PPLLTV

Paediatric Pan London Long Term Ventilation

Parent & Carer Competency Document for Invasive Ventilated CYP.

Trilogy 100 Guidance Notes

Name of CYP……..

Name of Parent/Carer……..

Version 1, 2021. To be reviewed 2023.

This document was compiled prior to the Field Safety Notice from Phillips Respironics in June 2021. Please contact your managing centre for additional guidance.

This competency document (2021) was developed by the Paediatric Pan London Long Term Ventilation Group (PPLLTV). The PPLLTV is a group of clinical nurse specialists and allied health professionals. The team are experts in the care of paediatric tracheostomy, tracheostomy long term ventilation and non-invasive ventilation and work within all the main London Specialist Paediatric Centers. The ethos of this approach is to enable the care giver to deliver safe, high-quality care against one common standard. This document has been devised to enable the assessment of the caregiver's competence to care for a child or young person (CYP) requiring tracheostomy for long-term ventilation on the Trilogy 100 and should be utilised in combination with the PPLLTV group invasive competencies document. The competencies are freely available for use by all, but practitioners should always refer to their local guidance if planning to use them in their own services

Its intended use is to guide those assessing the caregiver as well as act as a resource for the caregiver. The caregiver must demonstrate that they can undertake each relevant section and can consistently replicate each aspect of care, over a period of time, in a variety of contexts. When the caregiver feels confident and competent, they will sign each relevant section. Each section will be assessed and signed, by a qualified professional (assessor), once competency has been achieved.

The competency rating scale, adapted from Benner's Stages of Clinical Competence, enables the assessor to grade the caregiver's level of competence. The caregiver must demonstrate a minimum level of 'Achieved' in order to be deemed competent to care for the CYP without supervision.

The "achieved" box can only be signed by a healthcare worker governed by a regulatory body e.g., NMC, HCPC or GMC. Healthcare Assistants (HCA's) can deliver training and sign the observed/discussed with support boxes but must be countersigned by a healthcare worker governed by a regulatory body.

Final sign off needs to be completed by a senior staff member with clinical experience and competency in line with local policy. They should have either been aware of all the training done previously or as a minimum verbally go thought the competency book and then complete final sign off.

Observed /Discussed: Insight would be gained during the theoretical training

Performed/Discussed with support: Caregiver able to demonstrate/discuss the outlined skill with assistance

Achieved: Caregiver is able to demonstrate/discuss the outlined skilled independently

Caregiver sign: Caregiver to sign competency when they feel confident with the outlined skill

Comments: To discuss specific competencies

This document has been endorsed by:

PPLLTV
Paediatric Pan London Long Term Ventilation

North Thames Paediatric Network
Connecting paediatric services

South Thames Paediatric Network

This document was created by the PPLLTV group with specialists from: Central LTV team, Evelina London Children's Hospital, Great Ormond Street Hospital, King's College Hospital, Royal Brompton and Harefield Hospitals, Royal London Hospital, St George's University Hospital and The Children's Trust, Tadworth.

With special thanks to Jemma Bridger, LTV CNS Central LTV Team and the Evelina London Children's Hospital team.

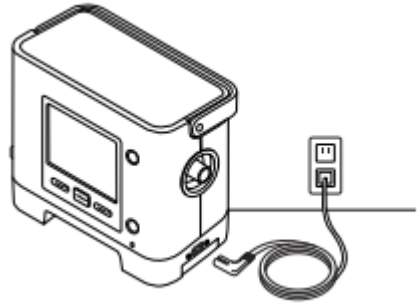
Performance criteria and knowledge required	Comments/Guidance
Understanding the CYP`s need for ventilation	
Aware of the need for ventilatory support.	Can describe why the CYP needs support from a ventilator. There are many reasons why a CYP requires support and can be due to: • Respiratory conditions e.g. Chronic Lung Disease, Interstitial Lung Disease, Pulmonary Bronchial Dysplasia. • Neuromuscular conditions e.g. Spinal Muscular Atrophy, Myotubular Myopathy. • Neurological conditions. • Cardiac conditions. • Specific airway issues e.g. Malacia. CYP needs ventilation due to (ADD SPECIFIC REASONS):
Able to describe in basic terms how the mode(s) of ventilation work. Mode: Pressures:	Please refer to ventilator specific guidance on the following pages for more information on specific ventilator modes.

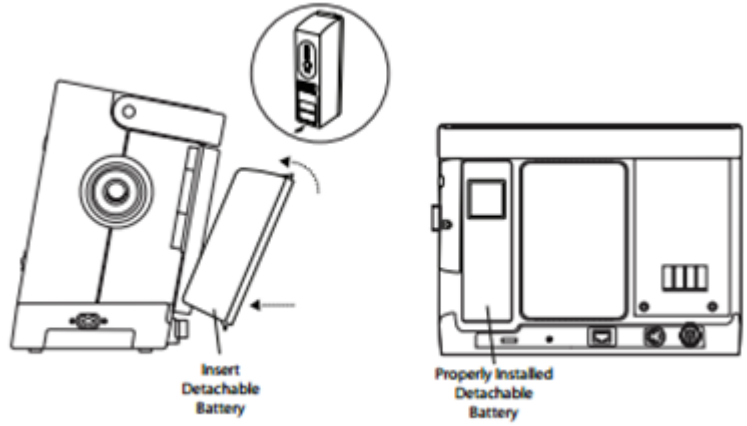
Performance criteria and knowledge required	Comments/Guidance
Understanding the CYP`s need for ventilation	
Identify the differences between CPAP and BIPAP (if applicable).	CPAP is Continuous Positive Airway Pressure. This mode provides a continuous flow of gas/air at a set pressure, sometimes called PEEP, into the CYP's airway and lungs to keep them open. The CYP has to be able to take all of their own breaths as this mode of ventilation does not provide breaths for them. CPAP helps to reduce the CYP's work and effort in breathing by holding the airways and lungs open. BIPAP is Bilevel (2 levels) Positive Airway Pressure. This mode provides a continuous flow of gas/air into the CYP's airways and lungs to keep them open, like CPAP but called EPAP (Expiratory Positive Airway Pressure). It also supports the CYP when they breathe in, by delivering a higher pressure, to help open their lungs called IPAP (Inspiratory Positive Airway Pressure). In BIPAP mode a back up rate can be set which means if the CYP's number of breaths per minute drop below this set "back up rate" the machine will give the CYP a breath. For some CYP's, if they have little or no respiratory effort, it may do all the work.

