Clinical Guideline: Acute CPAP for the 0-2 year old child

Authors:

Multi disciplinary members of a working group comprised from Hospital trusts within the North Thames Paediatric Network and East of England Paediatric Critical Care Network. Full details of members of the working group can be found in the references section.

For use in:

EoE Paediatric Units/ Paediatric Emergency Departments/Paediatric Assessment Units.

Guidance specific to the care of children aged 0 – 2 years requiring acute CPAP, this does not cover the use of CPAP in neonatal units or for the neonatal population.

Used by:

Medics, Nursing staff and AHPs involved in the care of children in acute paediatric units requiring CPAP

Key Words:

CPAP Respiratory Failure

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Approved by:

Paediatric Critical Care Clinical Oversight Group	**Ratified March 2021**
Clinical Lead Lauren Filby	**Lauren Filby**

Acute CPAP for the 0 – 2 Year Old Child

Treatment Guideline and Care Bundle

North Thames Paediatric Network and East of England Paediatric Critical Care Network Approach

N.B Although this guideline is directed at the care of children aged 0-2years receiving Acute CPAP, this may be limited by device availability in individual Trusts and local agreements, in which case use in conjunction with local policy. (see appendix 4 for more information)

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Introduction

This Guideline has been developed by the North Thames Paediatric Network, East of England PCC Network and a working group of key stake holders from hospitals/ Trust from the two networks (please see the back page of this guideline bundle for full list of participants).

The guideline is intended to reduce variations in practice and prevent discrepancies by promoting a standardised best evidence based practice approach for delivering acute CPAP to babies and young children (0-2 years).

The guideline development process involved a review of many current guidelines and policies related to acute CPAP from across the regions and current best practice evidence and research.

This guide is only intended for the 0 – 2 years old age range of patients and is only recommended by this group for the patients/ conditions indicated in the inclusion criteria of the guideline. For the neonatal patient population please refer to specific neonatal guidelines for the use of CPAP.

Although this guideline is directed at the care of children aged 0-2years, this may be limited by device availability in individual trusts, in which case use in conjunction with local policy. (see appendix 4 for more information)

What is CPAP?

CPAP (Continuous positive airway pressure) is a type of respiratory support that can only be used on a spontaneously breathing infant (Hansen et al 2005). It provides a continuous oxygen and air mix under gentle pressure to the patient via CPAP device/ ventilation machine and appropriately fitted mask or nasal prongs secured in place. Used widely in adults and children, it has particular value in supporting babies with severe bronchiolitis as it is non-invasive and frequently avoids the need for intubation.
The goal of CPAP is to improve oxygenation by providing support and protecting the fragile airways of sick infants / children (RCN, 2011). Evidence suggests that CPAP, when used as an alternative to mechanical ventilation, may decrease the amount of lung tissue damage (Jobe et al 2002).

The other role of CPAP is to reduce the work of breathing in a respiratory compromised infant/ child, allowing them to rest and avoiding the need for full ventilation. CPAP increases the functional residual capacity by providing a constant flow of oxygen under pressure; this makes inflating the lungs easier and prevents the collapse of the alveoli (Blackburn, 2003 & Davis & Hassell, 2007)

CPAP promotes the maintenance of a positive airway pressure greater then ambient pressure throughout inspiration and expiration and delivers a degree of PEEP which splints the upper airway, keeps alveoli partly inflated, easing re-inflation of the lungs (Davis & Hassell, 2007). This in turn decreases the compliance of the chest wall and allows for synchronous breathing, resulting in a decreased work of breathing and improved gas exchange (Morley 1999). Ultimately the aim of CPAP is to improve the respiratory outcomes of the sick infant/ Child (RCN, 2011).

