due to the use of dry, cold gases. Infants treated with low flow nasal cannula oxygen, require more suctioning, which can lead to mucosal damage, bleeding and infection.
- Head box oxygen can generate significant noise and can lead to substantial fluctuations in the delivered FiO₂ during cares, examinations and incubator entry.
- Nasal CPAP (nCPAP) delivered via nasal prongs or nasal mask has been shown to cause barotrauma as well as trauma to the nose and head. Abdominal distension is often seen and can at times lead to avoidable discontinuation of feeds, completion of septic screens and abdominal X-rays (Armfield and West, 2009).

- Bubble humidifiers do not significantly increase humidity and temperature and have been associated with mucosal trauma, infection and nasal bleeding.

The use of HHHFNC may minimise or avoid the problems noted above and has gained popularity due to its ease of use, increased comfort and benefits with mother – infant bonding (Lee et al., 2020).

There is evidence that HHHFNC provides some PEEP, approximately 3-5 cm H₂O when flow rates up to 8 L/min are used (Collins et al 2013). However, HHHFNC is not a CPAP device and the PEEP is neither controlled nor monitored.

Mechanisms of Action:

The mechanisms of action of HHHFNC are multiple and probably have different contributions dependent on the gestation of the infant and disease cycle.

Proposed mechanisms of action centre around reduction of upper airway deadspace, reduction of inspiratory resistance, gas conditioning and some degree of positive pressure delivery.

- 'Flush' is an important and novel concept. Flush is improved by having small nasal (<50 % of the diameter of the nares) prongs to allow leak. The flush of carbon dioxide during expiration from the upper airways dead space is probably the most important mechanism underlying its efficacy (de Jongh et al 2014, Dysart et al 2009).
- Gas conditioning: the evidence is that unconditioned gases (not fully humidified and not at 37°C) cause adverse compliance changes in lung tissue. Heated and humidified gases therefore;
 - Improve functional residual capacity
 - Reduce inspiratory resistance and subsequently improves work of breathing (Dysart et al 2009)
 - Improve lung compliance with increasing flow-rate (Dysart et al 2009, Saslow et al 2006)
 - Aids carbon dioxide elimination
 - Improves oxygenation (Dysart et al 2009)

Delivery of heated and humidified gases reduce metabolic demand of conditioning the inspiratory gases. With respiratory distress and tachypnoea, minute ventilation increases leading to larger volumes of Inspired gases requiring warming and humidification by the nasopharynx. This leads to a considerable energy demand. By providing gases that are already conditioned, HHHFNC aims to counteract this extensive energy expenditure (Dysart et al 2009).

- Continuous positive distending pressure (CPDP) prevents alveolar collapse. The amount of CPDP produced is directly related to the degree of flow delivered in a linear association. However, the patient's weight, the size of nasal cannula in relation to size of nares also impact upon CPDP produced, although to a lesser degree (Collins et al 2013, Dani et al 2009).

Summary of Actions:

Dead space washout	Reduce dead space making minute ventilation more efficient
Reduce inspiratory work of breathing	Exceed inspiratory flow thus eliminating nasal resistance
Improved lung Mechanics	Warmed, humidified gas has been shown to improve conductance, lung compliance and lung elasticity
Eliminates metabolic work associated with gas conditioning	Attenuates the energy and water loss associated with conditioning inspiratory gas
Provision of mild distending pressure	Provides positive distending pressure for lung recruitment. It prevents alveolar collapse
Improve secretion mobilisation	Ideal humidification of the inspired gas has been shown to restore muco-ciliary function and reduce symptoms of airway exacerbations

Table adapted from: High Flow Nasal Cannula Therapy in Neonatology (TL Miller 2013).

Choice of Nasal Cannula Size:

- Fitting nasal cannula that is narrower than the size of the nares is vital in preventing the generation of potentially harmful high pressures.
- The nasal cannula should be no larger than 50% of the diameter of the nares to ensure only safe CPDP is produced (de Jongh et al 2014, Dysart et al 2009).
- Incorrect nasal cannula fitting may lead to high distending pressures and pulmonary barotrauma, with the extremely premature infant being at greatest risk.
- If there is uncertainty of choice between two sizes, the smaller of the sizes should be used.

