**TRILOGY BiPAP machine set-up - Checklist**

**\*BiPAP device should be visually inspected and all settings**

**checked before connecting patient to BiPAP\***

Plug in (battery on charge). – KEEP ON CHARGE EVEN WHEN NOT IN USE.

Check O2 connection.

Switch on – check internal battery.

Connect **BiPAP hose**

(disposable adult passive circuit - REF 9624C)

Check **Bacterial Filter** attached

(attach to machine, furthest from patient)

Check **expiration port** present

(nearest to patient)

**Power Off :** Use the RIGHT button to select ‘Yes’

**‘100% Oxygen’:** This is to give a BOLUS of 100% Oxygen, this is not usually required to use for nurses using BiPAP on ward patients.

**‘Leak’:** Leak should be between 20-35L/min. A leak of <15L/min may mean the mask is unnecessarily tight, a leak of >50L/min may cause inefficient ventilation.

**Settings and Alarms:**

Confirm settings and alarms before connecting patient.

Select **MODIFY** to change settings

(The settings from the previous use will be saved unless the machine is ‘**Reset**’)

Under **MENU**.

Use DOWN button to highlight **SETTINGS AND ALARMS**.

Use the RIGHT button to select.

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| **Setting:** | **Initial value** | **Comments** |
| Dual Prescription | OFF | Dual Prescription allows separate day and night prescriptions for the patient, not used acutely. |
| Mode | S/T | Spontaneous and timed.  Display shows ‘Passive S/T’ |
| AVAPS | OFF | Average volume assured pressure support – not used for BiPAP. |
| IPAP | Start at 15 | Aim 20. Increase if pCO2 not falling. Increase by 2 up to max 30. |
| EPAP | start at 4 | Can increase - Senior review required. |
| Breath Rate | 10 | Only for backup breaths, if patient is not triggering. |
| Inspiratory time | e.g 1.5  (Minimum 1 sec) | Only for backup breaths, if patient is not triggering. |
| FiO2 | 21 – 100 %  As required | Aim target sats (usually 88-92%)  Start at venturi mask requirement prior to BiPAP starting (e.g. 35%) |
| Trigger Type | Auto-trak | Can be adjusted for complex patients, needs senior review. |
| Set Rise Time | 3 | Measured in 0.1 sec (i.e. 3 = 0.3 sec) |
| Ramp length | OFF - 45 min | Increases IPAP over time set, may improve compliance with BiPAP |
| Nebulizer enabled | OFF | Only *aeronebs* can be used with BiPAP but not currently available. |
| **Alarm:** | **Suggested value** | **Comments** |
| Circuit disconnect | 30 sec |  |
| Apnoea | 20 sec |  |
| Apnoea rate | 10-14 | Suggest half the patient’s pre-BiPAP respiratory rate |
| Low Vte (tidal volume) | 200 | Depends on patient ideal weight,  adjust accordingly |
| High Vte (tidal volume) | 800 | Depends on patient ideal weight,  adjust accordingly |
| Low minute volume | 4.0 | Minute volume = rate *x* tidal vol. |
| High minute volume | 14.0 | Minute volume = rate *x* tidal vol. |
| Low respiratory rate | 10-14 | Adjust accordingly |
| High respiratory rate | 40 | Adjust accordingly |

**Storage:**

Keep plugged in and on charge at all times, even when not in use.

The batteries will self-discharge if not plugged in even if the machine is not switched on.

The Trilogy BiPAP machine may be left plugged in to AC power without battery degradation.

The Battery may take up to 8 hours to fully charge once fully discharged.

Keep out of direct sunlight and do not store or use next to a heating appliance.

Do not block the cooling air vents located on the base and at the rear of the device.

**Cleaning:**

Do not steam autoclave the device. Do not immerse in liquid or allow liquid into the enclosed device or inlet filter. Do not spray water or other solutions directly onto the device. Do not use abrasive cleaners or harsh detergents.

