

Parent & Carer
Competency Document
for Invasive Ventilated
CYP
**Astral 100/150
Guidance Notes**



PPLTV

Paediatric Pan London Long Term Ventilation



Name of CYP.....

Name of Parent/Carer.....

This competency document (2021) was developed by the Paediatric Pan London Long Term Ventilation Group (PPLTV). The PPLTV 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 Astral 100/150 and should be utilised in combination with the PPLTV 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 through 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 skill 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:




This document was created by the PPLTV 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 Emilie Maughan, Wellchild LTV CNS GOSH.


Performance criteria and knowledge required	Comments/Guidance
Understanding the CYP's need for ventilation	
Identify the differences between CPAP and BIPAP (if applicable).	<p>CPAP is Continuous Positive Airway Pressure.</p> <p>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.</p> <p>The CYP has to be able to take all of their own breaths as this mode of ventilation does not provide breaths for them.</p> <p>CPAP helps to reduce the CYP's work and effort in breathing by holding the airways and lungs open.</p> <p>BIPAP is Bilevel (2 levels) Positive Airway Pressure.</p> <p>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).</p> <p>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.</p>

Performance criteria and knowledge required	Comments/Guidance
Understanding the CYP`s need for ventilation	
<p>Description of ventilator dependence.</p>	<p>Can identify the how dependent the CYP is on the ventilator.</p> <p><u>High</u>: 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.</p> <p>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.</p> <p><u>Severe</u>: 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.</p> <p>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.</p> <p><u>Priority</u>: unable to breathe independently and requires full time support from the ventilator.</p> <p>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).</p> <p><i>Reference: Department of Health (2016) National Framework for Children and Young People`s Continuing Care.</i></p>

Performance criteria and knowledge required	Comments/Guidance
Understanding the CYP`s need for ventilation	
<p>Able to check prescribed ventilator settings against the home ventilation plan and know when these should be checked.</p>	<p>Knows where there prescription is recorded and can locate the pressure settings on the ventilator screen (please see section on specific ventilator).</p> <p>These should be checked every day/shift and checked against the CYP`s home ventilation plan/LTV summary. The ventilator should also be checked if any changes have been made e.g. following a visit to the CYP`s managing centre or CCN team visiting.</p>
<p>Can discuss what should be done if the settings are different to the home ventilation plan.</p>	<p>If the settings differ to the home ventilation plan the caregiver need to clarify the plan they have is the most up to date one.</p> <p>This could involve contacting the CYP`s:</p> <ul style="list-style-type: none"> • 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.


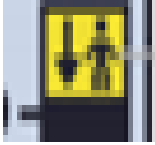
Performance criteria and knowledge required	Comments/Guidance
Ventilator Operation- Astral 100/150	
	<p>Modes of ventilation on the Astral 100/150.</p> <p>There are 3 modes of ventilation that are frequently most used:-</p> <p>CPAP - This mode provides a continuous flow of gas/air into the CYP's airway and lungs to keep them open.</p> <p>The CYP has to be able to take all of their own breaths as this mode of ventilation does not provide breaths for them.</p> <p>CPAP helps to reduce the CYPs work and effort in breathing.</p> <p>(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 timed breath is delivered for a pre-set length.</p> <p>P(A)C (Pressure Assist Control)–Bi-level support (IPAP & EPAP). Mandatory, pressure-controlled breaths are delivered. Each breath is controlled to the set pressures (EPAP and IPAP) and the length of the in-breath is also controlled to a set length e.g., 1 second. A Respiratory or breathing rate is set and the ventilator will deliver this many breaths every minute. The CYP can either trigger or initiate the breath to be given. If the CYP fails to trigger a breath after a certain amount of time (determined by the set respiratory rate), the ventilator will deliver the breath.</p>


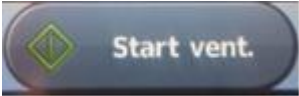

Performance criteria and knowledge required	Comments/Guidance
Ventilator Operation- Astral 100/150	
Able to connect ventilator to the main power supply.	<p>The external power lead is plugged into the back of the device utilising a specific fitting for the Astral device which can then be plugged into a normal power socket.</p>  
Able to turn the ventilator power on and off and determine if using mains or battery power.	<p>Pressing green button on the back on the machine which will put machine into standby mode.</p> <p>These indicators on the front of the ventilator show you which power source the ventilators is utilising.</p> <p>Power source indicators</p> <ul style="list-style-type: none">   AC (mains power supply)   DC (external battery or car accessory adapter)   Internal battery 

