

USING CPAP IN COVID-19

A user guide

Wrightington Wigan and Leigh NHS Teaching Foundation Trust

Introduction

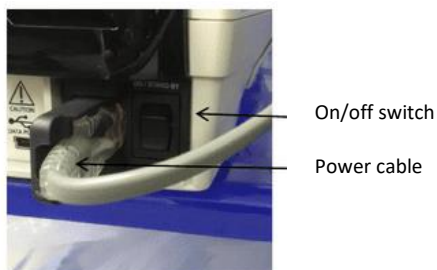
This User Guide has been written to describe how CPAP has been used during the COVID-19 outbreak within our organisation. The use of CPAP required rapid changes within established working practices. This document is a practical guide for using CPAP in other organisations to help to replicate the work we have done and the results we achieved.

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Section 1 -Equipment

Stellar 150 Using Non-Vented Mask

Start up:



- Attach the power cable to the rear of the device.
- Turn device on using switch sited next to where the power cable enters the machine.

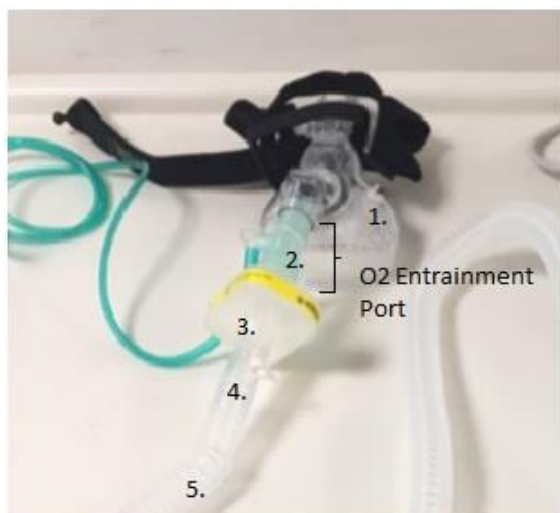


- Once device has powered up, unlock using the 'two ticks' button- (circled) and the central round dial (push and hold down together).
- Once unlocked, select the time you want the machine to be unlocked for, e.g. 5 or 120 minutes. (To re-lock device at any point press and hold same buttons as used to unlock)
- The machine will beep to confirm and the padlock symbol will now be open.

Clinical Set-up:



- Press the 'two ticks' button twice to go to page 3/3. Using the central dial scroll round to highlight 'Factory Defaults'. Push down on the dial to select and confirm 'Yes' by pushing down the dial again.
- This should then automatically highlight the 'Learn Circuit' box (circled opposite)- click on this and set up the circuit as shown in diagram below but **do not** attach mask to the patient at this time.

Circuit Set-up:

1. Non vented mask
2. O2 Entrainment Port- delivers O2 into circuit from wall point via green tubing
3. Viral/bacterial Filter- **change daily**
4. Exhalation Port
5. Long Tubing that connects to the Stellar device as below



Select 'Start' - you will hear the device run pressure through the circuit twice. This lasts for approximately 1 minute. Once completed, the screen will display a green smiley face and confirm the circuit has been learned successfully.

Setting the Mode/Pressures:

- Press the 'Two ticks' button to display the 'Clinical Settings' screen, 1/3.
- Turn the central dial to highlight 'Pathology' and click down- it will now turn orange.
- Turn the dial until it says 'Normal' then click button again to select – it will now turn dark blue again.
- Next, turn the central dial to highlight 'Mode'. Scroll through the options and click to select 'CPAP'
- Once in CPAP mode- set the fixed CPAP pressure as instructed by prescribing clinician – this will usually be a starting pressure of 10cmH2O.

The mask is now ready to be fitted to the patient so that ventilation can commence. Press the 'Lungs' button (above the 'two ticks' button in the picture above) to return to the home screen.

DO NOT TURN VENTILATOR ON UNTIL MASK HAS BEEN FITTED TO THE PATIENT



- Once mask fitted to patient press the start button (circled) to begin ventilation.
- The same button is used to stop therapy- confirm when prompted by clicking central dial.

Remember: NIV mask on → Ventilator on; Ventilator off → NIV mask off

Important:

The back-up battery will allow patients to be transferred from ward to ward without the device needing to be plugged in, however the battery will only last around 2 hours. It is therefore necessary that the machines are **plugged in at all times** when being used on patients or when in storage to keep the battery charged.

Section 2 – Implications for Clinicians


The problem of potential Aerosol Generation when using CPAP equipment required the need for isolation of the patient and a dedicated team of trained CPAP carers working within dedicated areas.


We deliberately identified areas of wards that could be isolated. The areas which proved to be most suited to our needs of providing isolated space were 8 bedded bay areas with only one entrance to the ward area. The clinical team caring for patients within the CPAP area entered wearing full PPE and remained in that area during their shifts other than to leave for breaks. The ratio of staff:patients was 2:1.

The clinical team who were responsible for caring for patients in the isolated CPAP bays were given an in house training course on how to use and care for patients prior to the adoption of the CPAP equipment. The documentation contained within this booklet provides the resources produced to support our clinical teams. We had an established team, primarily from the Sleep Management Service, who had expertise in using the CPAP devices. It was primarily members from this team who were instrumental in delivering the training required to up skill staff who required training. The CPAP machines were primarily sourced from the Trust Sleep Management Service and were the Stellar CPAP machines which the team had expertise in using.

