High Flow Oxygen Therapy - NICU - Paediatric Full Clinical Guideline UHDB

Reference no.: NIC RC 17/ July 2023/v002

Guideline for use of high flow oxygen therapy in neonates

Purpose

To ensure a standardized approach to management of babies requiring high flow nasal cannula (HFNC) oxygen therapy.

Aim and Scope

This guideline covers the indications for starting as well as management of neonates onhigh flow oxygen therapy (HF02) on NICU at the Royal Derby Hospital and SCBU at Queens's hospital Burton.

Background

High flow nasal cannula therapy (HFNC) was rapidly adopted nationally and internationally in neonatal intensive care units (NICUs) as a form of non-invasive respiratory support in the last decade, with limited randomized controlled trial (RCT) evidence of its efficacy and safety. More evidence has emerged in recent years on its utility in the neonatal population. The increasing popularity despite the limited published evidence was because it seemed effective as a form of noninvasive support, along with the perceived ease of use to provide care, increased infant comfort, ease in establishing oral feeds, parental and nursing preference

HFNC therapy may help the efficiency of ventilation and reduce work of breathing through the following mechanisms:

1. Washout of nasopharyngeal dead space, flushing nasopharyngeal cavity of expiratory gas leading to improved alveolar ventilation.
2. Reduction in inspiratory resistance associated with the nasopharynx by providing flow to support there by reducing inspiratory work of breathing (WOB).
3. Improvement in conductance and pulmonary compliance by supplying adequately warmed humidified gas.
4. Reduction in metabolic work load associated with gas conditioning.
5. Provision of some positive distending pressure for lung recruitment.

Humidification and heating of oxygen to body temperature has enabled tolerability of higheroxygen flow rates (up to 7 l/min) amongst other advantages. Heated and humidified high flow nasal cannula oxygen delivery is similar to low flow in that blended gas flows via tapered bi-nasal tubes that sit just inside the infant's nostrils without blocking them.

The device used at RDH and QHB is the Fisher & Paykel device Optiflow and it enables adjustment of inspired oxygen concentration (FiO2) and gas flow separately.

Indications

Consider starting high flow oxygen therapy support in neonates **>32/40 and >1000g** (for lower gestation infants discuss with consultant):

- Infants being weaned off CPAP - tolerating PEEP of no more than 6cmH2O, FiO2 requirement <40% for the preceding 24h and tolerating brief time off cares
- Infants with nasal trauma on CPAP support
- Infants being extubated or not requiring mechanical ventilation
- Infants with mild-moderate respiratory distress, as an alternative to CPAP
- Infants with chronic lung disease requiring sustained nasal cannula flow rates of > 1L
- Stable Infants who are near-term or post-term still requiring NIV respiratory support, that could be transitioned to general paediatric care.

Note: If there are concerns about existing air leak (e.g. Pneumothorax), the case must be discussed with the consultant on call before commencing HFO2 support.

Contraindications

- Infant requiring > 40% oxygen,
- Recurrent apnoeas and/ or has acidosis with pH <7.25
- Severe cardiovascular instability
- Infants with upper airway abnormalities such as choanal atresia, cleft lip and palate or tracheoesophageal fistula.
- Infants with skull base defects (risk of pneumocephaly)
- Infants with known air leak syndrome (pneumothorax, pneumomediastinum, pulmonary interstitial emphysema [PIE])

Initiation of HFNC therapy

- Start with flow rate of 4-6L/min.
- Consider starting at the higher flow rate if FiO2 > 0.30, previous MAP > 7, or with increased work of breathing (WOB).
- Start with FiO2 as appropriate to maintain target saturations appropriate to gestationand age.

- The temperature and humidity settings are already pre-set on our devices
- The high flow oxygen circuit changed weekly as per manufacturer's guidelines.

Prong size: as per manufacturers guide according to weight. Prongs should be selected that occupy less than 50% of the diameter of the nostrils. If the diameter is any greater than this can lead to generation of unpredictable amounts of PEEP.
[**Refer to manufacturer's guidelines on range of prongs available and size required**]

Monitoring during HFNC therapy

The following should be considered:

- All patients on HFNC should have continuous cardio-respiratory monitoring
- 60 minutes after initiation of therapy the patient should be reassessed to determine the effectiveness of the therapy. The assessment should include a clinical assessment and consideration for a blood gas analysis.
- Daily medical review and blood gas as needed

- Observe the tubing for 'rain out' – where condensed fluid on the inner walls of the tubing runs off into the infant's mouth; this can cause apnoea in the patient. Note that there are heated wires in the provided tubing which prevents this, so rainout should not occur unless extension tubing is used. Position tubing down and away from infant to minimise rain out into the airway.
- Observe the infant for secretions and suction as appropriate. These will increase during the first few days as the humidity allows the airways to expel previously dries mucosa and secretions, and then will settle down.

An infant on HF02 support should be reviewed by a senior doctor if:

- There is increased work of breathing
- increasing apnoea's and bradycardia's
- Blood gases are worsening
- There is a significant increase in FiO2 requirement
- Asymmetrical chest movements are seen
- FiO2 requirement increases to ≥50%
- <32/40 and <1000g caution should be exercised and consultant discussion isnecessary.

When on HF02 support the usual flow rate is 4-6L/min and FiO2≤40%. Occasionally a higher flow rate of 7-8 L/min may be required, but this should be discussed with a Consultant.

Weaning of HFNC therapy

Weaning of HFNC therapy should commence when the cause of respiratory insufficiency has begun resolution with <u>infant stable for > 24hrs, FiO2 < 0.30 and normal work of breathing/respiratory rate.</u>

- The approach to weaning is to initially wean FiO2 to < 0.30 before reducing flow rates.
- Review every 24hrs to determine if flow can be weaned or HFNC can be discontinued.
- Infants > 2kg may be weaned more quickly.
- Wean by 0.5 – 1 L/min decrements, with smaller decrements in smaller infants and infants with established chronic lung disease.

Consider discontinuing HFNC therapy at 2-4L/min if patient achieves stability criteria above

If at any time during the weaning process the patient's respiratory status worsens, the FiO2 and flow rate should be increased back up to the previous higher level or consider changing mode of respiratory support

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