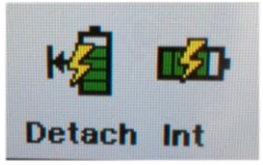
Performance criteria and knowledge required	Comments/Guidance
Understanding the CYP`s need for ventilation	
Description of ventilator dependence.	Can identify how dependent the CYP is on the ventilator. High: is able to breathe without support from the ventilator during the day, but needs support from the ventilator overnight. Could cope without support from the machine for up to 24hrs without harm. **For example: CYP is self-ventilating during the day but requires support from ventilator, at night, when asleep. The CYP can have time off the ventilator, but if left off the ventilator for too long the CYP will tire and their breathing become less effective.** Severe: requires ventilation, at night, due to poor respiratory function. CYP can breathe unaided if required. Can tolerate accidental disconnection, though it would cause the CYP to be unwell and may require hospital support. **For example: CYP is self-ventilating during the day, but requires support from ventilator, at night, when asleep. CYP can have time off the ventilator, but if left off the ventilator for too long the CYP will become unwell and may need hospital/medical support.** Priority: unable to breathe independently and requires full time support from the ventilator. **For example: CYP relies completely on the ventilator for their breathing. If CYP was off ventilator they would not breathe by themselves. There are instances for some CYP's that this is the case only when they sleep and during the day they can be off the ventilator but at night they are fully dependent on the ventilator (e.g. A CYP with Congenital Central Hypoventilation Syndrome).** *Reference: Department of Health (2016) National Framework for Children and Young People's Continuing Care.*

Performance criteria and knowledge required	Comments/Guidance
Understanding the CYP`s need for ventilation	
Able to check prescribed ventilator settings against the home ventilation plan and know when these should be checked.	Knows where the prescription is recorded and can locate the pressure settings on the ventilator screen (please see section on specific ventilator) These should be checked every day/shift and checked against the CYP's home ventilation plan/LTV summary. Should also be checked if any changes have been made e.g. following a visit to the CYP's managing centre or Children's Community Nursing team visiting.
Can discuss what should be done if the settings are different to the home ventilation plan.	If the settings differ to the home ventilation plan the caregiver needs to clarify the plan they have is the most up to date one. This could involve contacting the CYP's: • Tertiary centre who provides oversight of the CYP's ventilation needs. • Nursing Agency who provide CYP's package of care. • Continuing care team who manage the CYP within the community. • The centre responsible for the maintenance of the ventilator.

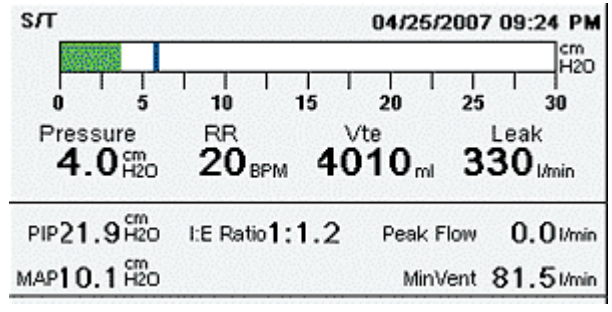
Performance criteria and knowledge required	Comments/Guidance
Ventilator Operation- Trilogy 100	
	Modes of ventilation on the Trilogy 100. There are 4 modes of ventilation that are frequently most used:- **CPAP**: This mode provides a continuous flow of gas/air into the CYP's airway and lungs to keep them open. The CYP has to be able to take all of their own breaths as this mode of ventilation does not provide breaths for them. CPAP helps to reduce the CYP's work and effort in breathing. **S/T (Spontaneous Timed)**: Bi-level support (IPAP & EPAP). CYP triggered (spontaneous) breaths are pressure supported with the length of breath set by the CYP. If the CYP fails to trigger a breath, a timed breath is delivered for a pre-set length. **PC (Pressure Control)** : Bi-level support (IPAP & EPAP). CYP triggered (assisted) and mandatory breaths are delivered to the same inspiratory pressure, and all have a fixed inspiratory time (or length of breath). **PC-SIMV (Pressure Control- Synchronised Intermittent Mandatory Ventilation)**: Bi-level support (inspiratory pressure and PEEP) This mode uses a "time window" –if the CYP doesn't trigger a breath a mandatory breath is given at the end of the window. If the CYP triggers a breath either assisted or spontaneous breaths are delivered.

