



GUIDELINE

Ventilation: Non-Invasive Positive Pressure Ventilation (NIPPV)

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NICU KEMH, NICU PCH, NETS WA

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this [disclaimer](#)

Aim

Outline the management of infants that require respiratory support via non-invasive positive pressure ventilation (NIPPV). Also termed non-invasive ventilation (NIV)

Risk

Failure to follow this guideline may result in adverse outcomes for the infant.

Background

- Non-invasive Positive Pressure Ventilation (NIPPV) is a ventilator modality of respiratory support to assist the infant to maintain “normal”/acceptable physiological parameters and minimize iatrogenic lung injury from mechanical ventilation. It is delivered via a non-invasive patient interface (nasal prong or mask) using the Draeger VN500.
- NIPPV superimposes an intermittent peak pressure on CPAP via Hudson prongs. Synchronized positive pressure peaks with infants own breathing efforts results in more effective pressure and volume delivery improving extubation success in preterm infants. However, does not seem to be beneficial for the primary treatment of RDS.
- Data from a recent Cochrane review comparing NIPPV to CPAP in preterm infants (>28 weeks) following extubation have suggested a reduced need for reintubation within 48 hrs with NIPPV. Pulmonary air leaks were reduced as well. NIPPV does not reduce the rate of death or BPD.

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- NIPPV reduces rate of intubations in infants with RDS (RR:0.78;95% CI: 0.64-0.94) but does not affect the rates of BPD (RR:0.78; 95% CI: 0.58-1.06). Only ventilator-generated synchronized NIPPV was associated with reduction in BPD.

Key Points

- NIPPV is NOT a replacement for endotracheal ventilation; it should be seen as alternative to [nCPAP](#). The decision to use NIPPV on the Draeger VN500 should be made in consultation with the treating Neonatology Consultant.
- Sepsis and other pathologies should always be considered in infants with increased work of breathing or other respiratory deterioration. Intubation needs to be considered.
- The use of NIV instead of mechanical ventilation is associated with a lower risk of nosocomial infections. Studies have shown a significant increase in infectious complications related to the presence of the endotracheal tube.
- Complications are similar to [nCPAP](#) or any type of positive pressure ventilation: abdominal distension due to excess gas (similar to CPAP belly), [pneumothorax](#), blockage of prongs, [nasal injury](#).

Indications for Use

To facilitate early weaning strategies from mechanical ventilation for infants at high risk of Bronchopulmonary dysplasia and infants with recurrent apnoea.

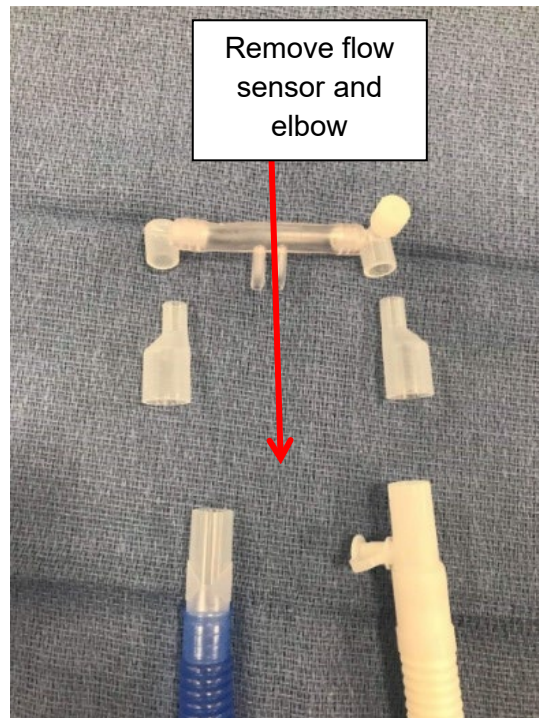
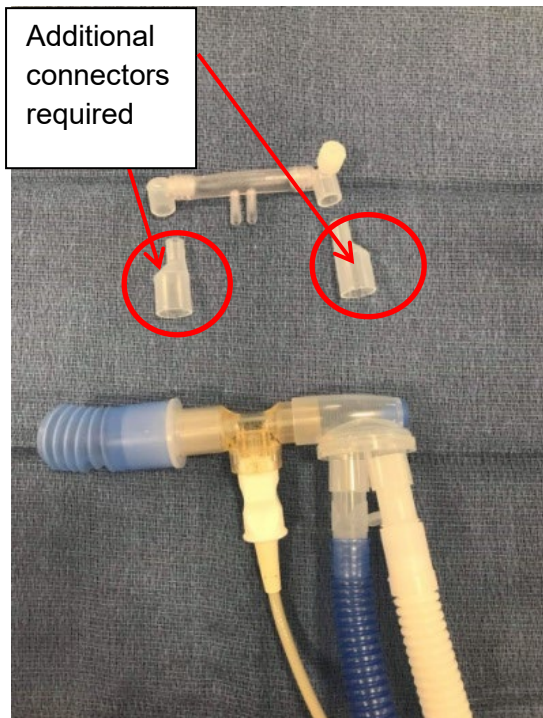
NIPPV Equipment