Section 3 - Documentation

Whilst the organisation uses Electronic Patient Records, there simply wasn't time to build the documents required for implementation of CPAP and as a result the documents used were paper based Examples are provided below:





COVID-19 CPAP Unit Monitoring Chart

Update to NoK / Family	
------------------------	--

General Notes/Communication

First Name		Surname			
DOB		Age			
Hospital No.		Consultant			
Admission Date		Admission Day No.			
CPAP Started		CPAP Day No.			
Today's Date:		HMEF Change <input type="radio"/>	Target Sats	92%	88%

Shift Nurse/HCA	Please print name				
Early					
Late					
Night					

Frailty Score	1	2	3	4	5	6	7	8	9
Ceiling of Care	Full Escalation		CPAP			DNAR			

Daily Weaning Plan

<input type="checkbox"/> Continuous CPAP (Breaks only for eating/drinking)	Other:
<input type="checkbox"/> 4 hours on 1 hour off	
<input type="checkbox"/> 3 hours on 2 hours off	
<input type="checkbox"/> 2 hours on, 3 hours off	

Daily Mobility Plan

Daily Positioning Plan

Daily Ward Round Plan

System	Parameter	Time	11	12	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10			
CARDIOVASCULAR	BP cuff (BLACK) v I I I ^ ^ MAP (RED) x HEART RATE (BLUE) x Please chart MAP & HR as 'x' and join up to form a graph	210																											
		200																											
		190																											
		180																											
		170																											
		160																											
		150																											
		140																											
		130																											
		120																											
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		70																											
60																													
50																													
40																													
30																													
20																													
10																													
5																													
RESPIRATORY	Please chart Sats & RR as 'x' and join up to form a graph Oxygen Sats (%) OBSERVED Resp Rate (bpm)	50	100																										
		40	95																										
		30	90																										
		20	85																										
		10	80																										
		0	75																										
	Resp Obs Resp Support	CPAP/NRB/Venturi																											
		Position (Prone/L/R/Set Up)																											
		O2 Flow Rate (lpm)																											
		PEEP																											
		Minute Volume (L)																											
		Tidal Volume (mls)																											
	Blood Gases	Sputum/Cough																											
		CBG/ABG																											
		pH (Temp Corrected)																											
PO2 (Temp Corrected)																													
PCO2 (Temp Corrected)																													
HCO3																													
BE																													
Sats																													
P Ox (as gas taken)																													
Lactate																													
NURSING	Mouth Care																												
	Check Facial Pressure Areas																												
	Eaten																												
	Drink																												

Monitoring of patients on CPAP therapy**Patient Name:****D.O.B:****Hospital Number:**Once CPAP treatment started aim for the following SpO₂ target:

- SpO₂ 92% for all patients **UNLESS** they are COPD/structural lung disease in which case aim for SpO₂ 88%

Titrate pressure (cmH₂O) first up to a maximum of 10cmH₂OIf this does not achieve required SpO₂ levels then increase oxygen until desired range is reached.

DATE	TIME	PRESSURE (cmH ₂ O)	O ₂ (Litres/min)	SPO ₂	POSITION

COVID-19 CPAP Trial Form

Patient Name	
DOB	
Hospital Number	
Frailty Score	
Ceiling of Care	

Baseline Parameters	
Resp Rate	
Sats	
Oxygen	
Position	

Apply 5-10 PEEP with 5lpm oxygen to begin with. Once CPAP treatment started aim for the following SpO2 target:

- Spo2 92% for all patients UNLESS they are COPD/structural lung disease in which case aim for SpO2 88%

Titrate pressure initially up to a maximum of 10cmH20 (Can go higher if a larger patient)

If this does not achieve required SpO2 levels then increase oxygen until desired range is reached.

Trial Start Time:

Trial Obs	DATE	TIME	PEEP (cmH20)	O2 (lpm)	SPO2 %	Resp Rate	TV (mls)	MV (L)	POSITION
1 30 mins									
2 1hr									
3 1hr 30									
4 2 hrs									

Parameter	Baseline (if any)	1 Hr on CPAP	2 Hr on CPAP
Date			
Time			
Oxygen			
pH			
pCO2			
pO2			
HCO3			
BE			
sO2			
Lac			

Comments

CPAP Trial Outcome			
Progress to Intubation	Extend Trial	Continue CPAP as guided by Consultant	End Trial

Trial to be discussed with Respiratory +/- Intensive Care Consultant for decision on further management

Name..... Date..... Time.....

Section 4 - Protocol

Protocols for the management of patients requiring CPAP therapy were developed continually during the COVID-19 outbreak. Protocols evolved during the outbreak as a result of growing clinical expertise and confidence.

The example below illustrates a later version of the treatment pathway developed.

Timeline	Patient COVID Positive (confirmed or suspected) and Type 1 Respiratory failure		
	Commence Nasal Prong Oxygen IV fluids and send bloods Hourly observations		
	Commence CPAP if requiring over 4l/min to maintain sats over 94% CPAP at 5cm H2O pressure		
Within 48 hours of admission	Responding Reducing RR or Reducing FiO2	No change	Worsening Increasing RR or increasing FiO2
Review at every 8 hours	Continue CPAP	Increase FiO2 to maintain Sats over 94% Increase CPAP pressure to 10cm and then 15cm pressure with sequential reviews	Arrange ICU review. Consider whether appropriate for ICU care / escalate if appropriate.
	Wean oxygen and pressure according to chart 1 aiming to leave the patient on 40% oxygen via facemask or better	Where there is no improvement at 15cm pressure-arrange ICU review. Consider whether appropriate for ICU care / escalate if appropriate.	