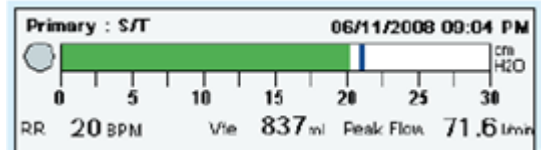
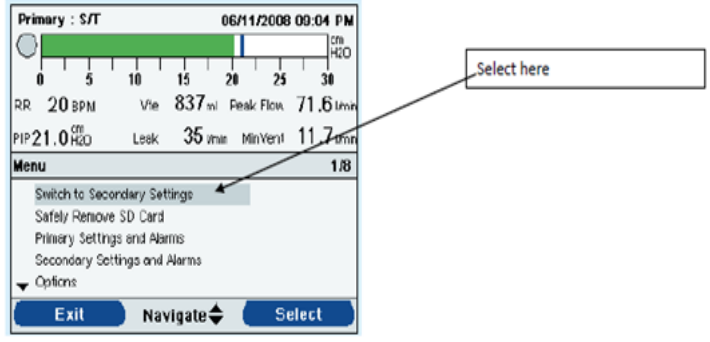
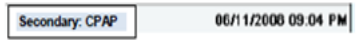
Performance criteria and knowledge required	Comments/Guidance
Ventilator Operation- Trilogy 100	
Able to connect ventilator to the main power supply.	The external power lead is plugged into the side of the device utilising a 2 pronged fitting which can then be plugged into a normal power socket. 
Able to turn the ventilator power on and off and determine if using mains or battery power.	Identifies the machine is plugged into mains power. As shown in picture the green light indictor will be visible 
Aware of length of battery life and what affects battery life. Aware if there is an internal and external battery.	Trilogy 100 has both an internal and detachable battery. When fully charged, which takes approximately 8 hours, the batteries will last approximately 4 hours depending on settings. On the screen you will see the below symbols for these. Battery / Symbol Internal Battery Detachable Battery External Battery

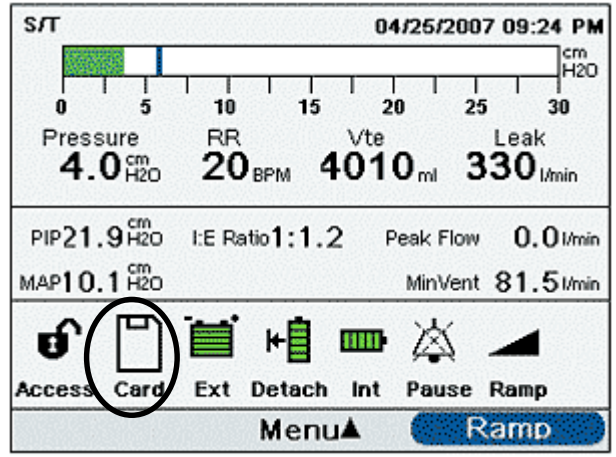
Performance criteria and knowledge required	Comments/Guidance
Ventilator Operation- Trilogy 100	
Aware of length of battery life and what affects battery life. Aware there is an internal and external battery.	 The detachable battery inserts as above. Whenever the ventilator is attached to the mains power the internal and detachable batteries will charge. The outside of the detachable battery has a set of LEDs that indicate the amount of charge left on the battery. **LED** / **Battery Capacity** All 5 LEDs are lit — 80-100% capacity 4 LEDs are lit — 60-79% capacity 3 LEDs are lit — 40-59% capacity 2 LEDs are lit — 20-39% capacity 1 LED is lit — 10-19% capacity 1 LED flashes — 1 to 9% capacity 0 LEDs are lit — 0% capacity 

<table>
<tr><th>Performance criteria and knowledge required</th><th>Comments/Guidance</th></tr>
<tr><td colspan="2">Ventilator Operation- Trilogy 100</td></tr>
<tr><td>Able to identify when the batteries need charging.</td><td>The following power indicators will be displayed on the monitoring screen to indicate the level of charge in the battery or batteries in use:
<table>
<tr><th>DC Power Indicator</th><th>Description</th></tr>
<tr><td>Battery In Use Indicator  </td><td>A black box will appear around the battery that is in use. For instance, if the external battery is currently in use, the  symbol appears on the Monitoring screen.</td></tr>
<tr><td>Green Fully Charged Battery Indicator</td><td>When a battery is charged to greater than 90% of its capacity, all of the bars in the battery symbol will appear in green.</td></tr>
<tr><td>Partially Charged Battery Indicator</td><td>When a battery is partially charged, some of the bars in the battery symbol will appear in green, while others will be clear. For instance, if the external battery is 50% charged, the following symbol displays on-screen:  </td></tr>
<tr><td>Yellow Low Battery Indicator (Medium Priority)</td><td>When the device detects that an in-use battery's charge is low (has approximately 20 minutes of charge left), the inside of the box surrounding the battery symbol turns yellow. (In addition to the battery indicator on the Monitoring screen, a medium priority alarm message will display indicating "Low Battery." See Chapter 6 for more information. The yellow indicator is for the last available battery source.</td></tr>
</table>
<table>
<tr><th>DC Power Indicator</th><th>Description</th></tr>
<tr><td>Red Low Battery Indicator</td><td>When the device detects that an in-use battery's charge is nearly depleted (has approximately 10 minutes of charge left), the inside of the box surrounding the battery symbol turns red. In addition to the battery indicator on the Monitoring screen, a high priority alarm message will display indicating "Low Battery." See Chapter 6 for more information. The red indicator is for the last available battery source.</td></tr>
<tr><td>Yellow Battery Recharging Symbol </td><td>Whenever AC power is applied to the device, the internal and detachable batteries will recharge as needed. If the internal battery is being recharged, the symbol displays. If the detachable battery is being recharged, the symbol displays.</td></tr>
</table>

</td></tr>
</table>

Performance criteria and knowledge required	Comments/Guidance
Ventilator Operation- Trilogy 100	
Able to identify the filters and explain their maintenance.	 Filter is a black sponge that should be washed weekly with a mild soap detergent. Ensure it is air dry before going back into the ventilator (This is done whilst the ventilator isn't in use). The filter is replaced with a new one every 3 months.
Able to demonstrate how to attach oxygen via the ventilator.	
Knows how to administer and measure oxygen via the ventilator, when required.	Oxygen is connected at the back of the machine using a connector. Attach tubing to connector and to your oxygen supply e.g., walled oxygen, cylinder or concentrator. There is no oxygen cell to measure % oxygen inside the Trilogy 100 therefore this must be measured at the oxygen supply in L/min e.g., flow meter or oxygen cylinder.

