

HOW TO SAFETLY CARE FOR A CHILD NEEDING NIV: A basic guide

INTRODUCTION TO THE VENTILATOR

Ensure you know why the patient needs Non Invasive Ventilatory support.

CPAP is Continuous Positive Airway Pressure. It provides a positive pressure of air through the nose and mouth, stenting open the upper-airway, preventing the bronchioles and alveoli from collapsing and maintaining adequate gaseous exchange. Measured in centimetres of water (cmH2O).

BIPAP is BI-level Positive Airway Pressure and this provides two pressures; an IPAP (Inspiratory positive airway pressure) and an EPAP (Expiratory positive airway pressure). It assists inspiration to achieve an optimal tidal volume, while preventing airway closure during expiration.

Three main Long Term NIV ventilators in the Trust



Stellar 100/150

CPAP/BIPAP



Nippy

CPAP/BIPAP



Airsense 10

CPAP

How to connect to main power supply

Ensure the plug is securely in the socket at the back of the ventilator and the plug at the wall is switched on.

If mains power is not connected

***The Stellar 100** has a 2-4 hr internal battery depending on pressure needed and if humidification is required. The vent will automatically switch to battery mode and alarm to inform you. Amount of battery charge is shown on the top right of vent screen.*

***The Nippy** has a 2-4 hour battery depending on pressure. The amount of battery charge is shown on the top right of vent screen.*

***The Airsense 10** does not have a battery therefore cannot be used unless plugged into the mains. If a child is more dependent on their ventilation they should be on either the Nippy or the Stellar*

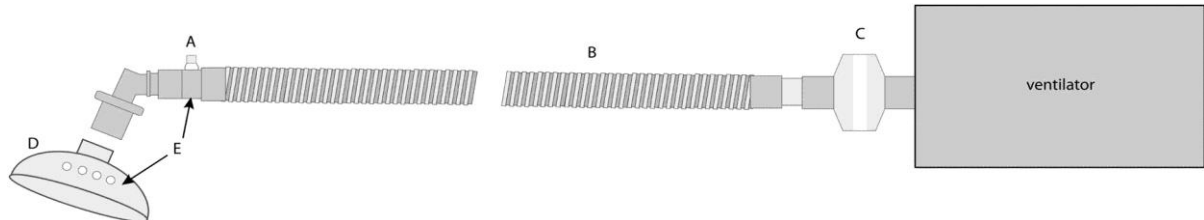
To note -the older the ventilator the less likely the ventilator will have a fully functional battery. Always keep the ventilator plugged in and carry out a battery test if needed to be used.

Setting up the NIV equipment

All the three machines in long term NIV will be attached to a single limb tube which may include a standard bacterial filter in the circuit closest to the ventilator (if it is a loan device).

The single limb tube will not have an intentional leak port. The single limb tube will be fitted to a long term NIV mask with an intentional leak port built in to allow carbon dioxide to escape the circuit.

Not all patients will need humidity. Please see humidity section.



- A. Ignore- no intentional leak required in the vent tubing
- B. Single Limb vent tubing
- C. Bacterial filter may be required on a loan device
- D. Long term NIV mask with Carbon dioxide exhalation port

Ventilator- with/without a humidifier

The Airsense 10-withoiut humidity



The NIPPY- without humidity



The Stellar 100- with humidity



How to deliver pressure

The Stellar 100

If the screen is not in standby mode, flick the black switch on the back of the ventilator near the plug.

Once the clock appears on the screen to turn on/off see below:



To turn off the press the 'on' button again then to confirm you wish the vent to stop press the top of the scroll dial button.

The Nippy



To turn on/off please press the same button above. To note once turned on the Nippy goes straight into treatment pressure.