- Select the appropriate size Hudson CPAP prongs to achieve a snug fit. See table below.

Hudson CPAP Size Guide	
Prongs Size	Infant's Weight
0	<700g
1	700-1250g
2	1250-2000g
3	2000-3000g
4-5	>3000g

- Assemble VN500 ventilator circuit with the Hudson CPAP prongs using the additional connectors (see photo below). The connectors can be found on the CPAP trolley or in the 'connectors' section in the compactus.
- The connectors from the ventilator circuit pack will fit the end of the blue and white circuit tubes and directly onto the Hudson CPAP prongs (see photo below). Keep rest of packet as this can be used when the infant transitions to bubble CPAP.
- Alternatively, a face mask or nasopharyngeal airway can be used for NIPPV.

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Initiating NIPPV on the Draeger VN500

1. If the infant is currently ventilated with the VN500, then the infant needs to be connected to the Neopuff while setting up NIPPV.
2. Prior to beginning therapy, the non-invasive ventilation mode (NIV) MUST be selected. The therapy mode can be easily changed from "Tube" to "NIV" at the Start-Standby dialogue. Once selected, the NIV therapy mode is highlighted in orange.
3. Go to start/standby screen, go to ventilation settings and set appropriate NIPPV settings by selecting PC-CMV mode.
4. Remember to deactivate the flow sensor.



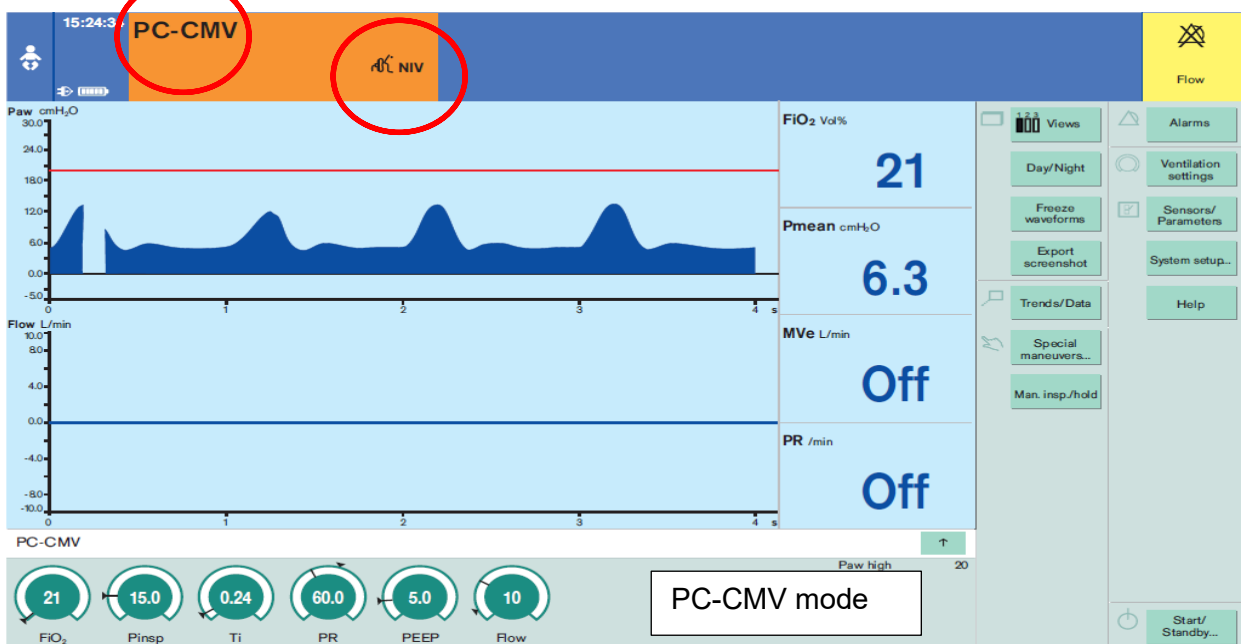
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PC - CMV = CPAP with non-invasive breaths