Performance criteria and knowledge required	Comments/Guidance
Ventilator Operation- Trilogy 100	
Can check the functioning of the ventilator prior to connecting the CYP.	**Pre-Use Checks:** -Check that the oxygen supply is connected, if using, or the port is intact if not using. - Check that the air-inlet filter (black sponge at the back) is clean and intact. - Check the machine is plugged into the mains, if near one, and charging light displayed. - Switch on. - Check the machine has flow out of the circuit and tubing is clean and intact. - Check the exhalation port/valve is in the circuit, is intact, not blocked and air can be felt coming out of the port/valve. - Check alarms are working (alarms should be checked when putting CYP on the ventilator or switching from a dry to wet circuit. See pages 17 and 18 for alarms). - Check that the SD card sign is showing on the ventilator screen. - Ensure that the internal battery is working, and the detachable battery is attached. I.e., indicted by 2 battery icons on the main screen - Check that the settings are correct to the Home Care Plan/ventilation plan. - If on humidified or wet circuit, check humidifier is switched on and water is in the chamber.
Able to check the ventilator is delivering pressure when connected.	 Can identify on the main screen pressure being delivered by the green bar moving back and forth. Followed by the pressure reading below it going to the pressures set for the CYP.

Performance criteria and knowledge required	Comments/Guidance
Ventilator Operation- Trilogy 100	
Can identify if a breath is CYP triggered or given by the ventilator (back up/mandatory breath).	If CYP triggered a breath, a green dot will appear on the ventilator screen. 
Able to change between programmes as per LTV plan (if applicable).	Can identify which programme the CYP is currently on e.g. Primary or secondary. Can switch between programmes by selecting:  It will look similar to below: 

Performance criteria and knowledge required	Comments/Guidance
Ventilator Operation- Trilogy 100	
Can identify where data can be downloaded from the ventilator e.g. USB port or SD card.	Can identify where the SD card is inserted into the ventilator as shown below:  Can identify SD is in place from the icon below being present on the screen: 

Performance criteria and knowledge required	Comments/Guidance	
Alarms- Trilogy 100		
Possible cause.	Possible alarm.	Actions..
Accidental decannulation i.e. tracheostomy has come out	Low minute ventilation Low inspiratory pressure Low expiratory pressure Circuit disconnection Apnoea	Assess CYP and immediately insert tracheostomy. If difficult, follow emergency algorithm.
Blockage or obstruction of tracheostomy tube	Low minute ventilation High minute ventilation High expiratory pressure High inspiratory pressure Low tidal volume Apnoea	Assess CYP and suction tracheostomy. Refer to escalation care plan.
Increased work of breathing	High minute ventilation High expiratory pressure High inspiratory pressure Low tidal volume Low minute ventilation Apnoea	If work of breathing is due to CYP being unwell refer to escalation plan. If work of breathing is due to CYP being excited, upset, crying, coughing, pain or discomfort. Monitor CYP and address issues if possible, e.g. reposition, administer pain relief.
Blocked/covered leak valve/port within the circuit	Low circuit leak alarm	Check leak valve/port within circuit to ensure not covered or blocked and correctly in place.

Performance criteria and knowledge required	Comments/Guidance	
Alarms- Trilogy 100		
Possible cause	Possible alarm	Actions
Disconnection within circuit	Low minute ventilation Low inspiratory pressure Low expiratory pressure Circuit disconnection Apnoea	Follow circuit from CYP through to ventilator to ensure everything is connected and correct where necessary.
Blockage within circuit	High minute ventilation High expiratory pressure High inspiratory pressure Low tidal volume Low minute ventilation Apnoea	Follow circuit from CYP through to ventilator to ensure everything there are no blockages or kinks within the circuit and correct where necessary. Water within the circuit, when on the humidified circuit, can act as a blockage.

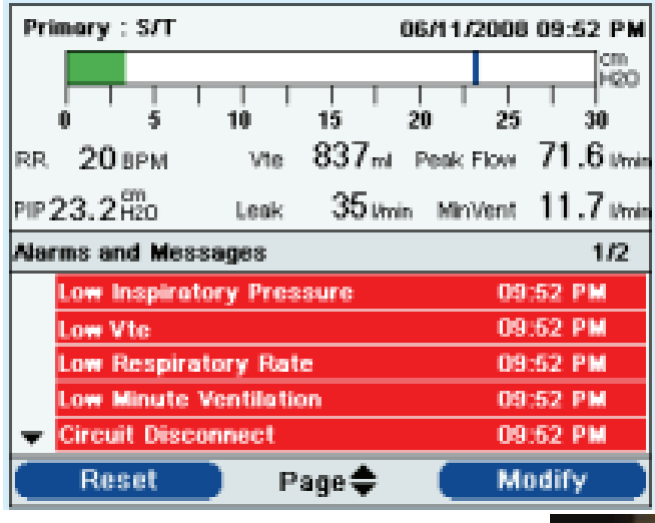
Minimum requirement in order to have this signed off:
Caregiver can identify that the machine may alarm due to a blockage or a leak.

For an alarm triggered by a blockage this could be due to: blocked tracheostomy tube, secretions/ water in the circuit, bent/ crushed circuit, covered/ blocked exhalation port, CYP has stopped breathing etc.