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Aware of length of battery life and what affects battery life. Aware if there is an internal and external battery.	<p>Following a Field Safety Notice 1706001 MHRA released for the Astral ventilator (July 2017), concerning the Astral power supply, their current recommendations are that the internal battery is NOT intended to serve as a primary power source. It should only be used when other sources are not available, or briefly, when necessary. For example: when changing power sources.</p> <p>There will be slight variations in the battery life dependent on the individual CYP's ventilator parameters and the CYP's respiratory pattern. Please observe the internal battery indicator carefully.</p> <p>The external battery cannot be charged from your main power. This can be used and recharged while connected to the Astral device.</p>																												
Able to identify when the batteries need charging.	<p>The internal battery should be replaced every two years, or when there is a noticeable reduction in usage time when fully charged.</p> <p>For the external battery press on the circle icon to power on and check battery life. The green lights indicate the level of charge in the battery or batteries in use:</p> <div style="display: flex; justify-content: space-around; align-items: center;">  <table border="1" data-bbox="1441 876 1798 1191"> <thead> <tr> <th colspan="2">On/Level Check button</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">○</td> <td>Press to power on battery or check battery level</td> </tr> <tr> <th colspan="2">DC on/off LED</th> </tr> <tr> <td style="text-align: center;">■</td> <td>Constant blue Battery turned on</td> </tr> <tr> <th colspan="2">Charging LEDs</th> </tr> <tr> <td style="text-align: center;">✳</td> <td>Flashing green Charging</td> </tr> <tr> <td style="text-align: center;">■</td> <td>Constant green Fully charged</td> </tr> <tr> <th colspan="2">Level Check LEDs</th> </tr> <tr> <td style="text-align: center;">■ ■ ■ ■</td> <td>Four green continuous Greater than 90% (approximate)</td> </tr> <tr> <td style="text-align: center;">■ ■ ■</td> <td>Three green continuous 65% to 90% (approximate)</td> </tr> <tr> <td style="text-align: center;">■ ■</td> <td>Two green continuous 40% to 65% (approximate)</td> </tr> <tr> <td style="text-align: center;">■</td> <td>One green continuous 10% to 40% (approximate)</td> </tr> <tr> <td style="text-align: center;">✳</td> <td>One green flashing Less than 10%</td> </tr> <tr> <td style="text-align: center;">✳</td> <td>One amber flashing Less than 5%</td> </tr> </tbody> </table> </div>	On/Level Check button		○	Press to power on battery or check battery level	DC on/off LED		■	Constant blue Battery turned on	Charging LEDs		✳	Flashing green Charging	■	Constant green Fully charged	Level Check LEDs		■ ■ ■ ■	Four green continuous Greater than 90% (approximate)	■ ■ ■	Three green continuous 65% to 90% (approximate)	■ ■	Two green continuous 40% to 65% (approximate)	■	One green continuous 10% to 40% (approximate)	✳	One green flashing Less than 10%	✳	One amber flashing Less than 5%
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Ventilator Operation- Astral 100/150	
Able to identify the filters and explain their maintenance.	<div data-bbox="1104 322 1453 662" data-label="Image"> </div> <p data-bbox="628 681 1473 712">Check weekly and change as required. They can be used for up to one month.</p>
Able to demonstrate how to attach oxygen via the ventilator.	<div data-bbox="856 833 1316 1135" data-label="Image"> </div> <div data-bbox="1453 851 1816 1087" data-label="Image"> </div> <p data-bbox="628 1195 1761 1291">Oxygen is connected via the back of the machine. When oxygen is not required, the oxygen port should be removed and not left in the back of the ventilator with no tubing attached as dust can enter the machine. This can cause damage and it is an increased infection risk.</p>