- Not synchronised because there is no flow sensor
- Will provide non synchronised back-up breaths
- Set PIP 14-20cm water. Can be increased to 25 in discussion with a consultant
- Set PEEP 5-9cm of water. Aim for the achieved MAP to be the same as if the infant was on bubble CPAP
- RR 10-40 breaths/minute
- Inspiratory time 0.3-0.5s similar to Ti on the ventilator
- Flow: 10L/min
- The disconnection alarm will function. Set the disconnection alarm to 20sec

When PC-CMV is selected, there will be 3 changes:

1. The ventilation mode display bar in the header will turn orange and display PC-CMV. See picture below.
2. There will be a picture of a face and mask in the orange header bar with the letters NIV (non-invasive ventilation).
3. The flow sensor will be automatically deactivated and must be removed from the circuit.



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Documentation of PC-CMV

Hourly documentation of ventilator settings is required with initial settings and any changes made in **RED** on the MR489.

HFO	VG		
Amp/Hertz	NIV PC-CMV	PC	CMV
ETT/SIMV/SIPPV/PSV		18	17-2
Pressure	PIP / PEEP	6	5.8
MAP	/ Rate	12.2	12.1
Rate	Slape / mIT	30	30
MV/TV	Nares	2	2
MiT	Septum	4	4
FiO ₂		✓	✓
Nitric No/No.		✓	✓
		21	21

Related CAHS internal policies, procedures and guidelines

[Continuous Positive Airway Pressure](#)

[Conventional Ventilation](#)

References and related external legislation, policies, and guidelines

1. Ruegger C, Owen L, Davis P. Nasal Intermittent Positive Pressure Ventilation for Neonatal Respiratory Distress Syndrome. Clinics in Perinatology. Vol 48 (4), 725-744. December 2021
2. Wang T, Zhang L, Luo K, He J, Ma Y, Li Z, Zhao N, Xu Q, Li Y, Yu X. Noninvasive versus invasive mechanical ventilation for immunocompromised patients with acute respiratory failure: a systematic review and meta- analysis. BMC Pulmonary Medicine. 2016; 16(1)129. DOI: 10.1186/s12890-016-0289-y
3. Lemyre B, Deguise MO, Benson P, Kirpalani H, De Paoli AG, Davis PG. Nasal intermittent positive pressure ventilation (NIPPV) versus nasal continuous positive airway pressure (NCPAP) for preterm neonates after extubation. Cochrane Database Syst Rev. 2023 Jul 27;7(7):CD003212
4. Boel L, Hixson T, Brown L, Sage J, Kotecha S, Chakraborty M. Non-invasive respiratory support in preterm infants. Paediatr Respir Rev. 2022 Sep;43:53-59.
5. John SC, Garg M, Muttineni M, Brearley AM, Rao P, Bhandari V, Slusher T, Murki S. Safety of bubble nasal intermittent positive pressure ventilation (NIPPV) versus bubble nasal continuous positive airway pressure (NCPAP) in preterm infants with respiratory distress. J Perinatol. 2024 Feb 15.


Useful resources (including related forms)

[CAHS Controlled Operator Manuals: Draeger Medical – Neonatal Care Ventilator Babylog VN500](#)

[quick-guide-Babyog-vn500-br-9109668-en-master.pdf \(draeger.com\)](#)

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This document can be made available in alternative formats on request.

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