The choice of nasal cannula will depend on the device used






1. Vapotherm:

Cannula Sizes	Weight	Tip OD
 Premature	<700g	1.5 mm
 Neonatal	<1100g	1.5 mm
 Infant	>1100g	1.9 mm
 SOLO (P,N,I)	700-1100g	1.9 mm
 Intermediate Infant	>1100g	1.9 mm

From Vapotherm: NICU pocket guide (Offers.vapotherm.com 2021).

2. Optiflow

2 SELECT CANNULA SIZE

SIZE RANGE	ENSURE GAP AROUND PRONGS
 Premature Size	
 Neonatal Size	
 Infant Size	
 Pediatric Size	

F&P OPTIFLOW JUNIOR		APPROX WEIGHT (KG)										SPARE WIGGLEPADS	
OPTIFLOW JUNIOR NASAL CANNULA	ITEM CODE	2	4	6	8	10	12	14	16	18	20	22	
 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							

Gestational age	< 32 weeks	27 weeks – 6 months
Weight	< 2 kg	1 – 8 kg
Max flow rate	8 L / min	8 L / min

Adapted from fphcare.co.uk (Optiflow Junior Nasal Cannula, 2021).

Operating Temperature:

Vapotherm - 35° C for flow rate < 5 L/min and 37°C at > 5 L/min

Optiflow – humidifier set at 37°C (NB – use non invasive setting on the Fisher & Paykel MR850 humidifier)

Fabian – humidifier set at 37°C (NB – use non invasive setting on the Fisher & Paykel MR850 humidifier)

HHHFNC versus CPAP:

Studies have shown that HHHFNC is as effective as nCPAP when used in neonates and that there may be benefits to choosing HHHFNC over CPAP.

- In treating infants with respiratory distress, there is no difference in work of breathing of the patient when nCPAP and HHHFNC are compared (Klingenberg et al 2009, Saslow et al 2006)
- There is similar efficacy to nCPAP for support of neonates >28 weeks gestation with respiratory dysfunction; when applied post-extubation and when used as primary therapy (reducing the need for intubation and mechanical ventilation (Fleeman et al 2019). Some studies have in fact shown a greater rate of endotracheal intubation or need for re-intubation in patients treated with nCPAP. Bruet et al. suggest this may be due to nCPAP being used as a rescue therapy when there is treatment failure with HHHFNC (Bruet et al 2021). Greater caution is required when treating infants < 28 weeks gestation (Holleman-Duray et al 2007, Manley et al 2013, Shoemaker et al 2007, Yoder et al 2013).
- There is no difference between extubation failure when HHHFNC is compared to nCPAP and no difference in those who went on to be diagnosed with bronchopulmonary dysplasia (Holleman-Duray et al 2007, Manley et al 2013, Yoder et al 2013).
- There are no differences in rates of PDA, intraventricular haemorrhage, periventricular leucomalacia, necrotising enterocolitis, laser eye surgery or sepsis (Holleman-Duray et al 2007, Shoemaker et al 2007).
- HHHFNC is as effective as nCPAP when managing apnoea of prematurity (Holleman-Duray et al 2007, Sreenan et al 2001).

- Infants treated with HHHFNC do not have an increased oxygen requirement when compared to infants treated with nCPAP (Sreenan et al 2001).
- Significantly reduced rate of nasal trauma compared to those treated with nCPAP (Kugelman et al 2014, Manley et al 2013, Yoder et al 2013).
- Significantly reduced rate of air leak for post extubation treatment compared to nCPAP (Fleeman et al 2019)

Benefits:

- Reduces work of breathing by improving gas exchange.
- Minimises nasal trauma when compared to nCPAP (Woodhead et al 2006, Collins et al 2013, Bruet et al 2021).
- Reduces risk of gaseous abdominal distension and therefore may improve feed tolerance (Luo K et al 2022).
- Delivery of humidified and heated gases protects the respiratory mucosa from drying and bleeding (Woodhead et al 2006). Delivery of cold, dry gases by other means can lead to bronchoconstriction, increased airway resistance and increased metabolic demand of conditioning the gases. Delivery of dry gases also leads to impaired lung compliance that negatively impacts upon respiratory distress (Dani et al 2009).
- May be tolerated better than nCPAP, reducing energy expenditure and improving growth (Holleman-Duray et al 2007, Shoemaker et al 2006).
- Infants do not require time off HHHFNC for nose breaks as with nCPAP.
- HHHFNC allows respiratory support to be carefully provided alongside oral feeding (See "Feeding Infants Receiving HHHFNC" below)
- Optimises opportunities for parental care administration, including skin-to-skin and breastfeeding (Klingenberg et al 2009; Dalglish et al, 2016; Canning, A., et al, 2020)
- Provides an alternative option for post-extubation respiratory support.

- Weight gain optimised in comparison to infants treated with nCPAP due to reduced metabolic demands, improved feed tolerance and earlier achievement of full feeds (Holleman-Duray et al 2007).
- Easy access to infants head for measuring head circumference, performing cranial ultrasounds or applying cerebral function monitors.

Drawbacks:

- Inability to measure and monitor airway pressure and therefore potential to over-distend the lungs
- Risk of pneumothorax, although the incidence of pneumothoraces appear to be lower in HHHFNC cohorts than in nCPAP cohorts due to the lower airway pressures required (Jeengar & Singh 2024)
- There are currently no studies / consensus on starting flow rates or weaning methods. These are likely to be dependent on gestation of infant, weight and degree of respiratory distress.
- Unknown impacts of HHHFNC on the extremely premature or extreme low birth weight infant.
- Unknown impacts of HHHFNC on oral feeding establishment and safety ("See Feeding Infants Receiving HHHFNC" below)
- Evidence suggests there is an increased risk of treatment failure in HHHFNC groups when compared to nCPAP (Bruet et al. 2021).

Indications:

Non-invasive ventilation option in term and pre-term infant as step down treatment from mechanical ventilation or nCPAP or as first line treatment of:

- Respiratory distress syndrome (surfactant deficient lung disease) / Grunting
- Meconium aspiration syndrome
- Respiratory acidosis
- Chronic lung disease
- Apnoea of prematurity

- Post-operative respiratory support
 - Alternative respiratory support in the conservative management of pneumothoraces
 - Infants with nasal trauma secondary to nCPAP
 - Use in infants with facial deformities, which may mean nCPAP is difficult to apply.
-
- Use of HHHFNC can be considered when nCPAP 4-6cmH₂O and FiO₂ <0.4
 - HHHFNC may be suitable for use in any infant irrespective of gestation; birth weight or age provided intubation and ventilation is not required. Caution, however, is advocated in the extremely premature and extreme low birth weight infants (Holleman-Durray et al 2007, Manley et al 2013, and Shoemaker et al 2007).

Contraindications:

- Abnormality in anatomy of upper airway preventing use of nasal prongs
- Respiratory distress requiring ventilation
- Worsening clinical instability

Starting HHHFNC:

- Ensure infant meets indications for use
- In infants > 1kg, start a flow rate at 6L /Min with FiO₂ adjusted to maintain saturations. Flow rates may be increased by 0.5-1L to a maximum of 8L/min if:
 - Increasing FiO₂
 - Increasing pCO₂
 - Increasing respiratory distress
 - To manage apnoea
- In infants < 1kg, starting flow rates 4-5L /min may be advocated as flow rates >6L /min should not be exceeded in this group of babies. It should be a senior decision to use flows >6 L/min in this group of babies. If respiratory support needs to be escalated further, BiPAP or mechanical ventilation need to be considered.

- Clinical assessment of infant after initiation of HHHFNC within 30 minutes and blood gas analysis within 2 hours to be considered.
- Continuous monitoring of heart rate, respiratory rate and oxygen saturations is required
- If persistent respiratory acidosis, apnoeas, increased work of breathing or FiO₂ requirement 50-60% alternative respiratory support should be considered in the form of BiPAP or intubation and ventilation.

