

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)

Original date of completion	April 2021
Last Reviewed	October 2023
Next Review Date	September 2024
Version	V4



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 than 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/STPN/NTPN Infection prevention and control guidance recommendations

Appendix 3: Resuscitation Council UK Paediatric Emergency Drug Chart

Appendix 4: Equipment selection guide (Separate Word Document also available to access embedded files – please email england.ntpn@nhs.net)

Appendix 5: Acute 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

Appendix 8: CPAP Education Slides – in separate document – please email england.ntpn@nhs.net

Appendix 9: Competency Framework – in separate document - please email england.ntpn@nhs.net

Appendix 10: Competency Framework Overview – in separate document - please email england.ntpn@nhs.net



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.



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

Indications	Contraindications
<ul style="list-style-type: none"> 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 <p>Type 1 – Hypoxia</p> <ul style="list-style-type: none"> Oxygen saturations <92% in >2L/min O₂ via nasal prongs or >4L via Hudson mask or FiO₂ >0.4 <p>Type 2 - Hypercarbia</p> <ul style="list-style-type: none"> PCO₂ > 6.5 kPa (in children without pre-existing chronic lung disease) Rising PCO₂ (> 2 kPa from baseline) Respiratory acidosis with pH < 7.30 <p>(regardless of the gas, the child's clinical condition should always be considered in the decision to start/refute acute CPAP/NIV)</p> <ul style="list-style-type: none"> Apnoeas: short-lived and infrequent Unresponsive to HHHFT (see guideline) but no red flags* 	<ul style="list-style-type: none"> Severe respiratory compromise indicating the need for imminent intubation as evidenced by the presence of any of the following: <ul style="list-style-type: none"> Recurrent or prolonged Apnoeas Severe cardiovascular instability and impending cardiac / respiratory arrest SpO₂ < 92% in fiO₂ 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: <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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 FiO ₂ stable below 40% or reducing. No agitation, minimal WOB Saturations within target range.	Established on CPAP, clinically stable. FiO ₂ 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/STPN/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
- Link here to CATS bronchiolitis guideline https://cats.nhs.uk/wp-content/uploads/cats_bronchiolitis_2022.pdf
- Print CATS drug chart <https://cats.nhs.uk/wp-content/uploads/drugcalculator.pdf>
- Print intubation check list <https://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.



Acute CPAP in the < 2 Years Treatment Guide

	Stable / Sustained improvement	Stable/ Improving	Establishing CPAP / Unstable or increasing acuity	Essential Care Considerations (ECCs)
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	<ul style="list-style-type: none"> 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
PEWs Score	Sustained improvement	Stable or improving	Triggering for escalation	Red Flags
FiO2 requirement	If stable on 40% FiO2, consider weaning	40-50% FiO2	> 50 % FiO2 or above	<ul style="list-style-type: none"> 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
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.	Immediate Escalation
Any agitation?	No	No	Yes	<ul style="list-style-type: none"> 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
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	

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



Step 1:	<ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> Are any nebulisers clinically indicated? Review Chest x-ray/ is repeat CXR clinically indicated? Consider suctioning Consider physio referral Ensure good positioning
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Step 2: Decision made by medical/ anaesthetic team to intubate and transfer to PICU. Please Initiate STOPP Tool
<https://cats.nhs.uk/wp-content/uploads/STOPP-Tool-V15-Sept-2022-eversion.pdf>

Weaning: <i>Decision to wean CPAP should be made by both medical & nursing staff.</i>	<ol style="list-style-type: none"> Titrate FiO2 to maintain SpO2 above 92% (Unless clinical condition indicates otherwise e.g. Cardiac, Pulmonary hypertension) Decrease in 5% increments Monitor patient on minimal pressure/ FiO2 for 2 -4 hours Discontinue CPAP- Consider whether patient requires step down to HHHFT or nasal cannula O2. Monitor patient closely for a minimum of 4 hours. If patient does not tolerate removal of CPAP, restart at weaning FiO2.
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Appendix 2: Infection Prevention and Control

NTPN/STPN NHSE IPC Advice letter updated in October 2023. Please contact NTPN england.ntpn@nhs.net for the latest version.

RCPCH: National guidance for the management of children with bronchiolitis and lower respiratory tract infections during COVID-19 (updated October 2023).

<https://www.rcpch.ac.uk/resources/guidance-management-children-viral-respiratory-tract-infections>



Appendix 3: Resuscitation Council UK Paediatric Emergency Drug Chart

<https://www.resus.org.uk/sites/default/files/2021-05/2492%20AAP%20RCUK%20PET%20chart-5.pdf>



Paediatric emergency drug chart

GUIDELINES
2021

		Adrenaline	Fluid bolus	Glucose	Sodium bicarbonate		Tracheal tube		Defibrillation
							Uncuffed	Cuffed	
Strength		1:10 000	Balanced isotonic crystalloid OR, 0.9% Saline	10%	4.2%	8.4%			
Dose		10 mcg kg ⁻¹	10 mL kg ⁻¹	2 mL kg ⁻¹	1 mmol kg ⁻¹				4 joules kg ⁻¹
Route		IV, IO	IV, IO	IV, IO	IV, IO, UVC	IV, IO			Transthoracic
Notes			Consider warmed fluids	For known hypoglycaemia				Monitor cuff pressure	Monophasic or biphasic
Age	Weight kg	mL	mL	mL (recheck glucose after dose and repeat as required)	mL	mL	ID mm	ID mm	Manual
< 1 month	3.5	0.35	35	7	7	-	3.0	-	20
1 month	4	0.4	40	8	8	-	3.0-3.5	3.0	20
3 months	5	0.5	50	10	10	-	3.5	3.0	20
6 months	7	0.7	70	14	-	7	3.5	3.0	30
1 year	10	1.0	100	20	-	10	4.0	3.5	40
2 years	12	1.2	120	24	-	12	4.5	4.0	50
3 years	14	1.4	140	28	-	14	4.5-5.0	4.0-4.5	60
4 years	16	1.6	160	32	-	16	5.0	4.5	60
5 years	18	1.8	180	36	-	18	5.0-5.5	4.5-5.0	70
6 years	20	2.0	200	40	-	20	5.5	5.0	80
7 years	23	2.3	230	46	-	23	5.5-6.0	5.0-5.5	100
8 years	26	2.6	260	50	-	26	-	6.0-6.5	100
10 years	30	3.0	300	50	-	30	-	7.0	120
12 years	38	3.8	380	50	-	38	-	7-7.5	120
14 years	50	5.0	500	50	-	50	-	7-8	120-150
Adolescent	50	5.0	500	50	-	50	-	7-8	120-150
Adult	70	10.0	500	50	-	50	-	7-8	120-150

Cardioversion	Synchronised Shock, 1.0 joules kg ⁻¹ escalating to 2.0 joules kg ⁻¹ if unsuccessful.	Weights averaged on lean body mass from 50th centile weights for males and females. Drug doses based on Resuscitation Council UK Guidelines 2021 recommendations. Recommendations for tracheal tubes are based on full term neonates. For newborns glucose at 2.5 mL kg ⁻¹ is recommended.
Amiodarone	5 mg kg ⁻¹ IV or IO bolus in arrest after 3rd and 5th shocks. Flush line with 0.9% saline or 5% glucose (max dose 300 mg).	
Atropine	20 mcg kg ⁻¹ , maximum dose 600 mcg.	
Calcium gluconate 10%	0.5 mL kg ⁻¹ for hypocalcaemia, hyperkalaemia (max dose 20 mL); IV over 2-5 min if unstable, over 15-20 min if stable.	
Lorazepam	100 mcg kg ⁻¹ IV or IO for treatment of seizures. Can be repeated after 10 min. Maximum single dose 4 mg.	
Adenosine	IV or IO for treatment of SVT: 150 mcg kg ⁻¹ (0-11 months of age); 100 mcg kg ⁻¹ (1-11 years of age) Increase dose in steps 50-100 mcg kg ⁻¹ every 1-2 min for repeat doses. 12-17 years: 3 mg, followed by 6 mg after 1-2 min if required, followed by 12 mg after 1-2 min if required. Requires large saline flush and ECG monitoring.	
Anaphylaxis	Adrenaline 1:1000 IM: < 6 months 100-150 mcg (0.1-0.15 mL), 6 months-6 years 150 mcg (0.15 mL), 6-12 years 300 mcg (0.3 mL), > 12 years 500 mcg (0.5 mL); can be repeated after 5 min. After 2 IM injections treat as refractory anaphylaxis and start low dose adrenaline infusion IV.	










Appendix 4: Equipment selection guide











The below table details commonly used devices across the North Thames Paediatric Network & East of England Paediatric Critical Care ODN, the appropriate age range and links to set up guides/troubleshooting.

This list is not exhaustive and is up to date at time of publishing.







December 2020, G2 CPAP guideline – Adapted from Whittington Hospital Equipment guide.

		0-1 yr	1-2 yr	Links & Resources				
Oxygen	FiO2 (face mask & nasal cannula)			System	Image	Indications	O2 concentration	Flow rate
				Nasal cannula		Low O2 requirement	28%-35%	<2L
				Simple face mask		Spontaneous breathing	35%-50%	3-8L
				Non-rebreathe mask		Spontaneous breathing	85%-95%	12-15L
	Heated Humified High Flow Therapy (HHFT) (e.g.: Optiflow, Vapotherm)			Please refer to HHHFT guideline  2 V6 HHHFT guideline.docx.pdf				
Non -Invasive Ventilation	SiPAP 	<10kg		Please refer to Infant Flow LP comprehensive set up guide , Workbook for set up and troubleshooting: https://www.manualslib.com/manual/1627507/Carefusion-Infant-Flow.html#manual https://pages.carefusion.com/rs/565-YXD-236/images/RC_Infant-Flow-LP-nCPAP-system-workbook_UG_EN.pdf  Infant Flow SiPAP Setup Comprehensive Requires oxygen and air supply, can work on internal battery.				
	Resmed Stellar 150 		>13kg	User guide including set up and troubleshooting: https://www.resmed.com/epr/dam/documents/products/machine/stellar-series/user-guide/stellar-100-150_user-guide_eur1_eng.pdf For use in paediatric and adult patients above 13kg. Wide range of interfaces available, dependant on patient.				



		0-1 yr	1-2 yr	Links & Resources
<p>Bubble CPAP</p> 	< 10kg			<p>Set Up Guide: https://resources.fphcare.com/content/bubble-cpap-system-ui-185042847.pdf</p> <p>Educational Device Video (Including Set Up): https://www.fphcare.com/en-gb/hospital/infant-respiratory/cpap/bubble-cpap-system/ https://www.youtube.com/watch?v=o2lj-nNxafa</p>
<p>Trilogy</p> 	>5kg			<p>Clinical Manual: https://www.bartshealth.nhs.uk/download.cfm?doc=docm93jijm4n13171.pdf&ver=22435</p> <p>Wide range of interfaces available dependent on patient.</p>
<p>MEDIN nCPAP</p> 				<p>Machine specifications:</p> <p> MEDIN specifications.pdf</p> <p>User manual:</p> <p> MEDIN user manual.pdf</p>
<p>Hamilton C1</p> 				<p>Set up Video: https://www.youtube.com/watch?v=vUTQhk3vE3Q https://www.youtube.com/watch?v=wRTmdKydsJo</p> <p>User Manual:</p> <p> HAMILTON H900 Humidifier Quick Reference Cards  HAM-T1 Quick Reference Cards  HAM-T1 Quick Reference Cards Adul</p> <p>eLearning & Education: https://www.hamilton-medical.com/en_US/E-Learning-and-Education/College.html</p>
<p>SLE 1000</p> 				<p>Machine Manual and Information:</p> <p>SLE 1000 User manual</p> <p>Requires oxygen and air supply</p>



		0-1 yr	1-2 yr	Links & Resources
Bonnets, Headgear, Prongs & Masks	<u>Inspire Infant Bonnets/Prongs/Masks (Inspiration)</u> 	Green	Red	Product information, user guide, brochure and educational video links: https://www.inspiration-healthcare.com/products/neonatal-intensive-care/respiratory-care/inspire-ncpap
	<u>Infant Flow LP Headgear (CareFusion)</u> 			Please refer to Infant Flow LP Workbook for mask/prong fit, application and troubleshooting (pages 28-60). https://pages.carefusion.com/rs/565-YXD-236/images/RC_Infant-Flow-LP-nCPAP-system-workbook_UG_EN.pdf
	<u>MEDIN MiniFlow interface</u> 			User, application and size guide manual:  MiniFlow user guide.pdf
	<u>Fisher & Paykal FlexiTrunk interface</u> 			Interface & application guide: https://resources.fphcare.com/content/flexitrunk-interface-ui-185042952.pdf
Other	<u>Humidifier (Fisher & Paykal)</u> 	Green	Green	Set Up Guide: https://resources.fphcare.com/resources/corporate/media/resources/resources/files/ui-185042301.pdf Educational Videos: https://education.fphcare.com/en-gb/education/online-courses/understanding-humidity/ https://education.fphcare.com/en-gb/education/video-library/

Appendix 5: Acute CPAP monitoring (printable template)

Name..... DOB...../...../..... Hospital Number..... Date.....

→ Time in hrs	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00	
PEEP (cmH20)																									
Flow required (l/m)																									
FiO2 (%)																									
Humidifier temp																									
Humid temp patient																									
Water Level																									
Hourly Cares																									
4 Hourly Cares																									
Rest Period (mins)																									
Suctioned																									
Blood Gas																									
pH																									
pCO2																									
pO2																									
HCO3																									
BE																									
Na+																									
K+																									
Ca+																									
Glucose																									
Dr/ Anaesthetist review																									
Staff Signature																									

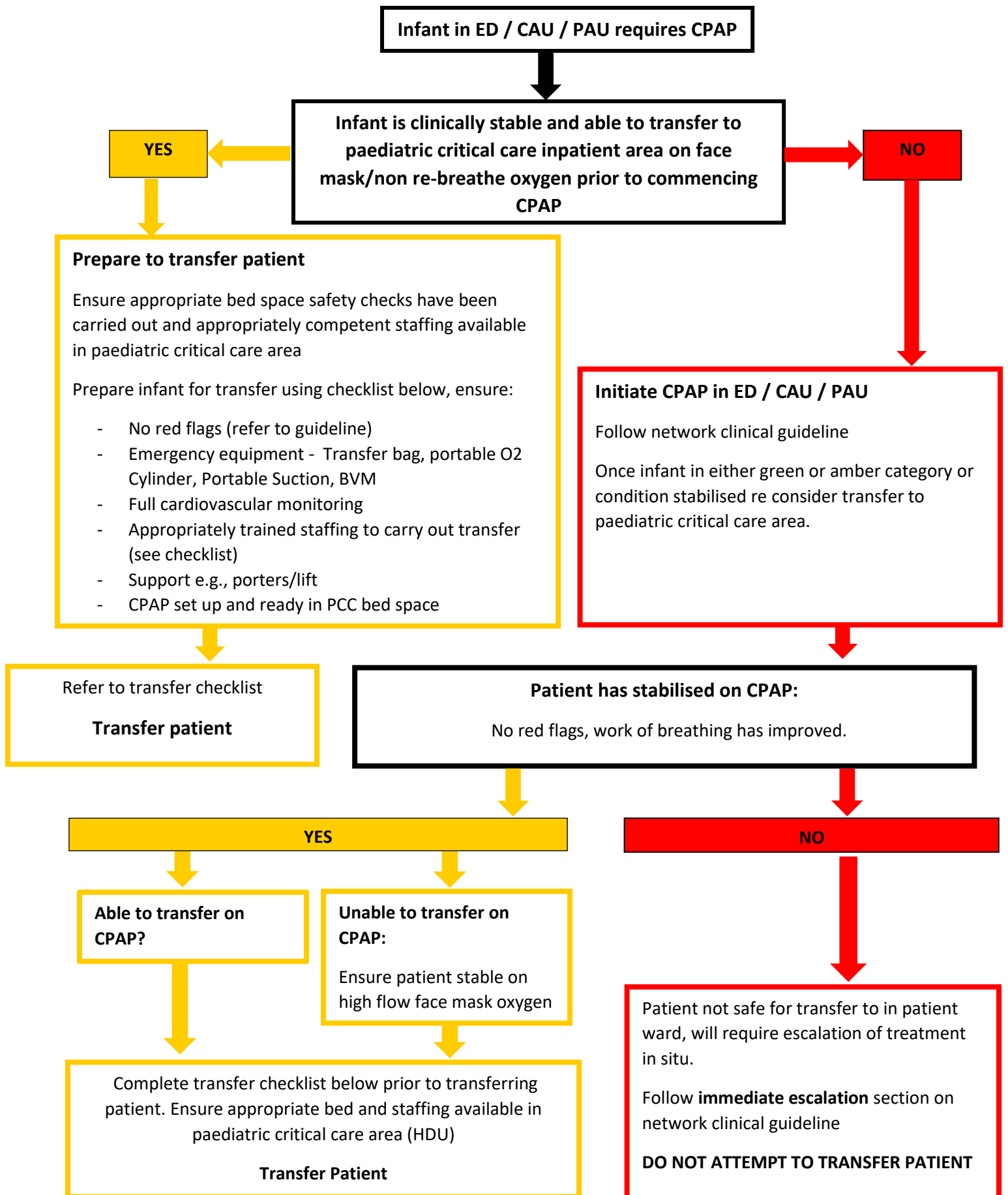
Quick guide to trouble shooting – **Always start at the patient and work back to the machinery**

DOPES

Issue	Suggested action
D Displacement	Check position of prongs / mask
O Obstruction	Suction to clear nasal passages
P Pneumothorax	Listen to chest, check symmetry of chest movement
E Equipment failure	Check for leaks, disconnections, blocked tubing
S Stomach distension	Check naso/orogastric tube, aspirate



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





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

<p>Infant Established on CPAP - Improvement in PEWS - improvement in WOB - improvement in any hypoxia</p> <p>Full cardiovascular monitoring during transfer IV access secured</p>	
<p>Personnel These are suggested minimum recommended team for the safe transfer of the infant; more staff may be required depending on route/estate, condition of the infant, experience and competence of the staff. At no time should the infant be transferred if at least one member of the team is not confident or adequately trained to do so.</p> <p>All staff should adhere to current guidelines for PPE / IPC throughout.</p> <ul style="list-style-type: none"> • Consider anaesthetic escort (based on local risk assessment) • Paediatric registrar/ Paediatric Advanced Clinical Practitioner with airway management expertise / training i.e., APLS/ EPLS • Critical Care (HDU) Nurse (senior band 5 or above, PILS trained) • Porter or equivalent • Person to walk ahead and secure the route/ ensure lift available. <p>Additional personnel as required to safely manage equipment / route / lifts/ support family etc.</p>	
<p>Equipment</p> <p>Transfer Bag <input type="checkbox"/> paediatric emergency transfer bag</p> <p>Oxygen <input type="checkbox"/> Calculate oxygen requirement for transfer and double it. <input type="checkbox"/> Spare full cylinder with BVM attached</p> <p>Air (for transfers on CPAP) <input type="checkbox"/> Calculate Medical Air required for transfer and double it. <input type="checkbox"/> Medical air cylinder with Schrader valve attached</p> <p>Suction <input type="checkbox"/> fully charged portable suction <input type="checkbox"/> soft suction catheters of appropriate size <input type="checkbox"/> Yankauer catheter</p> <p>Plus <input type="checkbox"/> Bag valve mask - correct size, attached to spare full oxygen cylinder <input type="checkbox"/> paediatric non rebreath oxygen mask</p> <p>Other <input type="checkbox"/> override key / pass for lifts / security doors as required</p>	
<p>Communication <input type="checkbox"/> Paeds ED Nurse in Charge aware of critical care transfer from department <input type="checkbox"/> senior paediatric doctor aware of transfer <input type="checkbox"/> PCC area have accepted infant and aware of imminent transfer and have allocated staff</p> <p>Accepting Nurse Name :..... Time Accepted:</p> <p><input type="checkbox"/> parents accompanying, or aware of transfer, contact details noted. <input type="checkbox"/> Any Investigations already sent for testing?</p>	

<p>Calculation for medical gases needed:</p> <p style="text-align: center;">Flow (L/Min) X time X 2</p>



Appendix 7: Observations and Cares, Feeding and Sedation recommendations

All children requiring CPAP should be nursed in a critical care bed with access to full cardiovascular monitoring and close nursing observation.

Continuous	
<ul style="list-style-type: none"> • ECG • Saturation • Naso-gastric/ Oro-gastric tube on free drainage (unless stable enough for feeds -see below) 	
Hourly	
Clinical Observations: <ul style="list-style-type: none"> • Respiratory rate • Work of breathing • Heart rate • Oxygen saturations • Capillary refill time • AVPU • CEW/PEWS score • Strict fluid balance • Parental or nursing concern • Pain / comfort score • Visual inspection of interface – adequate seal, free from secretions, skin integrity 	Equipment checks: <ul style="list-style-type: none"> • PEEP • Flow L/min • FiO2% • Humidifier temp check • Humidifier water check • Check CPAP tubing for water tracking up towards patient
4 hourly	
<ul style="list-style-type: none"> • Blood pressure • Temperature (unless pyrexial or hypo-thermic then as clinically indicated) 	<ul style="list-style-type: none"> • Cluster cares • Aspiration of NG/OG – to reduce risk of tummy distension due to air and to check absorption if feeding
4 – 6 hourly / patient specific	
<ul style="list-style-type: none"> • Sats probe position change (2 hourly for neonates) • Change patient position • Nose & mouth care • Check nappy (change as required) • Consider cuddles with parent if clinically stable 	<ul style="list-style-type: none"> • Prong checks, right position & not squashing the nose (clean and not blocked). Any evidence of skin break down complete risk assessment and initiate management, consider alternative interface if available. • Eye checks (visible & not exposed to airflow).

Blood Gases

Perform blood gas analysis - One hour post initiation of CPAP. Thereafter as the patient's condition dictates.

NOTE: Blood gases should not replace visual observation of the patient or undermine clinical judgement. Capillary blood gas can be considered in patients show signs of severe worsening respiratory distress, supplemental FIO2 of >60% or suspected impending respiratory failure (NICE 2019)

Feeding the infant on CPAP

Consider the use of a soother (dummy) to promote a closed circuit and improve PEEP, gain consent from family. For any child, in agreement with senior clinician and family, 'dummy dips' with milk may help settle. Support breast-feeding mums with expressing and milk storage facilities on site.



Appendix 7: Observations and Cares, Feeding and Sedation recommendations

All children requiring CPAP should be nursed in a critical care bed with access to full cardiovascular monitoring and close nursing observation.

Stable / improving	Unstable / increasing acuity
NBM for 4-6 hours post stabilisation on CPAP Then if: RR consistently <60 FiO2 < 40% No red flags Consider starting continuous feeds see below	Patient should not be considered for feeds, NGT/OGT should remain on free drainage. Monitor blood glucose
Starting feeds:	
Ensure - Senior clinician in agreement Ensure family aware of plan	Maintain strict fluid balance Fluid allowance agreed
Watch for:	
Respiratory deterioration associated with feeding Abdominal splinting Abdominal distention Tolerance of feeds	

Sedation of the infant on acute CPAP

Some children may struggle to settle on CPAP, consider all of the following strategies to assist. The use of a validated comfort / pain assessment tool may assist in indicating when/when not to consider sedation.

The irritable / unsettled / agitated child may be displaying symptoms of hypoxia / hypercapnia. Ensure this child is assessed appropriately and both hypoxia and hypercapnia have been addressed as causative.	
Non-medical interventions	Pharmacological sedation
<ul style="list-style-type: none"> • Swaddling • Non-nutritive suck • 'dummy dips' • Containment holding / cuddles • Pain score and analgesia if indicated • Consider if child is hungry and meets criteria for enteral feeding • Involve play team as appropriate to support with distraction • Check all pressure areas (all hard surfaces eg ECG leads, interfaces, cannulas etc.) 	<p>As a last resort a dose of chloral hydrate may be considered. On every occasion there MUST be discussion and agreement with the paediatric consultant, including out of hours</p> <p>Refer to the BNFC for dosage and indications; however, the lowest dose should always be given due to the ongoing risks of respiratory depression. The child should be fully monitored and closely observed for any adverse effects.</p>



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Acknowledgements

This guideline was developed by the following health care professionals from across the North Thames and East of England regions to form the acute CPAP Working group.

Name	Professional Role	Hospital/ Trust
Sophia Touzani	Lead Nurse	North Thames Paediatric Network
Francesca Wright	Lead Practice Development Nurse	East of England PCC Network
Laura Gannaway	Children's Site Practitioner	BHRUT
Dr Adele Cowper	PEM Consultant	BHRUT
Dr Bijan Shahrads	Consultant – General Paediatric	Homerton University Hospital
Marianne Hill	Matron – Paediatric Services	Homerton University Hospital
Gemma Parish	Respiratory CNS	Homerton University Hospital
Fiona Morrell	PDN	Homerton University Hospital
Suzanne McFarlane	PDN	North Middlesex Hospital
Dr Jenny Pallawela	Consultant – General Paediatric	North Middlesex Hospital
Dr Susan Liebeschuetz	Consultant – General Paediatric	Newham University Hospital
Dr Penny Salt	Consultant – General Paediatric	UCLH Hospital
Lakshmi Singaram - Chettiar	Respiratory CNS	UCLH Hospital
Nicky Baldwin	PDN	UCLH Hospital
Claire Cadman	PDN	UCLH Hospital
Jas Khalsa	PCC Lead Nurse	Hillingdon Hospital
Louise Tebble	PDN	Basildon Hospital
Michelle Pash	PICU Educator	St Mary's / Imperial
Sue Cornwell	PDN	Southend Hospital
Hannah Torrance	PDN	Southend Hospital
Mary Stebbens	PDN	Broomfield Hospital
Dr Lynn Sinitsky	Consultant – General Paediatric	Watford
Anna Lanwarne	PDN	Watford
Stuart Adams	PDN	Chelsea & Westminster
Dr Seema Sukhani	Consultant – General Paediatric	Luton & Dunstable
Dr Reshmy Nair	Consultant – General Paediatric	Luton & Dunstable
Laurell Lockett	PCC Lead Nurse	Luton & Dunstable
Shahi Saramad	Ward Manager	Whittington
Approval Gained From		
Dr Mamta Vaidya & Dr Hermione Lyall	NTPN Clinical Directors	North Thames Paediatric Network
Dr Ruchi Sinha, Dr Emma – Jane Bould & Dr Peter Sidgwick	PCC Clinical Leads	North Thames Paediatric Network
Dr Lauren Filby	PCC Clinical Lead	East of England
Dr Padmanabhan Ramnarayan	Retrieval Service Medical Director	Children's Acute Transfer Service



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