



CLINICAL GUIDELINE

Ventilation: Non-Invasive Positive Pressure Ventilation (NIPPV)

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NICU PCH

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

Overview

Non-invasive Positive Pressure Ventilation (NIPPV) is a ventilator modality of respiratory support, given to patients without the use of an endotracheal tube. In practice, the required mode is selected and is applied via the non-invasive patient interface (nasal prong or mask). The ventilator currently used for the delivery of NIPPV is the Draeger VN500. This is achieved by selecting the NIV mode in the start/standby menu. The use of NIPPV in the NICU has increased as research shows that its use can result in the potential complications of invasive mechanical ventilation being reduced.

Non-invasive respiratory support can be provided by use of CPAP or NIPPV. Please refer to Neonatal guidelines for use of NIV via nasal prongs or [CPAP](#). The following guideline will provide an overview of the use of NIPPV. The goals of NIPPV are to assist infant to maintain “normal”/acceptable physiological parameters and minimize iatrogenic lung injury from mechanical ventilation.

Data from a recent Cochrane review comparing NIPPV to CPAP in preterm infants following extubation have suggested a reduced need for reintubation with NIPPV.

Introduction

NIPPV superimposes an intermittent peak pressure on CPAP and is delivered to the infant with a ventilator and Hudson prongs. NIPPV, in particular when synchronized, improves extubation success in preterm infants, but does not seem to be beneficial for the primary treatment of RDS. NIPPV does not reduce the rate of death or BPD. NIPPV is NOT a replacement for endotracheal ventilation; it should be seen as alternative to nCPAP.

Sepsis and other pathologies should always be considered in infants with increased work of breathing or other respiratory deterioration. Intubation needs to be considered for these infants.

Indications for Use

- To avoid the need for reintubation in babies at high risk of BPD (Bronchopulmonary dysplasia) and recurrent apnoeas.
- NIV facilitates early weaning strategies from mechanical ventilation.

Advantages of NIV

- 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.
- Available research also suggests the use of NIV reduces the need for re-intubation in VLBW babies post extubation.

Nursing Management of NIV

- Nursing Staff MUST be deemed Ventilator Competent when caring for patients using NIPPV on the Draeger VN500
- Ensure appropriate size Hudson CPAP prongs to achieve a snug fit. See table below
- Management as per care of the ventilated or CPAP dependent neonate

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

Documentation

- 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	SiPpE / mIT	30	30
MV/TV	Nares	2	2
MiT	Septum	✓	✓
FiO ₂		0.21	0.21
Nitric No/No ₂			

Image 1: Documentation for PC-CMV

Equipment

To use NIPPV, the ventilator is attached to CPAP prongs with the use of connectors. The connectors can be found on the CPAP trolley or in the 'connectors' section in the compactus.

Alternatively, you can also use a face mask or nasopharyngeal airway for delivery of NIPPV. The decision to use NIPPV using the above equipment on the Draeger VN500 is a Medical decision and should be made in consultation with the treating Consultant.

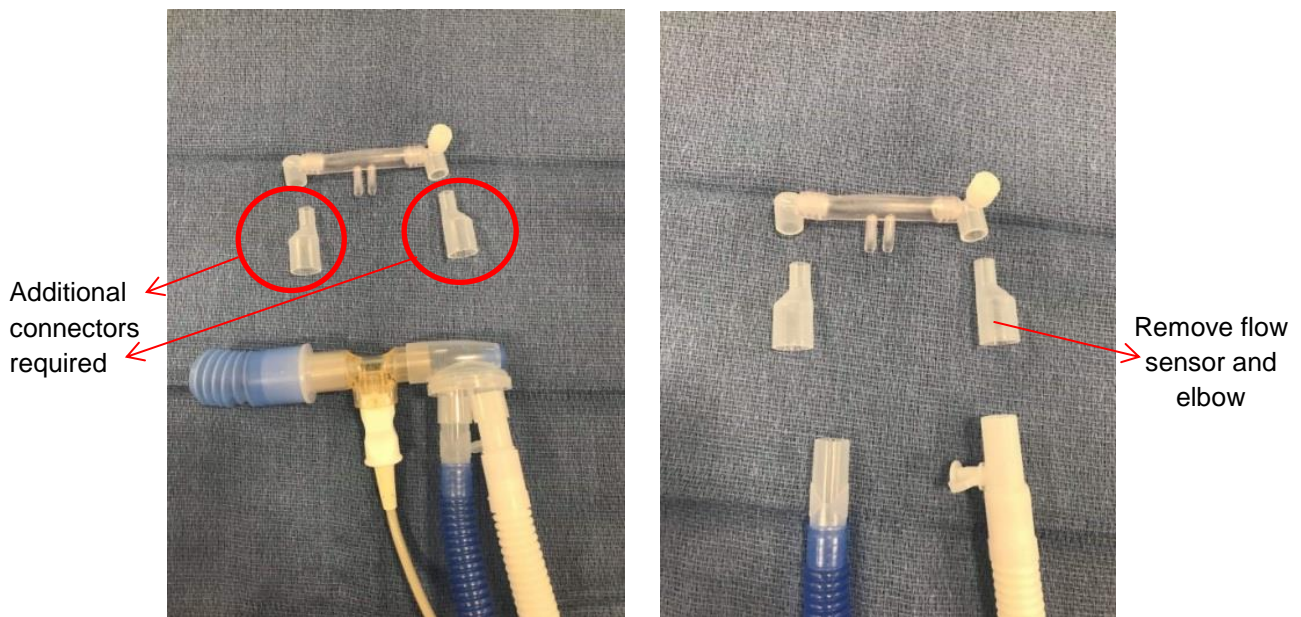


Image 2: Additional connectors required to convert ventilator circuit with CPAP prongs

Initiating Non-invasive Positive Pressure Ventilation (NIV) on the Babylog VN500

1. Assemble ventilator circuit with Hudson CPAP prongs appropriate for infant's nares. 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 above). Keep rest of packet with baby as this can be used when the baby transitions to bubble CPAP.
2. If the baby is currently ventilated with the VN500, then the baby needs to be connected to the Neopuff while setting up NIPPV on the ventilator.
3. 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.