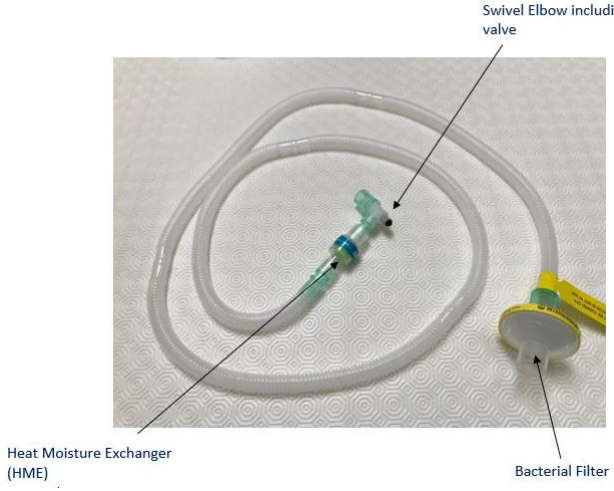
For an alarm triggered by a leak this could be circuit disconnection, leak around tracheostomy, hole in circuit etc.
They should check from the CYP back to the ventilator for any issues.

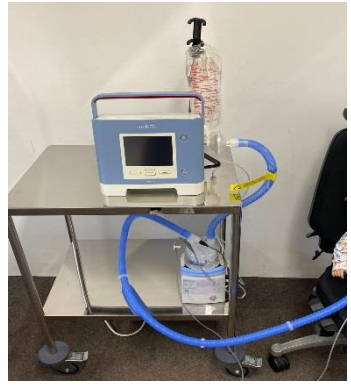
NB: Alarms will be set specific to CYP and this will be discussed with you.

Performance criteria and knowledge required	Comments/Guidance
Alarms- Trilogy 100	
Can describe the level of importance of alarms e.g. an information alarm or a warning alarm.	There are 3 alarm priorities: • **High Priority:** Requires immediate response, the alarm mute button will flash red, and the screen message will appear red. • **Medium Priority:** Requires prompt response, the alarm mute button will flash yellow, and the screen message will appear yellow. • **Low Priority:** An information alarm, a solid grey light appears on the alarm mute button and the screen message also appears yellow.

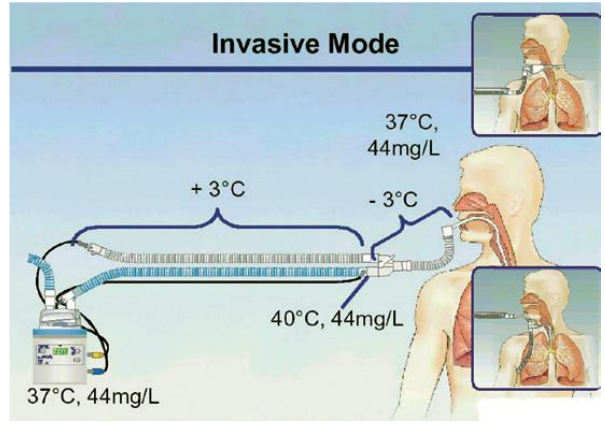


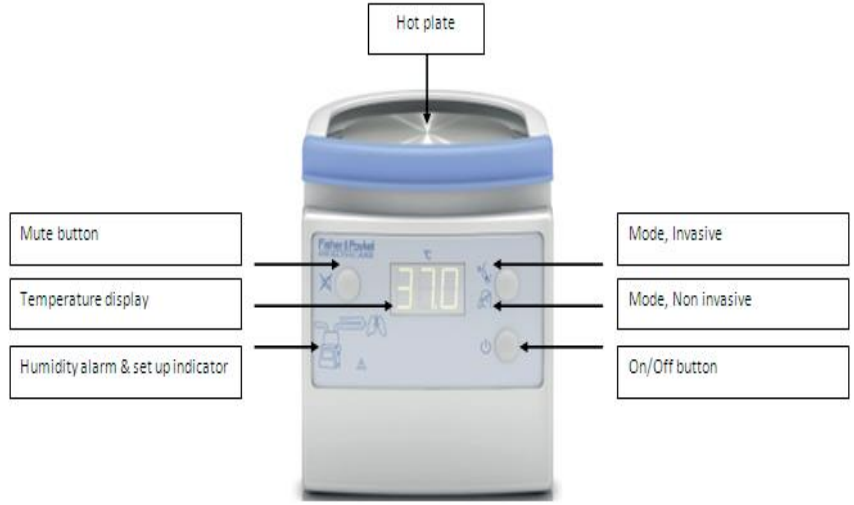
Performance criteria and knowledge required	Comments/Guidance
Alarms- Trilogy 100	
Can discuss likely causes of alarm and how to respond appropriately.	Link to previous alarm table on pages 17 and 18.
Demonstrate how to check the alarms are working and how often to do this.	Alarm check should include checking to see if the correct alarms are triggered for: • A disconnection: When tubing is first disconnected check that circuit disconnection and/or low minute ventilation alarm and/or apnoea alarm is triggered. • A blockage: Occlude the circuit whilst the ventilator is running to check high minute ventilation alarm followed by low minute ventilation alarm and/or apnoea alarm. • Intermittent occlusion of the tracheostomy connection to mimic high respiratory rate which will set off the high minute ventilation alarm. • A blocked expiratory/exhalation port: Keep circuit occluded and cover over the port and check low circuit leak alarm is triggered. This should be done before CYP is placed onto the ventilator and when you take over the care of the CYP. If the CYP is on the ventilator 24hrs a day these checks can been done when cares are required e.g. CYP need suctioning or undertaken on the spare ventilator.
Aware of the mute button, how long this silences the alarm for and the risks if the alarm was left muted.	 The mute button (shown left) when pressed, will silence the alarms for 60 seconds. You will still be able to see the visual alarm on the screen. Always reset the alarm once cause is established and remedied by pressing the reset button If the mute button is left on and the screen of the ventilator is not easily seen e.g. person has back to ventilator they will not have the audible warning of an alarm.
Aware of what to do if you cannot find the cause of an alarm and who to contact.	Ensure the CYP is safe (try suctioning of tracheostomy to ensure patency) and change to spare ventilator if necessary. Try changing the ventilator circuit. Call for support from parent and/or ventilator technical support or the CYP's clinical team.