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Ventilator Operation- Astral 100/150																																									
<p>Knows how to administer and measure oxygen via the ventilator, when required</p>	<p>Oxygen is connected via the back of the machine using an oxygen connector/port. Attach tubing to this to your oxygen supply e.g., walled oxygen, cylinder or concentrator.</p> <p>Monitoring screen will indicate oxygen percentage given via the machine.</p> <div data-bbox="1205 417 1705 843" data-label="Image"> <table border="1" data-bbox="1292 526 1665 787"> <tr> <td>Pressure</td> <td>3.1</td> <td>Mve</td> <td>7.3</td> <td>Resp. rate</td> <td>15</td> <td>FiO2</td> <td>30</td> </tr> <tr> <td>PIP</td> <td>25.1</td> <td>Mve</td> <td>7.4</td> <td>TI</td> <td>1.00</td> <td>SpO2</td> <td>98</td> </tr> <tr> <td>Avg. P</td> <td>8.3</td> <td>Vte</td> <td>495</td> <td>IR</td> <td>1:3.0</td> <td>Pulse rate</td> <td>72</td> </tr> <tr> <td>PEEP</td> <td>3.1</td> <td>Vt</td> <td>501</td> <td>% Spont</td> <td>0</td> <td>FiO2</td> <td>21</td> </tr> <tr> <td>Leak</td> <td>2</td> <td>% Spont</td> <td>0</td> <td>PP</td> <td>48.5</td> <td></td> <td></td> </tr> </table> </div> <p>NB. On the Astral 100 this is not a standard feature so the ventilator may not have the ability to show you the oxygen percentage and the oxygen amount would need to be measured at the oxygen supply in L/min e.g., flow meter or oxygen cylinder.</p>	Pressure	3.1	Mve	7.3	Resp. rate	15	FiO2	30	PIP	25.1	Mve	7.4	TI	1.00	SpO2	98	Avg. P	8.3	Vte	495	IR	1:3.0	Pulse rate	72	PEEP	3.1	Vt	501	% Spont	0	FiO2	21	Leak	2	% Spont	0	PP	48.5		
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<p>Can check the functioning of the ventilator prior to connecting the CYP.</p>	<p>Pre-Use Checks:</p> <ul style="list-style-type: none"> - If receiving oxygen check the supply is connected. If oxygen is not required to remove port from the back of the device. - Check that the air-inlet filter (white filter at the back) is clean and intact. - Check the machine is plugged into the mains 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 16 and 17 for alarms). - Check that the settings are correct to the home care plan/ventilation plan. - Check padlock sign is locked on top left-hand corner (see picture above). - If on humidified or wet circuit, check humidifier is switched on and water is in the chamber. 																																								

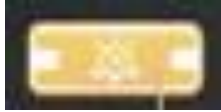
Performance criteria and knowledge required	Comments/Guidance
Ventilator Operation- Astral 100/150	
Able to check the ventilator is delivering pressure when connected.	Can identify on the main screen pressure being delivered. 
Can identify if a breath is CYP triggered or given by the ventilator (back up/mandatory breath).	A breath triggered by the CYP is shown by the yellow man with an arrow on the main screen pressure bar. 

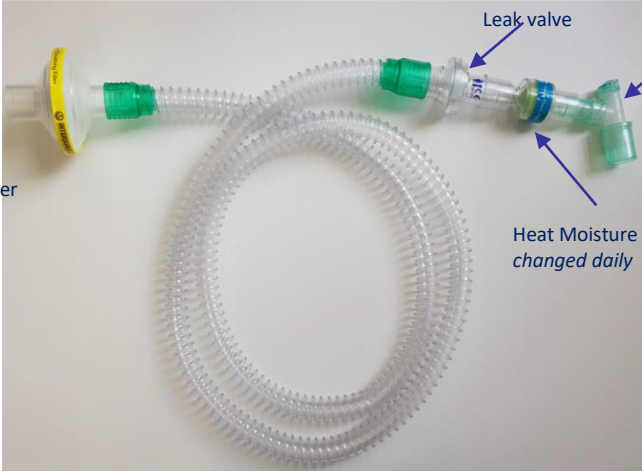
Performance criteria and knowledge required	Comments/Guidance
Ventilator Operation- Astral 100/150	
Able to change between programmes as per LTV plan (if applicable).	<p>To activate the correct program, press on the appropriate icon so that it turns orange.</p> <p>Press 'confirm'.</p> <p>Then press 'start vent.'</p>  
Can identify where data can be downloaded from the ventilator e.g. USB port or SD card.	 <p>Can insert USB stick into the back of the device which can download data from the device.</p>