Weaning:

- Weaning is a clinical decision and can be considered if:
 - Reduced work of breathing
 - Reduction in respiratory rate
 - Stable capillary blood gases
 - No apnoeas
 - Stable oxygen requirements
 - Aim to wean flow-rate towards 3L / min
 - Once a flow-rate of 3L / min has been reached, consider stopping HHHFNC
 - If oxygen support is still required, low-flow nasal cannula may be trialled.
 - The suggested weaning guidance would be as follows, but every baby might need individualised weaning plan based on his/her clinical status
 - Weight > 1kg:
 - If FiO₂ 21% aim to wean flow by 1L/min every 12 hours as tolerated
 - If FiO₂ 22- 25% aim to wean flow by 1 L / min 24 hourly as tolerated
 - If FiO₂ 25 - 30% cautious weaning 1L / min 24 - 48 hourly as tolerated
 - If FiO₂ >30 % weaning may not be possible but a minimum flow rate of 4 L / min should be maintained.
 - Weight < 1kg:
 - If FiO₂ 21% -25% aim to wean flow by 1 L/min every 24 hours as tolerated
 - If FiO₂ 25 - 30% cautious weaning 1 L / min 24 – 48 hourly as tolerated
- If FiO₂ >30 % weaning may not be possible but a minimum flow rate of 6L / min should be maintained.
- Weaning is a clinical decision and a more cautious approach may be advocated

based on individual clinical circumstances.

- Increase flow rate again if on weaning there is a significant increase in:
 - Respiratory rate
 - Work of breathing
 - FiO₂
 - pCO₂
 - Desaturations
 - Apnoeas

If flow rates are increased, delay further attempts at weaning until a period of stability has again been reached for 24-48 hours.

Weaning can be quite challenging in babies who have bronchopulmonary dysplasia specially if they have high non-invasive support. It can be particularly tricky for babies to be weaned from nCPAP to HHHFNC. It would be most sensible to be guided by your local LTV team for babies with bronchopulmonary dysplasia.

Feeding Infants Receiving HHHFNC

Infants receiving may demonstrate developmental readiness for oral feeding while still requiring non-invasive respiratory support.

The introduction of oral feeding in this context remains an area of evolving practice. Potential benefits include positive oral-sensory development and support of parent–infant interaction. However, concerns exist regarding physiological instability, altered suck–swallow–breathe coordination, and uncertain airway protection.

Current evidence is limited and largely derived from studies involving nCPAP, whilst there is insufficient high quality evidence confirming the safety of oral feeding on HHHFNC. Decisions should therefore be cautious, individualised and multidisciplinary.

Please refer to RCSLT Feeding and Non-Invasive Respiratory Support: The role of speech and language therapists.

General Principles

- Feeding on HHHFNC is not standard
- Decisions must be individualised
- Flow rate alone should not guide readiness
- Safety and quality take priority over volume
- Multidisciplinary input, including SLT, is advised
- Stop feeding immediately if instability occurs

Clinical Considerations prior to initiating feeding on HHHFNC

Feeding decisions should not be based on HHHFNC flow rate alone. A holistic assessment is required, incorporating:

- Infant stability
 - Stable oxygen requirement and work of breathing
 - Minimal apnoea/bradycardia/desaturation episodes
 - Ability to tolerate handling
- Developmental readiness
 - Demonstrates feeding cues
 - Appropriate behavioural state and tone
 - Emerging suck–swallow–breathe coordination
- Respiratory support factors
 - Flow rate appropriate for corrected gestation
 - Evidence of respiratory weaning or stability
 - Mouth closure and nasal leak adequate
- Medical context
 - Co-morbidities affecting airway protection
 - History of aspiration or feeding intolerance
 - Neurological or structural concerns
- Feeding history
 - Previous oral feeding success
 - Tolerance of non-nutritive sucking
- Parental involvement
 - Education and shared decision-making
 - Observed feeding interactions