Performance criteria and knowledge required	Comments/Guidance
Circuits- Trilogy 100	
Able to describe which circuit is in use.	Can clearly identify which circuit the CYP is currently on. Please note circuit type here:
Understand the purpose of the various parts of the circuits. NB: Picture is to demonstrate the parts and may not be the circuit the CYP is using.  	This should include: • Bacterial filter attached directly to the ventilator, which filters the air delivered to the CYP and protects the ventilator from becoming contaminated. Can state how often this should be changed. • Exhalation/expiratory port/valve is where the CYP exhales their carbon dioxide. • Understands the importance of having the exhalation port within the circuit and for it to remain uncovered and unblocked. If this is missing or blocked the CYP CANNOT exhale their carbon dioxide levels. This is very dangerous and can cause life threatening events to occur.
Awareness of differences in circuits.	Two main circuits in use are: • Humidified circuit/WET circuit which is attached from the ventilator to the CYP via a humidifier. This is to be used overnight when CYP is asleep and during the day as required. When on the wet circuit it is not advised to move CYP, due to the risk of water from the humidifier entering the CYP's tracheostomy or into the ventilator itself. A wet circuit can only be mains operated, as there is a heater wire within the circuit. • A dry circuit with HME is attached from ventilator directly to the CYP. Humidification is provided via the HME in the circuit. This is to be used as tolerated by the CYP and it is used in various ways from CYP to CYP. Whilst on this circuit the CYP can be moved easily and safely. HME should be used for transportation. See the home ventilation care plan for the HME dry circuit time plan.

Performance criteria and knowledge required	Comments/Guidance
Circuits- Trilogy 100	
Able to assemble and attach a new circuit onto the ventilator- WET Circuit. NB. These are one example of the circuits available and may not be the one the CYP is using.	 22mm circuit show above  15mm circuit shown above
Able to assemble and attach a new circuit onto the ventilator- DRY circuit. NB. These are one example of the circuits available and may not be the one the CYP is using.	 22mm circuit shown above  15mm circuit shown above

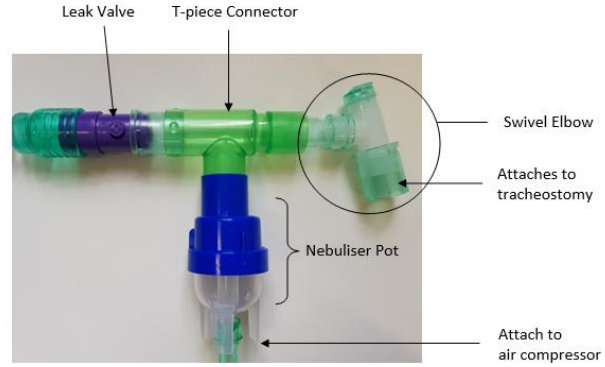
Performance criteria and knowledge required	Comments/Guidance
Circuits- Trilogy 100	
Circuit calibration (learn circuits) and when these should be performed (if applicable)	Not applicable. A circuit calibration is unable to be performed on a Trilogy 100 ventilator and is not required.
Aware of frequency of ventilation circuit changes and any individual parts.	Circuit tubing for the ventilators should be changed weekly or as per local/tertiary clinician guidance. The bacterial filter should be changed weekly unless indicated. The HME in the dry circuit should be changed daily. Awareness of who provides the circuits when the CYP is discharged e.g. is it the community nursing team or continuing care team.

Performance criteria and knowledge required	Comments/Guidance
Humidification	
Understands the need for humidification for a ventilated CYP.	Can identify the need for artificial humidification: •Upper airway performs an important role in warming and humidifying inspired air. •Having a tracheostomy bypasses these normal warming and humidifying mechanisms. •The CYP may require oxygen which is a dry gas. •During illness, with high temperatures secretions may become thicker and more copious. Can verbalise the potential consequences of poor humidification: • Increased risk of tracheostomy blockage. •Risk of infection, damage and lung collapse. •Increasing viscosity (thickness) of secretions.
Can identify different humidification devices.	Humidification can be achieved on the ventilator either by: •Humidified circuit or WET circuit which is attached from the ventilator to the CYP via a humidifier. The heated humidification systems have a plastic container filled with sterile water which is heated to a constant temperature. This constant temperature enables the air to be warmed and maximises the amount of water vapour in the air (moisture) and provides very efficient humidification. 

Performance criteria and knowledge required	Comments/Guidance
Humidification	
Can identify different humidification devices.	 Hot Plate heats the plastic container full of water to around 37◦c and will reach around 40◦c at the end of the circuit. The temperature then drops by 3◦c, so when it reaches the CYP airway, it is normal body temperature. PLEASE BE AWARE THE HUMIDIFIER USED AT HOME MAYBE A DIFFERENT MODEL TO ONE SHOWN ABOVE. PLEASE REFER TO HUMIDIFIER USER MANUAL FOR SPECIFICS. • HME or dry circuit which is attached from ventilator directly to the CYP. Humidification is provided via the HME in the circuit. They consist of multiple layers of water repellent paper or foam membranes which trap heat and moisture from the exhaled breath. Two examples of HME used are: Portex 600 on the left and Intersurgical on the right.  