Performance criteria and knowledge required	Comments/Guidance	
Alarms- Astral 100/150		
Possible cause.	Possible alarm.	Actions.
Accidental decannulation i.e. tracheostomy has come out	Circuit disconnection High Vte High Mve Low Pressure	Assess CYP and immediately insert tracheostomy. If difficult, follow emergency algorithm.
Blockage or obstruction of tracheostomy tube	Low Vte Low Mve Obstruction	Assess CYP and suction tracheostomy. Refer to escalation care plan.
Increased work of breathing	High Mve High Vte High respiratory rate	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.


Performance criteria and knowledge required	Comments/Guidance	
Alarms- Astral 100/150		
Possible cause	Possible alarm	Actions
Blocked/covered leak valve/port within the circuit	NV mask Low Vte Low Mve	Check leak valve/port within circuit to ensure not covered or blocked and correctly in place
Disconnection within circuit	Circuit disconnection High Vte High Mve Low Pressure	Follow circuit from CYP through to ventilator to ensure everything is connected and correct where necessary
Blockage within circuit	Low Vte Low Mve Obstruction NV Mask	Follow circuit from CYP through to ventilator to ensure everything there are no blockages or kinks within the circuit and correct where necessary. NV Mask alarm maybe triggered when using a Jetstream nebuliser within the ventilator circuit.
<p>Minimum requirement in order to have this signed off:</p> <p>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.</p> <p>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.</p> <p>NB: Alarms will be set specific to CYP and this will be discussed with you.</p>		

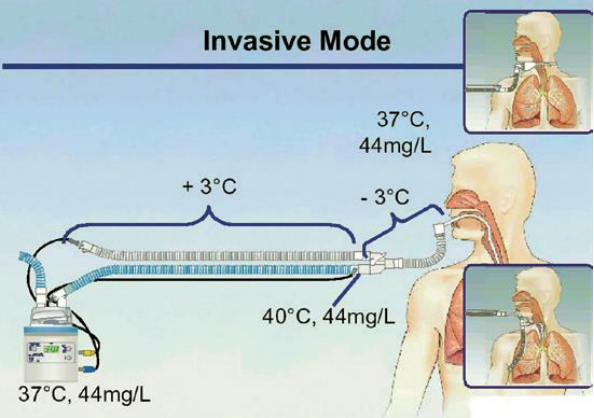
Performance criteria and knowledge required	Comments/Guidance												
Alarms- Astral 100/150													
Can describe the level of importance of alarms e.g. an information alarm or a warning alarm.	<table border="1" data-bbox="1078 294 1864 446"> <thead> <tr> <th>Alarm priority</th> <th>Alarm bar</th> <th>Audible alert</th> </tr> </thead> <tbody> <tr> <td>High</td> <td></td> <td>Red flashing light 10 beeps every 5 seconds</td> </tr> <tr> <td>Medium</td> <td></td> <td>Yellow flashing light 3 beeps every 15 seconds</td> </tr> <tr> <td>Low</td> <td></td> <td>Yellow steady 2 beeps every 25 seconds</td> </tr> </tbody> </table> <p data-bbox="671 415 977 446">There are 3 alarm priorities:</p> <ul data-bbox="671 461 1965 657" style="list-style-type: none"> • High Priority: Requires immediate response, you will see a red flashing alarm on the screen as well as on the alarm bar (as below). • Medium Priority: Requires prompt response, you will see a yellow flashing alarm on the screen as well as on the alarm bar. • Low Priority: An information alarm, you will see a solid flashing alarm on the screen as well as on the alarm bar. <div data-bbox="1189 703 1743 1156" style="text-align: center;">  </div> <p data-bbox="671 1171 1945 1247">IMPORTANT: All alarms should be responded to no matter what the priority. The priority indicator aims to guide the urgency in which the situation needs to be resolved.</p>	Alarm priority	Alarm bar	Audible alert	High		Red flashing light 10 beeps every 5 seconds	Medium		Yellow flashing light 3 beeps every 15 seconds	Low		Yellow steady 2 beeps every 25 seconds
Alarm priority	Alarm bar	Audible alert											
High		Red flashing light 10 beeps every 5 seconds											
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Can discuss likely causes of alarm and how to respond appropriately.	Link to previous alarm table on page 16 and 17.												