The Aironse 10

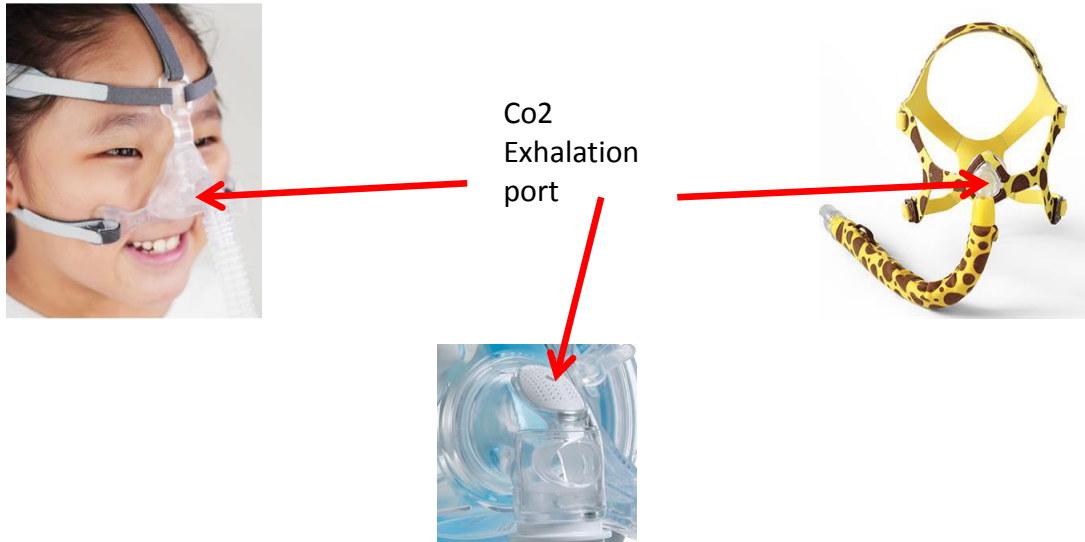
Press the on button above the screen to deliver pressure.



Mask safety check once ventilator is switched on.

All Long Term NIV masks have a carbon dioxide exhalation port

This must be checked once the ventilation pressure is started. The exhalation port must be clear and not obstructed to ensure expulsion of CO₂. This is checked by feeling for a pressure leak from around the port.

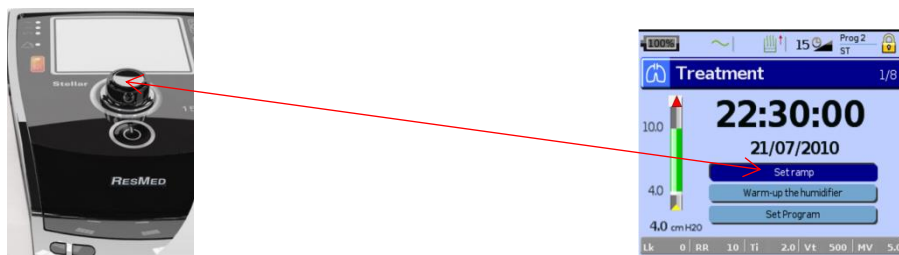


Check there is no ramp feature set and if NIV is needed acutely this needs to be turned off.

Ramp feature is a comfort setting that allows the ventilator to start at small pressures and build up to treatment pressure over a period of time. This may not be set on all ventilators.

The NIPPY- does not have a Ramp feature

The Stellar 100- Ramp can be turned off by scrolling the dial over the ramp bar on the front screen (while there is no treatment pressure), pressing the dial until the bar becomes yellow and scrolling back to 0, press the dial again until the ramp bar goes blue to lock.



The Airsense 10- Using the scroll dial button navigate to the 'My Options' scroll right, press the top of the scroll dial button and scroll down to 'off'



Checking the clinical Settings.

The Nippy- The clinical settings can be clearly seen on the home page.

The Airsense 10- Once treatment pressures are running, use the scroll dial button to 'Sleep Report' and CPAP pressure will be displayed.