Wipe clean with Clinell wipes between patients and when required during patient use.

There is a reusable foam inlet filter to protect the ventilator from dirt and dust.

This requires cleaning every week and replacing every 6 months and/or if damaged or visibly soiled.

**Other info:**

The machine and all attachments are **latex free**.

**Settings** may be completed without the machine starting by pressing and holding the ‘alarm silence’ button and the ‘down’ button for 5 seconds.

**Keypad lock:** this may be used for confused patients to prevent the settings from being altered. In most acute settings the keypad lock should not be required.

To lock the keypad, use **MENU**, select **OPTIONS** then select **KEYPAD LOCK** and **ON**.

To unlock the keypad temporarily hold the right button for 5 seconds.

To remove the keypad lock, use **MENU**, select **OPTIONS**, select **KEYPAD LOCK** and **OFF**.

**Troubleshooting:**

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| --- | --- |
| **Problem** | **Suggestions:** |
| **Persistently elevated**  **PaCO2** | Is there an excessive mask leak? Check mask fit.  Is the circuit set up correctly? Check connections and identify leaks.  Is there rebreathing? Check the expiratory port is patent.  Is the patient being over oxygenated?  Aim sats 88-92% .Especially consider the aim of oxygen therapy during period off NIV. Consider the acceptable level of PaO2 to be aimed for.  Consider increase in IPAP (max 30 unless senior review) – look at the Vte (tidal volume) this should be 6-8ml/kg ideal body weight.  Is the patient spending sufficient time on BiPAP? Encourage more sustained periods of use (particularly during sleep). Address compliance issues. Consider decrease in EPAP if high level set (>8cmH2O) |
| **Persistent Apnoea Alarm** | Check patient, is the patient breathing? Is the patient conscious? **CALL FOR HELP IF REQUIRED**  Check circuit connected.  Check mask fitting and leak.  Check trigger settings. (auto-Trak should be used.)  Check backup rate (breath rate) if this is too high it may be preventing the patient breaths from triggering. Consider reducing the set breath rate (minimum 10 unless senior review). |
| **Mask Leaks** | Small leaks (20-35L/min) are normal and acceptable but larger leaks (>50L/min) may cause inefficient ventilation, eye irritation, noise, dry mouth and nasal symptoms. Leaks <15L/min may mean the mask is too tight and may reduce compliance with BiPAP.  Be prepared to try different mask types  Use duoderm on nasal bridge for comfort and to protect skin against pressure damage.  Consider facial hair.  Consider position of NG tube |
| **Asynchrony between patient and ventilator** | Check correct tubing (disposable passive) is used in the circuit. The tubing should have a smooth interior to allow air flow to be detected accurately  If the patient’s respiratory effort is inadequate the machine may not sense inspiration. An increase in EPAP may help.  If the patient is very tachypnoeic increasing the IPAP may help: ensure rise time is as quick as possible (1). |
| **Keypad Lock**  **Keypad Lock continued.** | To lock the keypad, use **MENU**, select **OPTIONS** then select **KEYPAD LOCK** and **ON**.  To temporarily unlock the keypad on trilogy machine, hold the Right button for 5 seconds. An alarm noise indicates when the keypad is successfully unlocked.  The keypad will lock again after 30 seconds of inactivity.  To remove the keypad lock, use **MENU**, select **OPTIONS**, select **KEYPAD LOCK** and **OFF**. |
| **Hypocapnia / alkalosis** | Minute ventilation (MV) is too high. Reduce IPAP to reduce Tidal Volumes (Vte).  Is BIPAP still required? |
| **Difficulty inflating the chest** | Poor expansion of the chest and desaturation may be due to bronchospasm, mucous plugging, pneumothorax, atelectasis / collapse, consolidation, pulmonary oedema or rarely circuit tube obstruction/ kinking. **Clinical examination is required**. Chest X-ray may be required. |