Performance criteria and knowledge required	Comments/Guidance
Alarms- Astral 100/150	
<p>Demonstrate how to check the alarms are working and how often to do this.</p>	<p>This should be done before CYP is placed onto the ventilator and when you take over the care of the CYP.</p> <p>A good time to do this would be when the CYP requires suctioning. It would be useful for two people to do this in order to check the alarms.</p> <p>When tubing is first disconnected check that circuit disconnection or high tidal volume or low-pressure alarms are triggered</p> <p>Occlude the vent circuit whilst running and check the low tidal volume alarms or high pressure are triggered.</p>
<p>Aware of the mute button and how long this silences the alarm for and the risks if the alarm was left muted.</p>	 <p>Alarm Mute/Reset Button. This button allows you to mute an active alarm or reset the alarm display if no current alarm. When an alarm is muted this will last for 2 minutes. During this period, the mute button will flash. You will still be able to see the visual alarm on the screen.</p> <p>To cancel the mute simply press the button again.</p>
<p>Aware of what to do if you cannot find the cause of an alarm and who to contact.</p>	<p>Ensure the CYP is safe (try suctioning of tracheostomy to ensure patency). Change to spare ventilator if necessary. Try changing the ventilator circuit and/or performing a learn circuit. Call for support from parent and/or ventilator technical support or the CYP's clinical team.</p> <p>Astral 24hr technical support number: 0800 917 709</p>

Performance criteria and knowledge required	Comments/Guidance
Circuits- Astral 100/150	
Able to describe what 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. From ventilator To CYP 	This should include: <ul style="list-style-type: none"> • Bacterial filter attached directly to the ventilator, which filters the air delivered to the CYP and how often this should be changed. • Exhalation/expiratory port where the CYP exhales their carbon dioxide and knowing the importance of having this within the circuit and for it to remain uncovered and unblocked. If this is missing or blocked the CYP CANNOT exhale their carbon dioxide. This is very dangerous and can cause life threatening events to occur.
Awareness of differences in circuits.	Two main circuits in use are: <ul style="list-style-type: none"> • 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- Astral 150	
<p>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</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>15mm circuit shown above.</p> </div> <div style="text-align: center;">  <p>22mm circuit above.</p> </div> </div>
<p>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.</p>	<div style="text-align: center;">  <p>15mm circuit shown above.</p> </div>

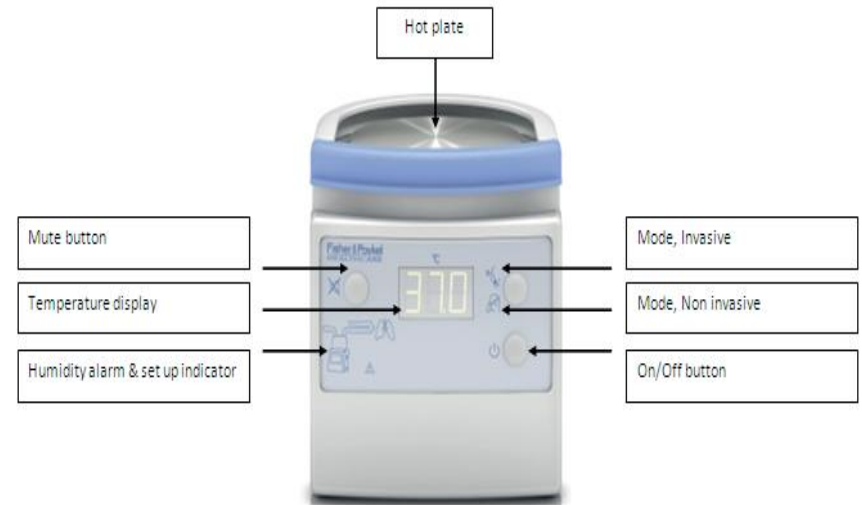
Performance criteria and knowledge required	Comments/Guidance
Circuits- Astral 100/150	
<p>Circuit calibration (learn circuits) and when these should be performed (if applicable).</p>	<p>The ventilator will require a 'learn circuit' to be completed as part of troubleshooting and for any additional different circuit type that may be used i.e., a separate 'learn circuit' is required for a wet circuit and then again for a dry circuit. It will also need to be performed if any changes are made to the mode of ventilation, but this will be done in the hospital setting. The 'learn circuit' does not need to be completed at each scheduled circuit change but it is good practice to do monthly.</p> <p>From the Setup Menu, select the Circuit sub-menu. Press start and follow the on-screen prompts.</p> <div data-bbox="768 530 1181 934" data-label="Image">  </div> <p>Follow the on-screen prompts to attach and test the circuit. A test result is displayed if any of the tests fail, otherwise the Learn Circuit function has been successfully completed and you will be returned to the main settings page.</p> <p>See '<i>Troubleshooting Common Problems</i>' Section if the Learn Circuit fails for more guidance.</p> <p>A learn circuit test also should be completed on each program when a new ventilator is sent out to them e.g. If they call ResMed and a loan device is provided. ResMed do not know what circuits the CYP uses and therefore they do not complete a learn circuit test.</p>
<p>Aware of frequency of ventilation circuit changes and any individual parts.</p>	<p>Circuit tubing for the ventilators should be changed weekly or as per local/tertiary clinician guidance.</p> <p>The bacterial filter should be changed weekly unless indicated.</p> <p>The HME in the dry circuit should be changed daily.</p> <p>Awareness of who provides the circuits when the CYP is discharged e.g. is it the community nursing team or continuing care team.</p>