Image 3: Setup dialogue of NIV

4. Go to start/standby screen, go to ventilation settings and set appropriate NIPPV settings by selecting PC-CMV mode.
5. Remember to deactivate the flow sensor.

The Babylog VN500 automatically switches to default modes when used for NIV for neonatal settings to the SPN-CPAP ventilation mode. At PCH, we would still continue to use the bubble CPAP for NIV. Press start and confirm to start NIV via PC-CMV mode.

PC - CMV = CPAP with non-invasive breaths

- Not synchronised because there is no flow sensor
- Will provide back-up breaths
- Set PIP 14-20cm water. Could 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 baby would be 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

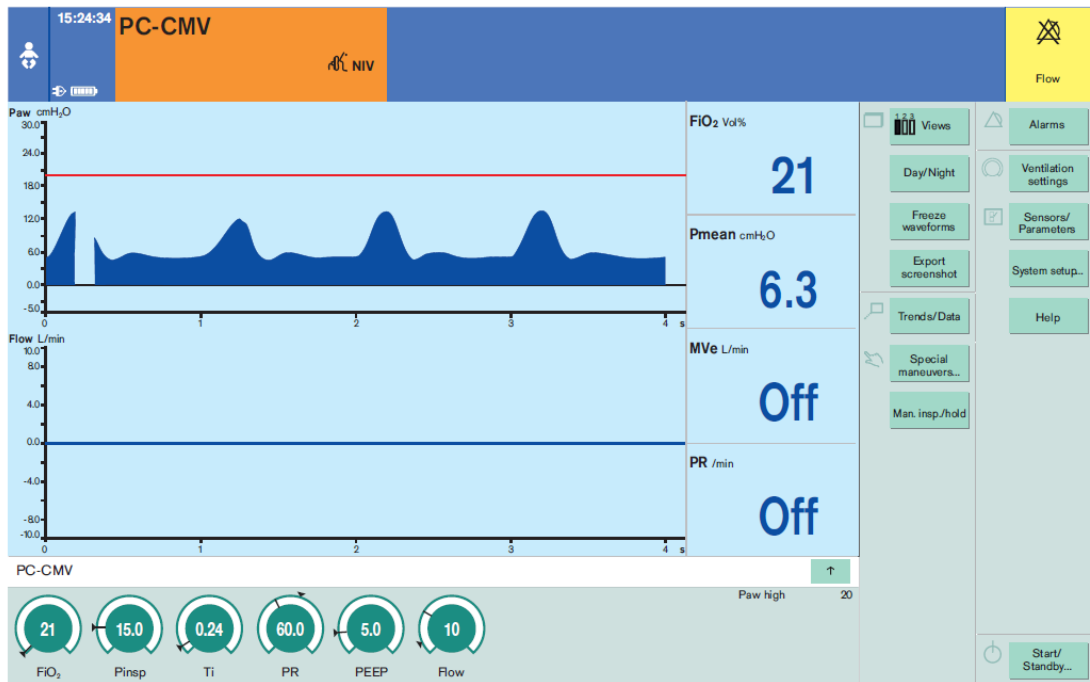


Image 4: Neonatal patient in the mode PC-CMV

When PC-CMV is selected, there will be 3 changes in the header bar as seen in the image above:

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

Complications of NIV

Complications are similar to treatment with nCPAP or any type of positive pressure ventilation: abdominal distension due to excess gas (similar to CPAP belly), pneumothorax, blockage of prongs, nasal injury. Appropriate nursing care should prevent nasal septal erosion and nasal obstruction.

Related CAHS internal policies, procedures and guidelines

[Ventilation: Conventional](#)

[Continuous Positive Airway Pressure](#)

References and related external legislation, policies, and guidelines

Barrington KJ, Bull D, Finer NN. Randomized trial of nasal synchronized intermittent mandatory ventilation compared with continuous positive airway pressure after extubation of very low birth weight infants. *Pediatrics*. 2001; 107(4):638-41.

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


Lemyr B, Davis PG, De Paoli AG, Kirpalani H. Nasal intermittent positive pressure ventilation (NIPPV) versus nasal continuous positive airway pressure (NCPAP) for preterm neonates after extubation. *Cochrane Database of Systematic Reviews*. 2017. DOI:10.1002/14651858.CD003212.pub3.

Lemyre B, Laughon M, Bose C, Davis PG. Early nasal intermittent positive pressure ventilation (NIPPV) versus early nasal continuous positive airway pressure (NCPAP) for preterm infants. *Cochrane Database of Systematic Reviews*; 2016; NO: 12. DOI: 10.1002/14651858.CD005384.pub2.

Useful resources (including related forms)

<https://www.draeger.com/Library/Content/niv-hb-9105201-en.pdf>

This document can be made available in alternative formats on request for a person with a disability.

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