Wolf and Glass, 2025

Feeding on HFNC Risk Assessment

Item	2	1	0
HFNC by weight 1500-2499 gr 2500-2999 gr 3-3.9 kg (~0-4 wk) 4-4.9 kg (~1 mo) 5-5.9 kg (~2-3 mo) 6-6.9 kg (~4-5 mo) 7-7.9 kg (~6-9 mo)	≥3L ≥4L ≥5L ≥6L ≥7L ≥9L ≥10L	3L 3-4L 4-5L 5-6L 6-8L 7-9L	2L 2L 2L ≤3L ≤4L ≤5L ≤6L
Medical complexity (choose highest score) See CHD chart	Very complex: ≥ 2 major systems involved OR Cardiac – single ventricle	Moderately complex: 1 major system involved OR Cardiac – cyanotic	Low complexity: No significant medical issues other than respiratory OR Cardiac – acyanotic
Oral Feeding Skill/Experience (choose highest score)	None or partial oral < 1 month OR Born <27 6/7 wks and CA <1 month	< 1 month or partial oral > 1 month OR Born 28-33 6/7 wks and CA <1 month	Full oral feeding > 1 month AND Born >34 weeks
Respiratory course/status (choose highest score) See respiratory distress chart	Extremely fragile; ECMO hx; severe BPD; significant time on vent; slow to wean; high FIO ₂ (>30% FIO ₂) OR Resp Distress Score: Marked	Stable but with significant support and or challenges weaning; moderate BPD; mod FIO ₂ (22-29% FIO ₂) OR Resp Distress Score: Moderate	Weaning respiratory support regularly; mild or no BPD; RA via HFNC (21% FIO ₂) OR Resp Distress Score: Normal/Mild
Airway Protection / Aspiration Risk	High risk or known aspirator OR Cardiac – known VFMI or s/p arch repair (for coarct or IAA) or s/p Norwood	Moderate aspiration risk OR Cardiac – s/p surgery with low risk for VFMI	Respiratory status is the only risk factor OR Cardiac – documented no VFMI or no surgery or s/p surgery with no risk for VFMI

Score: 10-8 higher risk 7-5 medium risk 4-0 lower risk

Suggested Feeding Process

Oral feeding should only proceed when agreed by the neonatal MDT (medical, nursing, SLT where available).

Stepwise approach

1. Pre-feeding readiness assessment
 - Behavioural state and physiological stability
 - Feeding cues present
 - Stable respiratory pattern
2. Non-nutritive sucking trial
 - Dummy/pacifier during tube feeds
 - Observe respiratory tolerance
3. Therapeutic oral feed trial
 - Small, paced feed
 - Elevated side-lying positioning
 - Slow flow teat or controlled breastfeeding latch
 - Frequent pauses
4. Continuous monitoring
 - RR, saturations, colour, tone
 - Stress cues: coughing, gagging, fatigue, disengagement
5. Immediate cessation criteria

- Desaturation, bradycardia, tachypnoea
- Increased work of breathing
- Behavioural distress

6. Documentation

- Feed tolerance
- Physiological responses
- MDT review outcome

Feeding progression should prioritise quality and safety, not volume achievement.

Potential Drawbacks and Risks

There is a lack of available literature focussed on oral feeding in cohorts of babies receiving HHHFNC; the majority of evidence available exists using cohorts of babies receiving nCPAP. However, current literature highlights several concerns:

- Physiological instability
 - Feeding may precipitate desaturation or bradycardia episodes (Dalglish et al, 2016)
 - Increased respiratory workload
- Behavioural stress
 - High rates of feed discontinuation reported in studies (Hanin, et al, 2017)
 - Fatigue and dysregulation
- Airway protection uncertainty
 - Lack of objective swallow safety data on HHHFNC
 - Silent aspiration cannot be excluded
- Delayed coordination
 - Respiratory support alters normal suck–swallow–breathe timing
- False perception of benefit
 - Multiple studies have found that earlier feeding does not consistently reduce time to full feeds or discharge (Dalglish et al, 2016; Dumpa et al, 2020)
 - Emphasis on volume over feeding quality may worsen outcomes

Systematic reviews conclude that evidence remains insufficient to confirm safety or superiority of oral feeding during non-invasive respiratory support, and caution is advised.