The Stellar 100- Press the 2 ticks using button on the right hand side of the screen

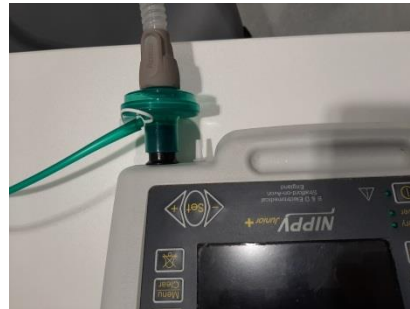
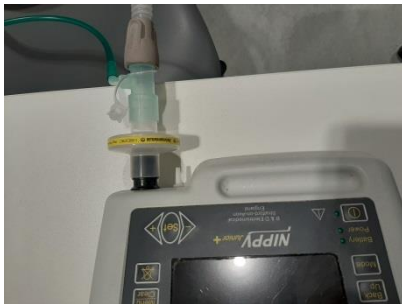
OXYGEN SUPPLY

Aware of expected oxygen saturation levels for the child

E.g 94% or above for non-cardiac patients, these parameters should be set by the medical team.

Administration of oxygen via a ventilator- up to 15l/m of Oxygen

The NIPPY- Oxygen can be given via the ventilation circuit closest to the ventilator either; via a bacterial filter (with an oxygen port attached), or a bacterial filter attached to a standard oxygen enrichment port.



The Airsense 10- as per NIPPY advice



The Stellar 100- the oxygen should go via the back of the machine using the white oxygen port. If this is not available then use a green oxygen enrichment port and attach between the vent and the tubing as per NIPPY advice.



Limitations to oxygen administration via Long Term NIV device- at best with 15l/m of oxygen via NIV the oxygen concentration at the mask will be 60-70%.

Filters

Can change the filter

Dust particle filters at the back of the ventilator on the Stellar 100, the Nippy and on the side of an Airsense 10.

They should be changed 3 monthly on manufacturer advice, check monthly, if very dirty discard and replace, do not wash and re-use

Avoid keeping the ventilator on the floor.

Replacement filters can be sourced from the NIV team.

Acute use on a loan ventilator.

The filter should be placed at the front of the ventilator before the tubing. This should be an anti-bacterial filter- this will require a weekly change on a dry circuit and every 3 days on a wet circuit.



ENSURE THAT A Heat Moisture Exchange (HME) IS NOT USED, THIS CAN INCREASE RESITANCE AND INCREASE WORK OF BREATHING!

MASK FIT

Where possible fit mask first then start ventilation once good placement of mask has been achieved

Fit the mask correctly

To fit the mask well, ensure the nostrils are not occluded and the mask is not in the eyes.

Nasal mask: *place the mask at the tip of top lip and roll up to the nasal bridge*

Fullface mask: *start with base at the crease of the chin and roll up to sit below the eye.*



You must check the mask visually

Can you feel exhalation port? The exhalation port must be kept clear at all time as this is where the child is able to breathe out their CO₂. It must be checked by visually ensuring the port is clean and clear and by waving your hand over the port at the front of the mask to ensure you can feel pressure release

Make sure nostrils are not blocked

Is the mask on too tight or loose? Check position of the headgear straps using 2 finger-tension that the straps are not too tight. If straps become undone, tighten by standing in front of the child and tighten both straps together.

Is the headgear on the right way round?

Do you have a good seal? Once the mask has been fitted, start pressure and use hands to check for leak around the eyes, nasal bridge and below mask, if there is still a large leak and the child is using a nasal mask check for oral leak using hands. If oral leak is noted, assist to close jaw or use a dummy, contact a NIV CNS for mask review if unable to fix.

Is the mask clean- wipe it down daily!

Aware of what to do in the event of a pressure sore

Contact the NIV team straight away for any red marking, introduce Barrier dressing like Siltape or switch mask if Grade 1, remove or switch mask if Grade 2 or above.



HUMIDIFICATION

When humidification is required

If the child has thick secretions, neuromuscular patients with a weak cough and CF patients. Re-occurring chest infections or oral and nasal dryness, 24 hr use of NIV.