Performance criteria and knowledge required	Comments/Guidance
Humidification	
<p>Understands the need for humidification for a ventilated CYP.</p>	<p>Can identify the need for artificial humidification:</p> <ul style="list-style-type: none"> •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. <p>Can verbalise the potential consequences of poor humidification:</p> <ul style="list-style-type: none"> • Increased risk of tracheostomy blockage. •Risk of infection, damage and lung collapse. •Increasing viscosity (thickness) of secretions.
<p>Can identify different humidification devices.</p>	<p>Humidification can be achieved on the ventilator either by:</p> <ul style="list-style-type: none"> • 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. <div data-bbox="1044 886 1641 1304" style="text-align: center;">  <p>Invasive Mode</p> <p>37°C, 44mg/L</p> <p>+ 3°C</p> <p>40°C, 44mg/L</p> <p>- 3°C</p> <p>37°C, 44mg/L</p> </div>

Performance criteria and knowledge required	Comments/Guidance
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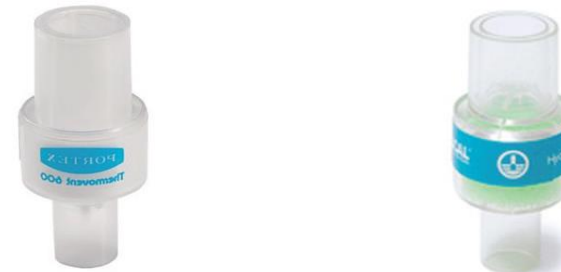
Humidification	
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Can identify different humidification devices.



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 breathe.
- Two examples of HME used are: Portex 600 on the left and Intersurgical one on the right.



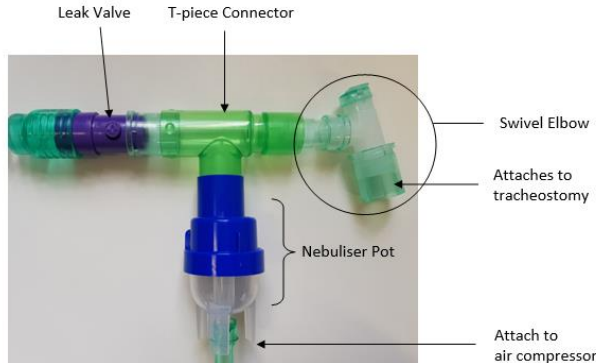
Performance criteria and knowledge required	Comments/Guidance
Humidification	
<p>Understand the importance of humidifier positioning.</p>	<p>Humidifier needs to be placed either in line or below the CYP. If humidifier is placed above the CYP there is a risk of water entering the tubing and being drawn to the CYP and their tracheostomy due to gravity.</p> 
<p>Able to troubleshoot common problems regarding circuit. I.e. rain out, temperature and fan directly blowing on the circuit.</p>	<p>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 37°C) to the CYP.</p> <p>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 in front of the humidifier. Try to cool the room evenly.</p> <p>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 keep the environment at a constant temperature and not have the humidifier by any drafts etc.</p> <p>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.</p>