Performance criteria and knowledge required	Comments/Guidance
Humidification	
Understand the importance of humidifier positioning.	Humidifier needs to be placed either in line or below the CYP. If humidifier is placed above the CYP there is a risk of water entering the tubing and being drawn to the CYP and their tracheostomy due to gravity. 
Able to troubleshoot common problems regarding circuit. i.e., rain out, temperature and fan directly blowing on the circuit.	Humidifier is affected by the temperature of the room and will always keep the temperature of the humidifier constant to provide that constant warmed air (around 37c) to the CYP. If the room is hot and air conditioning or a fan is utilised to cool the air around the humidifier, the air within the circuit tubing will cool. The humidifier will detect this change in temperature and will increase the temperature of the hot plate, to keep the air going to the CYP at that constant temperature. This results in the air within the circuit becoming warmer than the air outside so that air starts to cool, condense and water is formed. We call this rain out. To manage this do not place a fan or air conditioning unit directly on the humidifier. Try to cool the room evenly. Equally, if the room is cold and the air within the tubing is warmer than the room, it will follow the same process and rain out will form. Try to keep the environment at a constant temperature and avoid having the humidifier by any drafts or heat supply such as a radiator. The heater wires that connect to the ventilator circuit and to the humidifier have a short shelf life and need replacing every 12 months or so.

Performance criteria and knowledge required	Comments/Guidance
Humidification	
Able to troubleshoot common problems regarding circuit. i.e., rain out, temperature and fan directly blowing on the circuit.	Awareness of how often the water for the humidified circuit should be changed and where these are sourced. Please refer to local policy.

Performance criteria and knowledge required	Comments/Guidance
Nebulisers	
Demonstrate an understanding of the reasons for delivering medication via a nebuliser.	A CYP may require a nebuliser for many reasons. Some of these could be: • It is a medication that helps to loosen the secretions either when the CYP requires it or as part of a regular regime for the CYP. • The nebulisers may be required to loosen secretions e.g. if the secretions have become thicker and difficult to remove from the tube. Nebulisers can also be given when the CYP is on the HME/dry circuit either before/after/during to provide extra humidification. • Nebulised antibiotics to treat an infection the CYP has e.g. Colomycin.
Able to safely set up and administer a nebuliser [N.B May require specific training on the equipment used in the home by community/agency]. Demonstration completed on: (name of equipment)……	Jet Stream nebuliser positioning:  Aerogen nebuliser positioning on wet circuit:  Aerogen nebuliser positioning on a dry circuit:  NB: Aerogen nebuliser placement on the dry circuit can also involve removing the HME but it MUST be replaced after nebuliser is complete.

Performance criteria and knowledge required	Comments/Guidance
Nebulisers	
Observe CYP during nebuliser and can identify any changes.	Changes that can occur when a nebuliser is given are (list not exhaustive): • CYP may cough and need more frequent suctioning. • If the CYP's cough becomes continuous this should be closely monitored as maybe a sign the CYP is not tolerating the nebuliser. • CYP oxygen saturations may change outside their normal limits and again this should be monitored. • CYP may become wheezy/desaturate and may require a salbutamol nebuliser/inhaler/review by parent/clinician.
Observe CYP and monitor the effectiveness post nebuliser.	This is to observe if the nebuliser has been effective e.g. if given to help loosen the secretions to make it easier to remove them from the tracheostomy tube has this been achieved.

Performance criteria and knowledge required	Comments/Guidance
Nebulisers	
Aware of how to remove nebuliser and clean equipment and how frequently to change consumables.	Refer to local policy. Aerogen: Refer to manufacturing policy. Jet nebuliser: All parts washed with warm soapy water after each use.
Aware of the effect of nebulisers in circuits and how this can trigger alarms.	The jet stream nebuliser/compressor driven nebuliser will trigger alarms on the ventilator due to the additional flow of air/oxygen being used to push the nebuliser through. The ventilator will see this additional flow of air as a hindrance and will alarm. Please refer to ventilator section as to which alarm it will trigger. On the Trilogy there is a nebuliser enabled functionality. Select this when delivering a jet nebuliser to minimise the low circuit leak alarm. This will be active for 20 minutes. Once nebuliser is completed, press the nebuliser button again to disable the function and the alarms will return to normal. Check with local guidance as to whether this functionality is to be utilised. The Aerogen nebuliser does not require extra air or oxygen and uses mesh vibrating technology. This nebuliser device does not create any additional alarms when running in the ventilator circuit. (Ensure close supervision during nebulisation.)

Performance criteria and knowledge required	Comments/Guidance
Oxygen and CYP monitoring	
Demonstrate how to correctly place a saturation probe.	Can demonstrate: • How to correctly place a saturation probe. • How frequently the probe site should be moved. • How skin temperature, e.g., cold extremities, can have an affect on the reading of the saturation probe.
Demonstrate an awareness of expected oxygen saturation levels for CYP.	Can state the CYP's expected oxygen saturation level. Can identify which number relates to oxygen saturation level and which number is the heart rate and where to record this, if applicable. Can set the parameters and alarms on the oxygen saturation monitor (if applicable).
Knowledge of current oxygen requirement.	Can identify CYP's current oxygen requirement and how that is given e.g. by walled oxygen, concentrator or oxygen cylinder. Awareness of who provides that oxygen when in the home/community environment. Caregiver should have completed/be aware of the PPLOG (Paediatric Pan London Oxygen Group) competencies or other local oxygen competencies.
Discuss the steps to be taken if the oxygen saturations are low/poor trace.	Knows the steps to be taken if the oxygen saturations of the CYP are low/poor trace. For example: Is this due to movement of the CYP? Is the CYP's circulation poor so the probe is struggling to work. Is the probe flashing and indicating that it may need replacing?