The Airsense 10

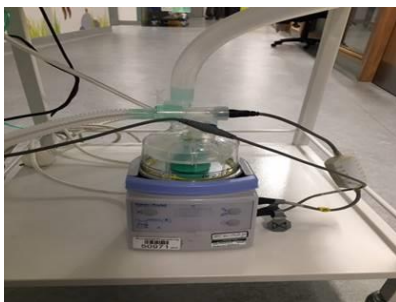


The Stellar 100



The NIPPY

An external humidifier is needed



With the Stellar 100 and Airsense 10

Never fill chamber when machine is on (it's a messy experience!), Ensure the lid is closed properly, this is a major cause for leak. Aim to have the humidifier below the patient to avoid rainout traveling towards the airway. Aware that the ventilator should not be moved/tilted with the humidifier attached.

Add water correctly- *When in hospital distilled water should be used, when at home cool boiled water to be added up to the max fill line.*

General humidity tips.

What to do if the child has nasal congestion?-Increase humidity level to help loosen nasal secretion

What to do if the tubing is getting water build up (rain out)- Reduce the humidity level and ensure it is not kept near a window or cold space, empty the water in the tubing back into the humidifier

Learn the circuit if adding a humidifier to Stellar 100

Attach humidifier to vent, mask and tubing, press the ticks button 3 times and use dial to press learn circuit, leave the circuit open until a smiley face appears on the screen



ALARMS

Always use a patient to ventilator approach to assessing alarms

The Aironse 10- There are no alarms on a Aironse 10

The NIPPY

High flow alarm- Should only sound when the ventilator detects too much leak from the vent circuit:

1. Check the mask is on correctly – refit the mask and resolve leak
2. Check there is no oral leak – close mouth, use dummy or chin strap, use full face mask if appropriate
3. Check there is no hole or tear in the tubing
4. Check the humidifier is attached properly
5. Nebuliser is attached to the tubing – if not in use remove from the circuit

Low flow alarm- when there is blockage to flow in the circuit:

1. Ensure the airway is patent
2. Check the exhalation port on the mask is clear
3. If the patient has a loan machine, ensure the filter is correct (not wet, not HME)
4. Ensure the tubing is patent and no kinked
5. Ensure no water in the tubing.
6. If using high levels of oxygen via the circuit this alarm may sound as the ventilator detects flow

The Stellar 100

High Leak Alarm-Should only sound when the ventilator detects a leak of over 25ltr/min for more than 25 seconds.

1. *Check the mask is on correctly – refit the mask and resolve leak*
2. *Check there is no oral leak – close mouth, use dummy or chin strap, use full face mask if appropriate*
3. *Check there is no hole or tear in the tubing*
4. *Check the humidifier lid is closed properly*
5. *Nebuliser is attached to the tubing – if not in use remove from the circuit*

Non Vented Mask Alarm / Blocked Tube

1. Ensure the airway is patent
2. Check the exhalation port on the mask is clear
3. If the patient has a loan machine, ensure the filter is correct (not wet, not HME)
4. Ensure the tubing is patent and no kinked
5. Ensure no water in the tubing.
6. If using high levels of oxygen via the circuit this alarm may sound as the ventilator detects flow
7. If no obvious reason, learn the circuit. (Have the circuit attached to the vent and off the patient, press the ticks button 3 times and select “learn circuit” with dial. Start learn circuit and wait for the smiley face to appear on screen. No re apply the mask and ventilate.

All alarms with stop automatically when the problem has been rectified, to stop alarm manually, press the orange button on the left of the screen

CLEANING AND MAINTENANCE

How to keep mask and tubing clean and risks

Wiped down every day and ensure the mask is dry when going on the face, wash whole mask and headgear once a week with warm soapy water/rinse with clear water and leave to air dry. A wet and dirty mask is one of the major causes of pressure ulcer.