Feeding Summary

- Feeding on HHHFNC is not routine and requires MDT agreement
- Flow rate alone should never determine feeding readiness

- Use cue-based, paced feeding techniques
- Stop immediately if instability occurs
- Prioritise neurodevelopmentally supportive feeding experiences
- Seek SLT input where available

Summary: Initiation and Weaning of HHHFNC

Indications for HHHFNC

- Non-invasive ventilation in term / pre-term infant
- Respiratory distress syndrome / Grunting
- Meconium aspiration syndrome
- Respiratory acidosis
- Respiratory support post-extubation or weaning from BiPAP
- Chronic lung disease
- Treatment & prevention of apnoea of prematurity

Start HHHFNC

- Commence 6 L / min if >1kg, 4L/min if <1kg
- FiO2 to maintain saturations
- Clinical assessment at 30 mins
- Blood gas within 2 hours
- Flow can be increased to 8 L / min if needed, if > 1kg or 6 L/min if <1kg

Clinical Improvement

YES

NO

Start Weaning

	FiO2 21%	FiO2 22-25%	FiO2 25 – 30%	FiO2 >30%
Weight > 1kg	Wean 1L / min 12hrly	Wean 1 L / min 24 hrly	Wean 1 L / min 24 - 48 hrly	Wean flow to minimum 4 L/min
Weight < 1kg	Wean 1 L /min 24hrly		Wean 1 L /min 24 - 48hrly	Wean flow to minimum of 6 L/min

- 24 hours stability at 3 L / min – discontinue HHHFNC
- Start low flow nasal cannula O2 if required to maintain saturations
- If increased WOB, RR or FiO2 return to previous settings and halt weaning for a further 24-48hrs

Consider

- nCPAP
- BiPAP
- NIPPV
- Intubation and ventilation

Proposed Parent Information Leaflet

Heated Humidified High Flow Nasal Cannula (HHHFNC)

Breathing Support

Information for Parents and Carers on the Neonatal Unit

Why you are receiving this leaflet

If your baby is receiving Heated Humidified High Flow Nasal Cannula (HHHFNC) breathing support, it is natural to have questions or feel worried. This leaflet explains what HHHFNC is, why it is used, what you may see on the neonatal unit, and how you can remain involved in your baby's care.

Our aim is to support both your baby and your family throughout their neonatal stay.

What is Heated Humidified High Flow Nasal Cannula (HHHFNC)?

HHHFNC is a type of breathing support used for babies who need extra help with their breathing or oxygen levels.

Warm, humidified air and oxygen are delivered through small, soft prongs that sit just inside your baby's nose. This gentle flow:

- Makes breathing easier
- Improves oxygen delivery
- Helps keep the airways open
- Reduces your baby's breathing effort

The air is warmed and humidified to protect your baby's delicate nose and lungs.

Why does my baby need HHHFNC?

Babies may need HHHFNC for several reasons, including:

- Prematurity (immature lungs)
- Lung infection or inflammation
- Episodes of low oxygen levels
- Breathing difficulties after birth
- Recovery after ventilation or CPAP

HHHFNC allows babies to receive breathing support while remaining as comfortable and settled as possible.

Every baby is different. The neonatal team will regularly review your baby's progress and adjust support as needed.

What will I see at my baby's cot side?