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

Performance criteria and knowledge required	Comments/Guidance
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Nebulisers	
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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: <ul style="list-style-type: none"> 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.
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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: <div style="text-align: center; margin-top: 10px;">  </div>
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Aerogen nebuliser positioning on wet circuit:



Aerogen nebuliser 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. Page 27

Performance criteria and knowledge required	Comments/Guidance
Nebulisers	
Observes CYP during nebuliser and can identify any changes.	Changes that can occur when a nebuliser is given are (list not exhaustive): <ul style="list-style-type: none"> • 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.
Observes CYP and monitors the effectiveness post nebuliser.	This 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	
<p>Aware of how to remove nebuliser and clean equipment.</p>	<p>Refer to local policy.</p> <p>Aerogen: Refer to manufacturing policy.</p> <p>Jet nebuliser: All parts washed with warm soapy water after each use.</p>
<p>Aware of the effect of nebulisers in circuits and how this can trigger alarms.</p>	<p>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.</p> <p>The Aerogen nebuliser does not require extra air or oxygen and uses the flow of the ventilator. This nebuliser device does not create any additional alarms when running in the ventilator circuit.</p> <p>(Ensure close supervision during nebulisation).</p>

Performance criteria and knowledge required	Comments/Guidance
Oxygen and CYP monitoring	
Demonstrate how to correctly place a saturation probe.	Can demonstrate: <ul style="list-style-type: none"> • 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	
<p>Able to describe signs of distress or changes in clinical condition outside the CYP's normal parameters.</p> <p>A, B, C, D approach</p>	<p>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.</p> <p>Assessment should be structured and must include:</p> <ul style="list-style-type: none"> •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.
<p>Describe action to be taken if CYP is in respiratory distress.</p>	<p>Each CYP will be different but this could include:</p> <ul style="list-style-type: none"> • 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 an oxygen saturation monitor, then place on one. • Administering oxygen as per CYP escalation plan.
<p>Awareness of escalation process on the CYP's specific care plan</p>	<p>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.</p>
<p>Know who to contact in an emergency and where the contact information is recorded</p>	<p>Give examples of when appropriate to call:</p> <ul style="list-style-type: none"> •999 e.g., unable to pass tube and needs emergency help. •GP e.g., CYP is unwell and there are 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.	<p>Equipment should all be checked prior to any travel to ensure it is correct for CYP and it is fully charged.</p> <p>Equipment may include (list not exhaustive):</p> <ul style="list-style-type: none"> • Ventilator CYP is on (if 24hrs dependent a spare ventilator should be with CYP at all times as well). • 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	
<p>Demonstrate taking the CYP out on a trip, using their buggy or wheelchair, safely securing all equipment.</p>	<p>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 .</p> <p>The key to keeping the CYP safe is Be Prepared!</p> <p>Be appropriately trained and confident to provide all aspects of CYPs care.</p> <p>Environment - 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?</p> <p>What potential risks are associated? How could these risks be managed?</p> <ul style="list-style-type: none"> • 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>Pack your bags carefully and sensibly- all essential equipment and supplies must be easily accessible.</p> <p>Re- think travel/journey/activity if CYP unwell/unstable.</p> <p>Emergency equipment must be checked pre- journey, appropriately charged and easily accessible.</p> <p>Prepare 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?</p> <p>Alternative 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.</p> <p>Re-stock and re charge your equipment when you return.</p> <p>Ensure you take sufficient supplies e.g. suction catheters, oxygen, nebuliser solution, external batteries for ventilator.</p> <p>Driving. 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.</p>

Performance criteria and knowledge required	Comments/Guidance
Travel and Transport	
Calculate required amount of oxygen for the duration of the outing.	<p>BOC Medical Cylinder data chart: Cylinder code=capacity in litres (L): AZ 170 C 170 D 340 CD 460 E 680 J 6800</p> <p>Can calculate how much oxygen is required using the formula: (Journey time X prescribed O2 requirement = Total amount needed for journey).</p> <p>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.</p> <p>For more information on oxygen see the PPLOG oxygen leaflet.</p>
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.