| **Nasal problems** | Nasal redness / nasal bridge sores- Appropriate padding or change of mask may be necessary.  Rhinitis / nasal crusting / bleeding- Ask about nasal symptoms. |
| **Dry mouth** | Regular mouth care is essential; consider saline nebs during breaks from BiPAP.  Consider humidified circuit – requires a different circuit, contact ICU or CCOT. |
| **Gastric distension** | Check for abdominal pain or distension occurring during NIV  Try to reduce IPAP if possible  Consider nasogastric tube with a nasogastric tube guard accepting a small leak will occur. Small leaks should not cause a problem (20-35L/min)  Consider anti-emetics. |
| **Persistent hypoxaemia** | Check correct FiO2 setting on machine. If there is a definite OSA or atelectasis then increasing EPAP may help (remembering to increase IPAP by same level to maintain the same pressure support)  Deteriorating clinical condition in the presence of hypoxaemia should lead to an urgent review of the patient and consideration of intubation and mechanical ventilation. **CONTACT ITU** |
| **Patient position** | The patient should be positioned upright with their head up  Consider additional support if necessary (pillows, soft collar, rolled up towel) |
| **Patient discomfort / poor compliance with BiPAP**  **Patient discomfort / poor compliance with BiPAP continued.** | Consider using the **RAMP** when starting – this will gradually increase the IPAP and may make BiPAP more tolerable. (e.g. 20 mins ramp to achieve target IPAP).  Consider reducing the IPAP, if appropriate, discuss with senior nurse/doctor.  Consider loosening the mask, aim for leak 20-35L/min.  Allow regular comfort breaks, mouth care.  Reposition patient.  Consider mask size. Make sure the patient is properly fitted with the correct size mask. Use mask packaging to size patient. |
| **Non co-operation / aggressive behaviour** | Assess for patient agitation, confusion and not maintaining mask ventilation  This may be due to hypoxaemia or hypercapnia. Ensure constant supervision as it may be necessary to hold the mask in place initially until ABG’s have corrected themselves before the agitation / confused state settles. This may be lifesaving. Relatives may also be helpful to calm the patient.  **SEDATION MUST BE AVOIDED WITHOUT SENIOR MEDICAL OR ANAESTHETIC INPUT.**  Haloperidol may be useful to decrease agitation and facilitate tolerance of NIV therapy. Avoid benzodiazepines. |
| **IPAP not achieved** | If the measured IPAP is lower than the set IPAP by >0.5cmH2O (e.g. IPAP set at 18 but measured IPAP is showing as 17.4) consider changing the Rise Time to a lower setting. E.g. reducing from 3 to 2.  Allowing a faster flow during inspiration. |
| **Low Vte alarm** | Low estimated tidal volume, check alarm settings,  Aim Vte (ml) = 6 – 8 *x* ideal body weight (kg)  e.g. for 60kg ideal body weight, aim Vte 360-480ml.  Check leak.  Consider increasing IPAP (maximum 30 – unless senior review). Patients with OSA may tolerate higher IPAP. |
| **High Vte gged in and on charge at all times, even when not in use.alarm** | High estimated tidal volume, check alarm settings,  Aim Vte (ml) = 6 – 8 *x* ideal body weight (kg)  e.g. for 60kg ideal body weight, aim Vte 360-480ml.  Consider decreasing IPAP (minimum 15 – unless senior review). |
| **The Device does not turn on.** | Chest AC power cord is plugged in and internal battery is charged. Contact EME if the device still does not switch on.  *Note: The device requires AC power to charge the internal battery. Keep plugged in even when not in use.* |

For issues with the machine please contact ward manager and EME.

For clinical issues using BiPAP please contact:

**Respiratory SpR (**daytime)- RSCH bleep 8398 / 8060. PRH bleep 6048.

**Critical Care Outreach Team** - RSCH bleep 8495. PRH bleep 6331.

**Clinical Site Team** - RSCH bleep 8284. PRH bleep 6014.