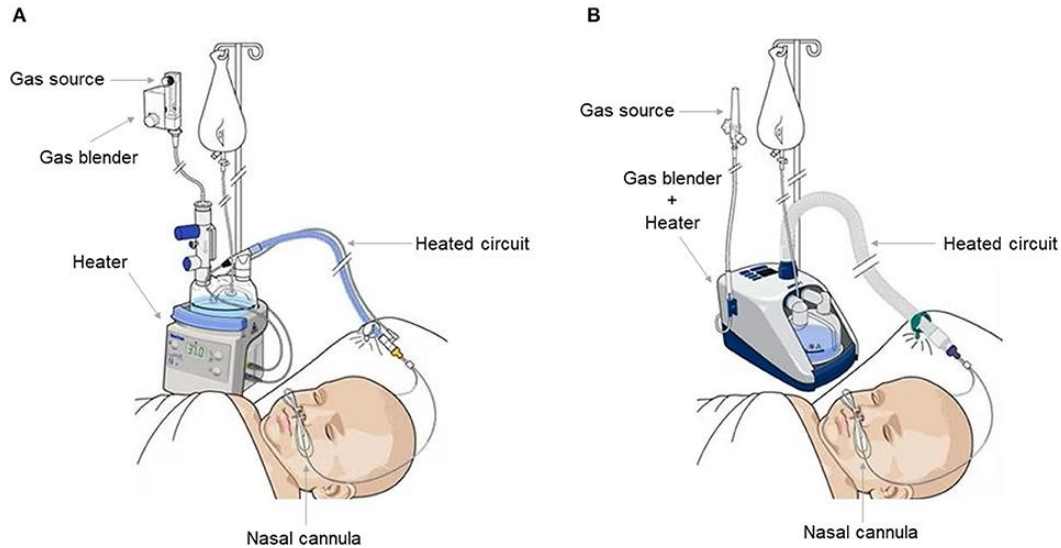
Seeing equipment around your baby can feel overwhelming at first. HHHFNC involves:

- Soft nasal prongs secured with gentle tape
- Tubing connected to a warming and humidifying machine
- Monitoring leads to track breathing, oxygen levels, and heart rate

You may hear a soft flowing sound — this is normal.

Your baby may still move, stretch, and respond to your voice and touch.

The neonatal team checks the equipment frequently to ensure it is working safely and comfortably.



Will HHHFNC hurt my baby?

HHHFNC should not be painful. Some babies may take a short time to settle when it is first started, which is normal.

Staff carefully position the prongs and regularly check your baby’s skin to prevent irritation. Please tell a nurse if you notice redness or discomfort.

Can I still be involved in my baby’s care?

Yes — your presence and involvement are very important. Please talk to the team looking after your baby regarding how you can be involved. Here are some examples:

- Skin to skin contact (kangaroo care)
- Comfort and soothe your baby
- Take part in routine cares
- Talk or sing to your baby
- Support feeding plans
- Ask questions

If you would like to be present and comfort your baby when HHHFNC is being started, you can. It is also ok to step away, if you feel this is the right thing for you. The team caring for your baby will make sure your baby will remain comfortable throughout the procedure.

What about feeding?

Breathing and feeding are closely linked and when breathing is affected this can impact feeding and swallowing. Your team will be able to advise you about whether or not your baby is able to do some oral feeding whilst on HHHFNC and if they are you will be seen by the Speech and Language Therapist who will be able to support you with how to do this. Your baby will still need their NGT during this time.

The speech and language therapist will assess and consider

- Your baby's developmental readiness
- Your baby's clinical presentation including their medical history and clinical stability (including their breathing effort)
- Why your baby needs HHHFNC and any plans for weaning

The team will discuss feeding options with you that are appropriate for your baby, and will review those with you regularly.

How will I know if my baby is improving?

Signs that your baby is getting better:

- Easier breathing
- Stable oxygen levels
- Less effort when breathing

As your baby gets better, HHHFNC support is gradually reduced. This happens at a pace that suits your baby.

If more support becomes necessary, the team will explain why and discuss the next steps with you.

What if I feel worried or overwhelmed?

Having a baby on a neonatal unit can be emotionally challenging. It is completely normal to feel anxious, tired, or unsure. We are here to support your whole family — not just your baby.

Please speak to the neonatal team if you need:

- More explanation
- Emotional support
- Practical guidance

We aim to always keep you informed about how your baby is doing in terms of their: progress, feeding, breathing support and care. All the questions that parents ask us, are taken very seriously. Please let us know, if we can help answer your questions.

When should I alert staff?