Servicing requirements

PAT testing needs to be done yearly but a full servicing on the Stellar 100 and Airsense 10 needs to be done every 5 years. To be aware that the battery on the Stellar 100 may deplete after 2 year

NEBULISERS

Reasons for giving nebulisers

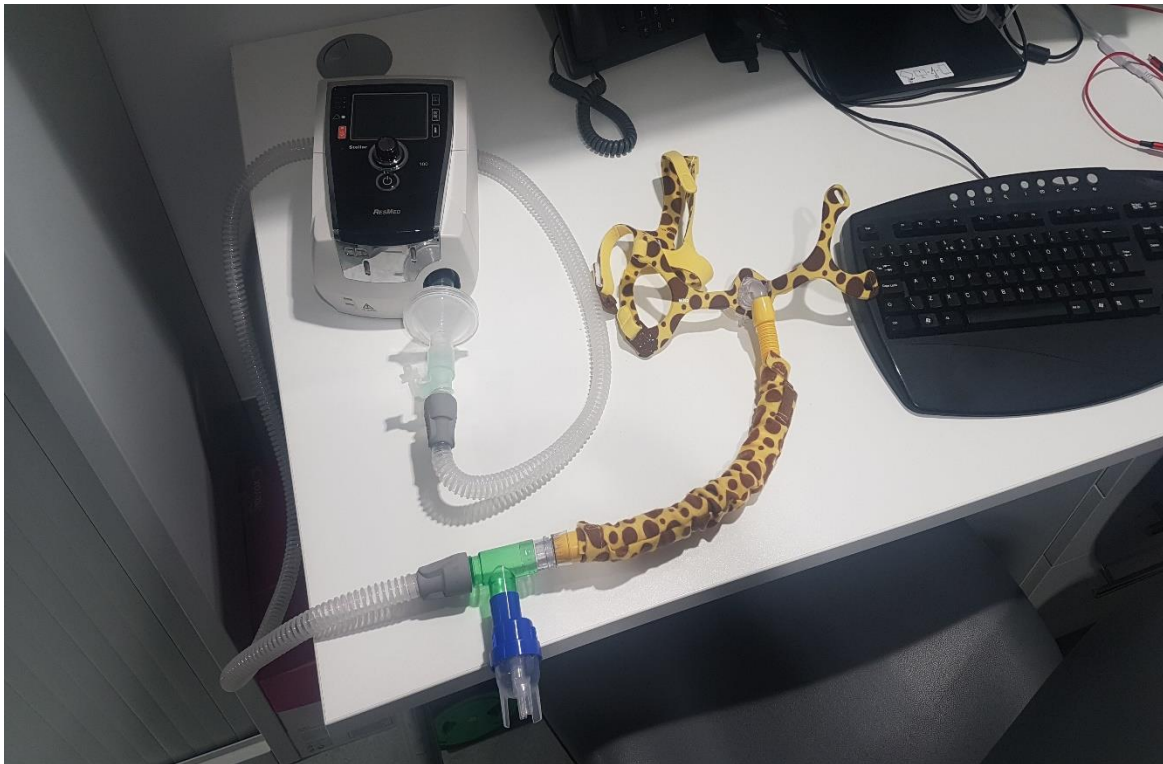
Mucolytics and saline for clearing secretions or antibiotic use for bacterial colonisation

We would not use nebulisers via an NIV circuit unless the patient was 24/7 dependant

Nebulisers are not as efficient via a NIV circuit as via a face mask and should be avoided if possible, they exhalation port on the mask can become blocked with saline and cause the non-vented mask alarm to sound. It is also not ideal as medication has been found inside the ventilators on children who have regular nebs.