Appendices List

Appendix 1: Pre-treatment optimisation Considerations

Appendix 2: NHSE/ RCPCH/ NTPN Infection prevention and control guidance recommendations

Appendix 3: WETFLAG printable template

Appendix 4: Equipment selection guide

Appendix 5: CPAP monitoring printable template

Appendix 6: Transfer of patient on CPAP Risk flow chart and Transfer checklist

Appendix 7: Observations and Cares, Feeding and Sedation recommendations

Appendix8: Education Slides

Appendix 9: Competency Framework

Appendix 1

Pre-treatment Optimisation

Optimisation of medical management prior to starting NIV:

Prior to commencing CPAP ensure the following have all been optimised, refer to condition specific guidelines where they exist.

- Consider non-medical attempts to settle infant (swaddling/non-nutritive suck/comfort cuddles/pain assessment)
- Positioning (semi recumbent/side-lying if tolerated).
- Trial on HHHFT (if clinically indicated)
- NGT /OGT to decompress the stomach - leave on free drainage.
- IV fluids- ensure the patient is well hydrated
- NBM – to avoid the risk of aspiration and prevent gastric distention.
- CXR- To rule out a pneumothorax
- Antibiotics – ensure appropriate antibiotic cover as per local policy if any evidence of infection/ consolidation
- Nebulisation – with 3% sodium chloride or sodium chloride if appropriate
- Steroids – No role in bronchiolitis but in a child over the age of 1yr and with significant history of atopy, trial of oral steroid may help.
- Physiotherapy- Useful in helping to clear secretions.

Apart from medical care optimization, ensure:

- Paediatric consultant/ Senior Dr have reviewed the patient.
- Anesthetic team is made aware of the patient.
- The patient has been discussed with CATS (where applicable/ unstable)
- A clear plan and plan for escalation is documented in patient notes in the event of NIV failure.
- Explanation is given to the family and they are kept updated throughout.

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Acute CPAP in the < 2 Years
A North Thames and East of England Approach

Indications	Contraindications
• Bronchiolitis • Other possible indications should be discussed with a Paediatric Consultant. These include children with acute respiratory failure secondary to e.g. viral induced wheeze, lower respiratory tract infection, evidence of respiratory failure • Consider using CPAP first-line in bronchiolitis in pre-term infants, infants aged < 6 weeks (term or preterm) or children with pre-existing neuromuscular conditions. • **Consider use in cardiac patients with caution, liaise with tertiary team** **Type 1 – Hypoxia** • Oxygen saturations <92% in >2L/min O_2 via nasal prongs or >4L via Hudson mask or FiO_2 >0.4 **Type 2 - Hypercarbia** • PCO_2 > 6.5 kPa (in children without pre-existing chronic lung disease) • Rising PCO_2 (> 2 kPa from baseline) • Respiratory acidosis with pH < 7.30 **(regardless of the gas, the child's clinical condition should always be considered in the decision to start/refute acute CPAP/NIV)** • Apnoeas: short-lived and infrequent • Unresponsive to HHHFT (see guideline) but no **red flags***	• Severe respiratory compromise indicating the need for imminent intubation as evidenced by the presence of any of the following: - Recurrent or prolonged apnoeas - Severe cardiovascular instability and impending cardiac / respiratory arrest - Sp02 < 92% in fi02 60% or above - GCS <8/15 or need for airway protection • Undrained pneumothorax or pneumomediastinum • Multi organ compromise • Upper airway abnormalities that make CPAP ineffective that may include the following: - Airway obstruction Choanal atresia, tracheoesophageal fistula - Craniofacial/mid facial abnormalities - Facial trauma or burns - Base of skull fracture - Recent facial or upper gastrointestinal surgery • Inadequate resources - lack of trained personnel to safely deliver therapy - lack of suitable equipment to safely deliver and / or monitor patients receiving CPAP

Staffing ratios

Nursing ratio should be determined based on the assessment of the patient's overall condition, including all clinical (not only respiratory), social and infection control needs. A validated Paediatric Early Warning Score (PEWS) should be used and all critical care interventions considered. Be prepared to adjust the ratio according to fluctuations in patient condition or location. Nursing staff caring for children on CPAP should be competent or be directly supervised by a competent practitioner. Consider whether the infective status and use of PPE for the patient will affect the nursing ratio.