Performance criteria and knowledge required	Comments/Guidance
Emergency management	
Able to describe signs of distress or changes in clinical condition outside the CYP's normal parameters. A, B, C, D approach.	It is important to assess the CYP as well as any monitoring available. Knowing what is normal for the CYP will be vital in identifying if there is any change in their condition. Assessment should be structured and must include: •Checking the tracheostomy is in situ and that the tracheostomy is patent. Are there any secretions? Can they be easily removed? Is the tracheostomy tube clear? •Observation of breathing (to include chest movement, respiratory rate, effort and oxygen saturations). **Examples of distress could be breathing faster and harder than their normal, obvious movement and possible sucking in of chest and stomach when breathing, oxygen saturations lower than normal.** •Observation of circulation (to include colour and temperature). **Examples of distress could be paler than normal, sweating or flushed, heart rate higher or lower than normal.** •Observation of the CYP's responsiveness/neurology compared to their normal. **Example of distress could be: CYP is upset, more or less responsive to their environment and people around them.**
Describe action to be taken if CYP is in respiratory distress.	Each CYP will be different but this could include: • Suction, tracheostomy tube change, reposition, nebulisers. • Placing onto ventilator if having time off the ventilator. • Changing from HME dry circuit to humidified wet circuit. • Following escalation plan identified below if CYP is unwell and needs to be moved on to unwell programme. • If not on a saturation monitor, then place one on. • Administering oxygen as per CYP escalation plan.
Awareness of escalation process on the CYP's specific care plan.	Each CYP will have a care plan that will identify what steps to be taken when the CYP becomes unwell. Knowing where this care plan is and how to follow it and what to do if it is out of date.
Know who to contact in an emergency and where the contact information is recorded.	Give examples of when appropriate to call: •999 e.g., unable to pass tube and needs emergency help. •GP e.g., CYP is unwell and concerns regarding temperatures or normal childhood illnesses. •CCN team e.g., first line point of call for concerns regarding changes in tracheostomy secretions. •Ventilator service provider e.g., if having ongoing issues with ventilator having followed troubleshooting guidance.

Performance criteria and knowledge required	Comments/Guidance
Travel and Transport	
Identify all equipment needed.	All equipment should be checked prior to any travel to ensure it is correct for CYP and it is fully charged. Equipment may include (list not exhaustive): • Ventilator CYP is on (if 24hrs dependent a spare ventilator should be with CYP at all times). • Detachable battery for ventilator and/or ways to charge the ventilator when out. • Spare ventilator circuit. • Bag Valve Mask (in case of ventilator failure). • Tracheostomy emergency box and equipment. • Oxygen, if applicable. • Oxygen saturation monitor, if applicable. • Nebuliser (portable). • Home ventilation care plan.

Performance criteria and knowledge required	Comments/Guidance
Travel and Transport	
Demonstrate taking the CYP out on a trip, using their buggy or wheelchair, safely securing all equipment.	It is likely that a CYP is going to need to move from one department to another in a hospital/healthcare setting during their stay. Once out of hospital, the CYP will be leaving the home environment to access normal daily activities such as shopping, play, leisure and school . **The key to keeping the CYP safe is Be Prepared**! **B**e appropriately trained and confident to provide all aspects of CYPs care. **E**nvironment - Think about the place CYP is going to. What facilities are there that you could make use of? Mains power, easy access, extra space, lifts, familiarity, other trained adults? What potential risks are associated? How could these risks be managed? • Beach- sand that could enter the tracheostomy tube. • Relative/friend house with open fires and use of oxygen. • Outpatients appointment and transport: space to respond to an emergency? • Out for a walk and lack of additional power supply. • Cinema is dark, do you need to take a torch. **P**ack your bags carefully and sensibly- all essential equipment and supplies must be easily accessible. **R**e- think travel/journey/activity if CYP unwell/unstable. **E**mergency equipment must be checked pre- journey, appropriately charged and easily accessible. **P**repare for emergencies–understand action to take for clinical emergencies, escalation plans, equipment failure, fire evacuation, car breakdown etc. Have you got back up if required or if you become unable to care for CYP? **A**lternative power sources/equipment in the event of failure: back up batteries, car chargers, back up equipment/manual suction machine. Always remember to take the mains lead. **R**e-stock and re charge your equipment when you return. **E**nsure you take sufficient supplies e.g. suction catheters, oxygen, nebuliser solution, external batteries for ventilator. **D**riving. Consideration to what you would do if the CYP needs attention and planning ahead for that e.g. use of mirrors to have a clear view of CYP at all times. Knowing your route so, if needed, you can safely get off the road to provide care. Having another person in the car who is able to provide that attention. Consider what you would do if your vehicle broke down. Securing equipment in the car.

Performance criteria and knowledge required	Comments/Guidance
Travel and Transport	
Calculate required amount of oxygen for the duration of the outing.	BOC Medical Cylinder data chart: Cylinder code=capacity in litres (L): AZ 170 C 170 D 340 CD 460 E 680 J 6800 Can calculate how much oxygen is required using the formula: (Journey time X prescribed O2 requirement = Total amount needed for journey). Double the amount for safety. For example, If the CYP is on 2L/min O2 and is going out for one hour (60mins) they will need 120L of oxygen. Double this to 240L to cover you in the event of an emergency. For more information on oxygen see the PPLOG oxygen leaflet.
Safely unpacking and recharging all equipment following return from outing.	Understanding of the importance of charging equipment following an outing to ensure equipment is ready for use and has charge to be able to perform.