Tell a member of the nursing or medical team if you notice:

- Increased redness around the nose
- Your baby appearing uncomfortable
- Equipment concerns
- Anything that worries you

Further support

If you would like additional emotional or family support, please speak to staff. Neonatal teams can arrange access to:

- Family support services
- Counselling
- Peer support groups

For more information regarding breathing support and much more, see:

<https://www.bliss.org.uk/parents/support>



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Exceptional Circumstances Form

Form to be completed in the **exceptional** circumstances that the Trust is not able to follow ODN approved guidelines.

Details of person completing the form:	
Title:	Organisation:
First name:	Email contact address:
Surname:	Telephone contact number:
Title of document to be excepted from:	
Rationale why Trust is unable to adhere to the document:	
Signature of speciality Clinical Lead:	Signature of Trust Nursing / Medical Director:
Date:	Date:
Hard Copy Received by ODN (date and sign):	Date acknowledgement receipt sent out:

Please email form to: Kelly.hart5@nhs.net requesting receipt.

Send hard signed copy to: Kelly Hart
 Project Support/Office Manager
 Box 402
 Cambridge University Hospital
 Hills Road
 Cambridge CB2 0SW

East of England Neonatal Benchmarking Group

**Benchmark: Heated Humidified High Flow Nasal Cannula
OxygenVersion 2.**

Score relates to practice in (unit):	
Scored by:	Date scored:
<p>Statement: There are various manufacturers of HHHFNC including VapoTherm & Optiflow. Heated Humidified High Flow Nasal Cannula (HHHFNC) delivers non-invasive respiratory support in neonates, in the form of oxygen or a mixture of oxygen and air at flow rates >1.0L/min. Delivery of high flow rates via standard nasal cannula is contraindicated due to the negative impact on the respiratory mucosa with delivery of cold and dry gases. HHHFNC is an established and effective respiratory support used in new-born infants with mild respiratory distress syndrome, apnoea or after extubation or INSURE HHHFNC has a number of physiological benefits, including:</p> <ul style="list-style-type: none"> • Non-drying to the upper airway mucosa • More accurate Fio2 delivery • Reduced barotrauma and abdominal distension compared to NCPAP • Improves functional residual capacity, lung compliance and oxygenation • Reduces inspiratory resistance and subsequently improves work of breathing. • Aids carbon dioxide elimination <p>HHHFNC may reduce the length of/need for ventilation and following ventilation in neonates with respiratory distress syndrome may potentially reduce the incidence of Chronic Lung Disease</p>	
<p>Standards: Careful observation will be necessary to reduce the risk of trauma related to HHHFNC therapy. Regular on-going assessments are instrumental in the success or failure of the infant on HHHFNC</p>	
<p>Patient Group: Any infant cared for in a neonatal unit that requires respiratory support from HHHFNC</p>	
<p>Triggers for the development of the benchmark: Standardising practice Including evidence into practice Professional concerns Documentation Education</p>	
<p>Criteria for scoring: Max. 6 infants nursed on HHHFNC in the last month will be assessed visually and their documentation reviewed.</p>	

Key Factors	Individual scores	Possible total
1. 1	There is an evidence-based guideline to support clinical practice.	3
2. 2	Patient Interface & HHHFNC Delivery System	6
3. 3	Nursing Care/ documentation of infant receiving HHHFNC	7
4. 4	Education and training	5

Factor 1: There is an evidence-based guideline to support clinical practice

Evidence based practice guidelines ensure that care delivered to the infant is of the highest standard.

Clinical guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate healthcare for specific circumstances, statements about different aspects of the patients' condition and the care to be given.

Factor 2: Patient Interface & HHHFNC Delivery System

In order to minimise the risk of potential damage caused by the HHHFNCO2 interface, each time the system is set up it should be measured correctly and set up so as to not cause any pressure on the nares or septum.

Factor 3: Nursing Care of infant receiving HHHFNC

The on-going care of the infant on HHHFNC is primarily the responsibility of the registered nurse, who will ensure its safe and effective delivery.

With increased use of nasal HHHFNC in neonates there is evidence of decreased incidence of chronic lung disease and barotrauma.

Factor 4: Education and training.

Caregivers need to understand the HHHFNC system they are using to be able to troubleshoot and prevent complications.

Statements to justify scores/local action plans: