



Crumlin | Temple Street | Tallaght | Connolly

Children's Health Ireland Nursing Practice Guidelines on the use of Neopuff™ in Infant resuscitation

Area of use:	All of organisation <input checked="" type="checkbox"/>	CHI at Connolly <input type="checkbox"/>	CHI at Crumlin <input type="checkbox"/>
		CHI at Tallaght <input type="checkbox"/>	CHI at Temple Street <input type="checkbox"/>
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Version History

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Please note practice variation

No practice issues identified across CHI

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1.0 Introduction

This guideline details the indications and procedure for infant resuscitation using Neopuff™ in CHI.

Studies have shown that compared to self-inflating bags, T-Piece resuscitators such as Neopuff™ provide a more controlled and reliable peak inspiratory pressure (PIP) and positive end expiratory pressure (PEEP), which facilitates the maintenance of functional residual capacity (FRC) (Perez *et al.*, 2017)

2.0 Purpose of the guideline

The purpose of this document is to provide clear and concise guidance outlining the use of Neopuff™ device for infant resuscitation, thus ensuring staff are promoting best practice as per international and national recommendations. This guideline will also act as an educational tool in facilitating medical and nursing induction and education and the standards laid out in it will form the basis of our regular audit review process. While the aim of this guideline is to support Neopuff™ as the primary method of neonatal resuscitation, Bag Valve Masks (i.e. self-inflating bags) and Mechanical Insufflation-Exsufflation (MIE) Flow inflated circuits will still be available at all times for resuscitation in CHI.

3.0 Scope

Employees: all full-time, part-time and fixed term employees employed by CHI at Temple Street are covered by this policy.

Agents: agents are considered to be people such as employees of suppliers, volunteers, students on placement or any other individuals associated with CHI at Temple Street. All such agents are covered by this policy

4.0 Glossary of terms

FRC	Functional Residual Capacity
PEEP	Positive End Expiratory Pressure
PIP	Peak Inspiratory Pressure
PPV	Positive Pressure Ventilations

5.0 General Responsibilities

All Staff: Adhere to all guidelines and procedures relevant to their area of work.

Line Manager/Head of Department: to ensure their staff are aware of and compliant with all policies and procedures relevant to their area of work.

6.0 Procedure

Neopuff™ is a flow-controlled device specifically designed to provide assisted respiratory breaths for infant resuscitation (Hussey, Ryan and Murphy, 2004). To prevent the risk of injury to a patient's lungs, it is imperative that this equipment is checked daily and pre each use to ensure correct PIP and maximum pressure relief are set within a safe range (Hussey, Ryan and Murphy, 2004).

ACTION	RATIONALE AND REFERENCE
1. Confirm the air and oxygen supply lines from the low flow air - oxygen blender are plugged into the mains air and oxygen supply.	This will provide the gas flow through the Neopuff™.
2. Ensure green gas supply line is connected from the gas flow meter attached to the low flow air - oxygen blender to the gas inlet port on the Neopuff™.	This will facilitate the use of the Neopuff™ including where only one mains air/oxygen supply is available at a patient's bedside.
3. If low flow air - oxygen blender not in use ensure the green gas supply line is attached to an oxygen flow meter.	
4. Attach clear T-piece circuit to gas outlet port. Leave cap in place or attach test lung	
<ul style="list-style-type: none"> • Check the manometer reads zero with no gas flow. • Set the gas flow meter to 10 L/min. • Occlude both the white PEEP cap and the end of the clear T-piece circuit. • Turn the PIP control fully clockwise until it does not turn anymore • Remove the cap covering the maximum pressure control knob. 	<p>If not, the manometer needs calibration</p> <p>A flow of 10 L/min is the minimum gas flow required to effectively reach efficient PIP and PEEP pressures.</p>
5. Adjust max pressure control knob clockwise or counter clockwise until the max pressure of 40 cm H₂O is noted on the manometer. Replace the cap over the maximum pressure relief knob. [Resuscitation above 40 cmH ₂ O [mbar] cannot be achieved unless the Max Pressure Relief valve is adjusted.	Ensuring maximum pressure relief is set no higher than 40 cm H ₂ O as it reduces the risk of accidental volutrauma (Hussey, Ryan and Murphy, 2004).
6. Rotate the blue PIP knob until a PIP of 25 cm H ₂ O is noted on the manometer.	A PIP of 20 – 30 cm H ₂ O is recommended to establish FRC and is understood to stimulate the return of spontaneous breathing (Perez et al., 2017).
7. Release your finger off the white PEEP cap (while keeping the end of the clear T-piece circuit occluded). Adjust white PEEP cap until a PEEP of 5 cm H ₂ O reads on the manometer	A PEEP of 5 – 8 cm H ₂ O is recommended. It is reported that this PEEP can reduce the need for endotracheal intubation (Perez et al., 2017, (Hussey, Ryan and Murphy, 2004).

6.1 Daily safety checks

Action	Rationale
<ol style="list-style-type: none"> 1. Adjust the gas supply to a flow rate of 10L/min and check that oxygen blender is set at 21% oxygen. 2. Occlude both the PEEP cap and the T-piece and check the reading on the manometer, this should read 25cm H₂O, which is the PIP setting. 3. Check the maximum pressure relief by keeping both the PEEP cap and T- piece occluded and turn the peak inspiratory pressure knob fully clockwise until it can no longer turn. Check the reading on the manometer, this should read no more than 40cm H₂O . 4. Turn the peak inspiratory pressure knob anticlockwise until the manometer reads 25 cm H₂O. 5. Release your finger off the white PEEP cap (while keeping the end of the clear T-piece circuit occluded). Adjust white PEEP cap until a PEEP of 5 cm H₂O reads on the manometer. 	<p>This commences the flow of medical gases; a flow of 10L/min is required to accurately provide an efficient PEEP.</p> <p>A PIP setting of between 20 – 30 cm H₂O is widely recommended as an initial respiratory pressure (Perez <i>et al</i> 2017).</p> <p>This is your safety maximum pressure relief, meaning even if the peak inspiratory pressure knob is moved the maximum PIP that can be delivered to the patient is 40cm H₂O , thus reducing the risk of volutrauma (Hussey, Ryan and Murphy, 2004).</p> <p>A PEEP of 5 – 8 cm H₂O is recommended and it is reported that this PEEP can reduce the need for endotracheal intubation (Perez et al., 2017, Hussey, Ryan and Murphy, 2004).</p>

6.2 Using Neopuff™ for resuscitation

Action	Rationale
<ol style="list-style-type: none"> 1. Check the manometer reads zero with no gas flow. 2. Adjust the gas supply to a flow rate of 10L/min. 3. Rotate the low flow air – oxygen blender to the patient’s baseline oxygen requirement. (i.e. if a patient is already on 40% oxygen via non - invasive ventilation this should be your baseline starting oxygen) This can be adjusted as per patient’s condition. 4. Occlude both the PEEP cap and the T-piece and check the reading on the manometer, this should read 25cm H₂O, which is the PIP setting. 5. Release your finger off the white PEEP cap (while keeping the end of the clear T-piece 	<p>This will provide the gas flow through the Neopuff™.</p> <p>Much debate surrounds the use of 100% oxygen in infant resuscitation (Hussey, Ryan and Murphy, 2004). The 2020 American Heart Association neonatal resuscitation guidelines recommend initiating PPV at 21% oxygen and adjusting as per patient’s condition.</p> <p>As per manufacturer’s guidelines, for safety reasons Neopuff™ must not be used until correct PIP and PEEP pressures have been checked (Fisher and Paykel, 2019).</p>

<p>circuit occluded). Adjust white PEEP cap until a PEEP of 5 cm H₂O reads on the manometer.</p> <ol style="list-style-type: none"> 6. Seal the mask over the patient’s nose and mouth, this will provide a continuous PEEP of 5cm H₂O. 7. Occluding the white PEEP cap will provide a PIP of 25cm H₂O. 8. Resuscitate patient by placing and removing your finger over the white PEEP cap allowing for inspiration and expiration while providing a continuous PEEP. 9. Ensure to observe patient for chest rise and monitor manometer to review PIP and PEEP levels. Failure to reach the set PIP indicates a leak around the face mask 10. Refer to current basic life support algorithm if further resuscitation is required 	<p>Efficient PPV initiated at 40 – 60 breaths per minute should stimulate an improvement in both the patient’s heart rate and respiratory status (Raghuveer and Cox, 2011).</p>
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7.0 Monitoring and Evaluation

This policy/procedure/protocol/guideline shall be **Reviewed** and updated at least every three years by the Author/and or Owner, or earlier if required, in order to determine its effectiveness and appropriateness. In addition, the Author/and or Owner will **Audit** compliance of key practice principles with this policy/procedure/protocol/guideline on an annual basis.

8.0 Key stakeholders

NAME	TITLE	Location
Dr Katie Cunningham	Consultant Neonatologist	Temple Street
Dr Margaret Moran	Consultant Neonatologist	Temple Street
Dr Ann Hickey	Consultant Neonatologist	Temple Street
Ms Claire Ahern	Resuscitation Officer	Temple Street
Ms Michelle Sheerin	Resuscitation Officer	Temple Street
Ms Eilish Clarke	Clinical Nurse Education Facilitator, St Michaels B	Temple Street
Ms Karen Brennan	Clinical Nurse Manager 2, St Michaels B	Temple Street
Ms Grainne Power	Clinical Nurse Manager 1, St Michaels B	Temple Street
Ms Susan Keane	Clinical Practice Facilitator	Temple Street
Ms Caroline O Connor	Nursing Quality, Practice and Research Coordinator	Temple Street
Ms Jennifer Dunne	CNM 3 Neonates Crumlin	Crumlin
Ms Abaigh Healy	CNM 2 Resuscitation team Crumlin	Crumlin
Reviewed and approved at the CHI NPC July 2023		

9.0 Communication and training

A full training programme will be implemented prior to the use of the Neopuff in the clinical areas.

10.0 References

- American Heart Association. (2020) “Part 5: Neonatal Resuscitation”, 2020 American heart association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care, 142(2), pp. 524 – 550.
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- Fisher and Paykel (2019) Infant Resuscitation: technical Manual. Available at: <https://www.fphcare.com/en-gb/resources/neopuff-rd900-technical-manual> (Accessed: 29 April 2021).
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- Jayaram, A. et al. (2013) “T-piece resuscitator versus self-inflating bag for preterm resuscitation: An institutional experience”, Respiratory Care”, 58(7), pp. 1233 – 1236.
- Perez, S.A. et al. (2017) “Comparison the efficacy of three positive pressure ventilation devices used by medicine students on a neonatal resuscitation simulator”, Clinical Practice, 14(2), pp. 137 – 144.
- Raghuvver, T.S. and Cox, A.J. (2011) “Neonatal Resuscitation: An update”, American Family Physician, 83(8), pp. 911 – 918.
- The Rotunda Hospital Dublin (2016) *Quick guide to using the Neopuff*.
- University Hospitals of Leicester (2018) *Neopuff resuscitator set up guide*. Available at: <https://secure.library.leicestershospitals.nhs.uk/PAGL/Shared%20Documents/Neopuff%20Resuscitator%20UHL%20Neonatal%20Guideline.pdf> (Accessed: 29 April 2021).

A	Low Flow Air - Oxygen blender
B	Gas flow meter
C	Neopuff
D	Air and Oxygen medical gas mains air supply
E	Gas supply line
F	T Piece circuit
G	Max pressure relief knob
H	Peak Inspiratory Pressure knob
I	Manometer
J	PEEP Cap