Acuity	Stable / Sustained improvement	Stable/ Improving	Establishing CPAP / Unstable or increasing acuity
Descriptor	Established on CPAP, clinically stable, gases improved Fi02 stable below 40% or reducing. No agitation, minimal WOB Saturations within target range.	Established on CPAP, clinically stable. Fi02 40-50% Improving work of breathing no agitation Saturations within target range	Establishing on CPAP or remaining critically unwell since CPAP initiated No improvement in work of breathing or getting worse Agitated Apnoeas Clinically tiring
Nurse ratio	**1:2**	**1:2**	**1:1**

Environment & Safety

Isolation CPAP is an AGP refer to the NHSE/ RCPCH/ NTPN/local Infection prevention and control guidance recommended. **See appendix 2**
Infants requiring acute CPAP should be nursed in a critical care bed space with access to as a minimum: full cardiovascular monitoring, medical air, oxygen & suction, plug sockets, relevant PPE.
Give due consideration to the appropriateness of the bed space location taking into account staffing skill mix, isolation requirements, condition of the patient and suitability of the space should escalation to level 3 care be required.
The space should be clutter free with access at all times to both sides of the cot.
There should be a BVM of the appropriate size with the infant at all times.

Commencing treatment

Inform on call consultant & anaesthetic team of child commencing CPAP. Ensure Family are informed of the treatment plan, with explanation of what CPAP is and the plan should there be an escalation in care required e.g. escalation to level 3 care.

Assess patient & repeat blood gas 60 minutes after commencing CPAP.

Within first 60 minutes of commencing CPAP please prepare for next steps in case of patient deterioration

- Calculate WETFLAG **(See Appendix 3 for printable template)**
- Link here to CATS bronchiolitis guideline https://cats.nhs.uk/wp-content/uploads/guideline-bronchiolitis.pdf
- Print CATS drug chart http://cats.nhs.uk/wp-content/uploads/drugcalculator.pdf
- Print intubation check list http://www.cats.nhs.uk/wp-content/uploads/emergencyintubationchecklist.pdf

Select interface and equipment: Based on local availability and patient age and weight. **See Appendix 4 for equipment selection guide**
Monitor Equipment Hourly: See Appendix 5 for printable record chart.
On initiation: A competent clinician should observe patient for comfort and compliance.
Titrate FiO2: As prescribed to maintain SpO2 ≥92 % and flow to achieve a PEEP of 5-7CM of H2O
Hourly, 4 hourly and Essential Care Considerations: See treatment chart below
Escalate or Wean: To avoid rapid deterioration or unnecessary continuation on CPAP review response to treatment and follow escalation or weaning criteria
Interdepartmental Patient Transfers: Please see Appendix 6 ; Transfer of patient on CPAP Risk flow chart and Transfer Checklist

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Acute CPAP in the < 2 Years Treatment Guide

	Stable / Sustained improvement	Stable/ Improving	Establishing CPAP / Unstable or increasing acuity
Monitoring & Clinical observations	Continuous Saturations & ECG via monitor with appropriate alarm limit set. Apnoea alarm in situ **Hourly recording of:** Respiratory rate Heart rate Oxygen saturations CRT AVPU Input / output PEWS **Minimum 4 hourly:** Temperature Non-invasive BP	Continuous Saturations & ECG via monitor with appropriate alarm limit set Apnoea alarm in situ **Hourly recording of:** Respiratory rate Heart rate Oxygen saturations CRT AVPU Input / output PEWS **Minimum 4 hourly:** Temperature Non-invasive BP	Continuous Saturations & ECG via monitor with appropriate alarm limit set Apnoea alarm in situ **15 – 30 minute recording of:** Respiratory rate Heart rate Oxygen saturations CRT AVPU Input / output PEWS Non-invasive BP Patient NBM Temperature
PEWs Score	Sustained improvement	Stable or Improving	Triggering for escalation
FiO2 requirement	If stable on 40% FI02, consider weaning	40-50% FiO2	> 50 % Fio2 or above
RR & work of breathing	Minimal WOB Sats >92%	Improving	The same or worsening
Blood gases	Blood gases are not indicated for infants who are clinically improving, unless required for another purpose.	Consider capillary blood gas testing in severe worsening respiratory distress or suspected impending respiratory failure.	Blood gas 1 hour after initiating CPAP, thereafter as condition dictates.
Any agitation?	No	No	Yes
Apnoeas, bradycardias or exhaustion	No	No	Yes
Next steps:	**See weaning plan below**	**Continue on CPAP** Medical / Nursing team to re-assess every 30 – 60 mins. Re-discuss situation with anaesthetics if FiO2 50% or above.	**See step 1**