How to set up a nebulisers in the NIV circuit

T-Piece via the NIV circuit should be attached at the patient end in between the mask and the tubing and should be help horizontal



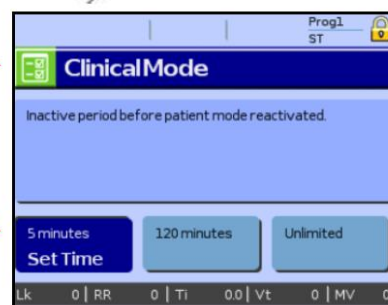
Unlocking the clinical settings menu to change pressure settings

This should be done under the guidance of a medic as ventilation pressure is a medical prescription

The Stellar 100

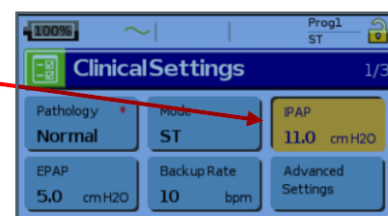
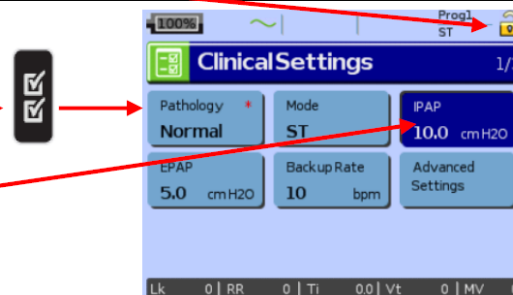
Unlock Settings – unlocks clinical menu and settings

- **Press and hold** navigation **dial & ticks** (settings) button
- **Keep holding** for several seconds
- **Release dial & ticks** button when Clinical Mode screen appears
- **Press dial** to unlock settings
- Unlocking for 5 minutes is recommended
- Stellar beeps twice to indicate settings unlocked
- Padlock open when settings unlocked



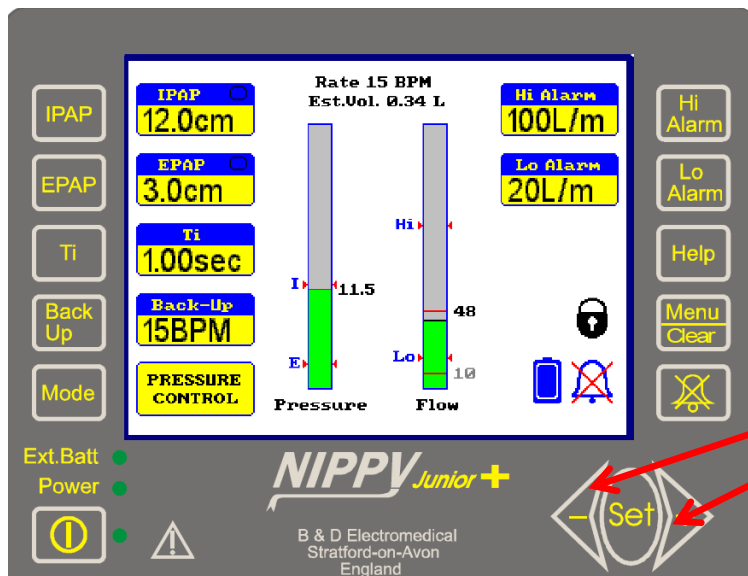
Change Settings

- **Press ticks** button
- Clinical Settings screen will appear
- **Turn dial** to highlight appropriate setting in dark blue
- **Press dial** to unlock highlighted setting
- Unlocked setting will turn orange
- **Turn dial** to change setting
- **Press dial** to lock in change
- **Repeat** for each setting change required



Re Lock by holding down the scroll dial and the 2 ticks button.

The NIPPY



While the ventilator is on. Hold the 2 buttons down together for 5 secs. The machine will alarm and the padlock will be unlocked.

Highlight the clinical settings that needs to be changed and use the same initial 2 buttons to increase or decrease as requested.

The Ventilator must be relocked once finished

The Airsense 10



While the ventilator is on. Hold the 2 buttons down together for 3 secs. The padlock on the display will appear unlocked.

Press the top of the scroll dial button. Once in settings menu scroll down to 'Set Pressure' and scroll up/down to the desired pressure.