



LONDON'S  
AIR AMBULANCE  
roadside intensive care



## Pre-hospital Care Standard Operating Procedure

### Ventilator Checks

<b>REVIEW:</b>	November 2010	
<b>APPROVAL/ ADOPTED:</b>	PHC Policy Board	
<b>DISTRIBUTION:</b>	PHC Doctors PHC Paramedics PHC Pilots	
<b>RELATED DOCUMENTS:</b>	SOP Rapid Sequence Induction Equipment folder – Oxylog 2000, Pneupac	
<b>THIS DOCUMENT REFERS TO:</b>	<input checked="" type="checkbox"/> PHC Clinical Practice PHC Non-clinical Practice PHC Operational Procedure	Ref: CP-16

#### Aims:

- To review the ventilators used by HEMS
- To detail the procedure for checking the ventilators

#### Background:

The main HEMS ventilator is the Oxylog 2000. These are straightforward transport ventilators with a few 'extra' functions. Familiarise yourself with the ventilator before use. There is a manual and a CD in the equipment folder. If you have a problem when using the ventilator on a mission: check the patient and eliminate ventilator problems by disconnecting and assisting ventilation with an ambu bag. The Oxylog checks should be performed daily as part of the aircraft checks. Although gas driven, the Oxylog also requires battery power and so must be placed on charge when not in use and changed daily as per SOPs. The Oxylog that has been on the aircraft overnight on Thursday is to have the battery fully drained. It is then to be placed on charge during the day on Friday to ensure it is mission ready on Saturday

The aircraft and cars also carry Pneupac ventilators. The Pneupac should be checked weekly as per the aircraft / car check lists.

#### Policy:

##### 1. The Oxylog 2000

- The setting of the tidal volume (TV) and respiratory rate (f) tends to be a dynamic process, using end tidal CO<sub>2</sub> as an endpoint. The following settings are a reasonable start point:
  - TV should be about 10ml/kg (approx. 500ml for an adult)
  - f can be set initially at 12.
  - Remember that minute volume is TV x f and a reasonable value is 70ml/kg/min.

- After ventilation is established and good oxygenation / normocapnia achieved the tidal volume can be reduced in keeping with good ITU practice.
- I:E ratio is set with TI:TE knob. The default ratio should be 1:2. Variation of I:E ratios is only likely if using the ventilator for secondary transfers.
- Pmax sets the maximum inspiratory pressure that will be delivered. This should be set around 40 mbar (approx. 40 cmH<sub>2</sub>O). The airway pressure alarm is very useful and its activation can indicate anything from a blocked tube to bronchospasm.
- PEEP: 5cm of PEEP in an intubated patient equates to about zero in a spontaneously breathing patient. Few HEMS patients will need more than 5cm PEEP.
- 'No air mix' gives 100% O<sub>2</sub>. 'Air mix' gives around 60%. Intubated trauma patients should be given 100% O<sub>2</sub>.

### **Ventilatory Modes**

- IPPV provides mandatory ventilation as set by freq / Tv.
- SIPPV / SIMV are modes that allow the patient to trigger the ventilator with inspiratory effort and are sometimes used as an adjunct to weaning patients off ventilators on ITU. HEMS patients that are anaesthetised should have proper muscle relaxation and this mode is therefore not used.
- CPAP mode allows self ventilating intubated patients to have a degree of positive airways pressure. Again, this is unlikely to be useful for HEMS patients

### **The checks**

- Ensure the dials are set appropriately, as described above.
- Make sure that the three hoses are connected properly to the right side of the ventilator. The middle one is particularly prone to disconnection. The O<sub>2</sub> hose has a Schraeder valve connection which can be plugged into the aircraft supply or a cylinder (with appropriate attachment)
- When you turn the ventilator on it will perform an electronic self test.
- Hold a rubber glove onto the patient end of the circuit and observe periodic inflation of the glove.
- Occlude the patient end of the circuit. The peak airway pressure should rise and the alarm sound.
- Remove the glove from the tubing and wait. After a few seconds the "leakage?" alarm will sound
- Disconnect the oxygen supply. The low pressure warning alarm should sound.
- Note that the alarm needs to be reset between each test to remove the old error message.

### **Alarms**

- Alarms will be inaudible in-flight but a red light and an error message will be displayed. The ventilator screen and the end tidal CO<sub>2</sub> trace must be visible and checked constantly.

## **2. The Pneupac**

- This is a very basic ventilator which can be used if the oxylog develops a fault or if there are 2 patients to be ventilated. It is entirely gas powered and therefore has no battery. Brief instructions are printed on the front of the device.

### **Checking the Pneupac**

- Attach to O<sub>2</sub> supply either on the aircraft or a cylinder, noting that the red spherical window on the front panel marked "O<sub>2</sub>" will change from red to white.
- Immediately, the ventilator will start to work and the TV / f can be adjusted using the labelled dial on the base of the unit. Turning the dial clockwise will increase TV whilst decreasing f. The initial setting of the ventilator is facilitated by a diagram of a heart (for an adult) and a baby (for a child).
- Use a glove to check function, as per the oxylog
- Occlude the gas outlet with a finger; the pressure relief valve, set at 40cmH<sub>2</sub>O will blow off.
- There is no disconnect alarm on this ventilator. If the white spherical window marked O<sub>2</sub> goes red the supply pressure has dropped.