Essential Care Considerations (ECCs)

- Cluster hygiene cares (nappy/ nose / mouth care)
- 2-4 hourly sats probe site rotation & document
- Optimise Positioning
- Prong/mask checks – unblocked and in situ
- Eye checks – remain visible and not exposed to air flow
- Consider referral for physiotherapy assessment
- OP & NP suction if indicated and safe to do so
- Consider feeding regime alteration **(See appendix 7 for feeding and sedation recommendations)**
- Psychosocial support& clear communication

Red Flags

- Worsening clinical status/respiratory distress
- worsening hypercarbia / acidosis
- Sats < 92% in FiO2 ≥ 60%
- Prolonged Apnoea/ bradycardic episodes
- Exhaustion /signs of poor respiratory effort /Clinically tiring
- PEWS indicates immediate escalation to resus team

Immediate Escalation

- Increase FiO2 to 100%
- Call 2222
- Liaise with retrieval team or on site PICU (L3 paediatric critical care unit)
- Prepare for intubation
- Initiate STOPP Tool
- Communicate with the family

If blood gas shows PH <7.20 or pCO2 >7.50 consider early escalation to step 2

Step 1:	• Senior review. Contact on call consultant if OOH to request they come into hospital. • Call anaesthetic team to inform them of patient who potentially needs intubation & request review. • Call CATS/ retrieval team for advice. • Ensure adequate PEEP (5-7cm H2O)	• Are any nebulisers clinically indicated? • Review Chest x-ray/ is repeat CXR clinically indicated? • Consider suctioning • Consider physio referral • Ensure good positioning

Step 2: **Decision made by medical/ anaesthetic team to intubate and transfer to PICU. Please Initiate STOPP Tool** http://www.cats.nhs.uk/wp-content/uploads/stopp_tool.pdf

Weaning:

Decision to wean CPAP should be made by both medical & nursing staff.

1. Titrate FiO2 to maintain Sp02 above 92% (Unless clinical condition indicates otherwise eg. Cardiac, Pulmonary hypertension) Decrease in 5% increments
2. Monitor patient on minimal pressure/ FiO2 for 2 -4 hours
3. Discontinue CPAP- Consider whether patient requires step down to HHHFT or nasal cannula O2.
4. Monitor patient closely for a minimum of 4 hours.
5. If patient does not tolerate removal of CPAP, restart at weaning FiO2.

Appendix 2

Infection Prevention and Control

NTPN/ NHSE IPC Advice letter - Winter 2020

NTPN. NHSE Paeds Networks IPC Transf

RCPCH: National guidance for the management of children with bronchiolitis and lower respiratory tract infections during COVID-19

https://www.rcpch.ac.uk/resources/national-guidance-management-children-bronchiolitis-during-covid-19

Appendix 3

FINAL - Appendix 3 WETFLAG.pdf

Appendix 4

FINAL - Appendix 4 Equipment guide.pc

Appendix 5

FINAL - Appendix 5 Monitoring templat

Appendix 6

FINAL - Appendix 6 Transfer flowchart.p

Appendix 7

FINAL - Appendix 7 Observations, cares,

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: Date:	Signature of Trust Nursing / Medical Director: 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

EOE ODN Office Manager

Box 402

Rosie Hospital

Cambridge University Hospital

Hills Road

Cambridge CB2 0QQ