

CPAP POLICY FOR COVID-19 PATIENTS ADMITTED TO RESPIRATORY CPAP UNIT ON WARDS 48 /49

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INTRODUCTION

CPAP supports breathing (with a tight fitting mask) by providing oxygen under continuous positive pressure throughout the respiratory cycle.

- CPAP improves oxygen transfer by increasing alveolar recruitment and increases functional residual capacity so reducing the work of breathing.
- The pressure valve determines the minimum inflation of the alveoli throughout the respiratory cycle.

The surge in COVID-19 cases has superseded the capacity of critical care locally and regionally. Respiratory department at the Countess of Chester Hospital NHS FT has taken on the responsibility to provide CPAP to those patients deemed unsuitable for IPPV and level 3 care on wards 48/49. This follows extensive local investigation into the benefits of treatment and the risks of cross-infection to other patients and staff and is in-keeping with the NICE guidelines for the management of COVID-19 patients requiring non-invasive ventilatory support.

PURPOSE AND SCOPE

This policy outlines the expected standard of care for adult patients with COVID -19 receiving CPAP on the Respiratory CPAP Unit, currently on wards 48 and 49 at the Countess of Chester hospital NHS Trust.

PATIENT RISK FACTOR

If there is non-compliance with the guideline and procedures, there will be a high risk of patient morbidity or mortality.

Exceeding these flow rates could lead to a rapid pressure drop in the oxygen supply, reducing oxygen delivery. This could pose a potentially significant risk to multiple patients simultaneously.

Due to the large anticipated volume of patients requiring CPAP, and the limited oxygen supply to wards at the Countess of Chester, we are unable to use our V60 machines for CPAP due to their high oxygen consumption. We are therefore using Phillips Dreamstation machines designed for domiciliary use for Obstructive Sleep Apnoea, and adapting them for acute use with entrained oxygen. It is vital that the set-up and starting/stopping guides are followed closely to reduce the risk to patients and staff.

RESPONSIBILITY

This policy applies to all adult patients (over the age of 18 years) with confirmed or strongly-suspected COVID -19 (deemed unsuitable for IPPV level 3 care) receiving CPAP on the Respiratory CPAP unit at the Countess of Chester Hospital NHS FT. Children are excluded.

All Healthcare Professionals working within the Trust undertaking CPAP are expected to work within this policy. This includes all Medical Staff, Registered Nurses, Healthcare Assistants (HCAs), Student Nurses, Therapy Services, pharmacists and pharmacy Technicians.

GUIDELINES

CPAP is highly aerosol generating procedure and all areas providing this should only be accessed wearing full AGP PPE .This includes

- Surgical Cap
- FFP3 mask
- Goggles or Full face Visor
- Full sleeve apron
- Gloves
- Appropriate Footwear

Indications for CPAP :

- Respiratory Support for Type I respiratory failure (Hypoxaemia with $paO_2 < 8Kpa$ despite high flow oxygen of $>40\%$ and $RR > 25/$).
- See patient assessment flow chart (Appendix 1) for further details.

Contraindications for CPAP on Respiratory CPAP Unit:

Relative

- Significant underlying cardiac, respiratory or neurological disease
- Unable to remove CPAP mask independently
- Unable to self-prone in bed independently
- Confusion/Agitation
- Poor functional baseline (eg $CFS \geq 6$)
Frail patients/patients with multiple co-morbidities with COVID-19 have a very poor prognosis and should not be treated with CPAP as it is highly likely to be futile and may prolong suffering

Absolute

- Type 2 respiratory failure
- $GCS < 8$
- Severe haemodynamic instability
- Pneumothorax (without chest drain)
- Multi-organ failure
- Bowel obstruction.
- Recent Ear Nose and Throat surgery.
- Laryngeal trauma, recent tracheal anastomosis.
- Epistaxis.
- Systolic BP less than 90mmHg.
- Facial Trauma

Cautions to CPAP :

- Recent upper GI anastomosis (CPAP can cause gastric distension).
- Weak Cough/copious secretions.
- Sputum retention.

Complications of CPAP :

- Reduction in cardiac output.
- Pneumothorax – barotrauma.
- Gastric distension leading to vomiting and aspiration of gastric contents.
- Sleep disturbance.
- Nasal bridge ulceration.
- Drying of secretions.
- Drying of eyes and conjunctivitis.

Equipment :

See appendix 4 for full list of equipment required.
Equipment required will be stored on ward 48.

Initiation of CPAP :

- The ceiling of treatment and Resuscitation status should be determined and documented for all patients prior to the initiation of CPAP. Patients for whom escalation to IPPV would be appropriate should be referred to ICU.
- All patients should be referred to the Respiratory Consultant on call to be accepted for CPAP on the Respiratory CPAP Unit. During working hours, this should be done by a consultant or ST3+ physician. Out of hours, this should ideally be done by the consultant general physician on call.
- Please complete COVID-19 CPAP Prescription (Appendix 3)
- Assess response to CPAP 30-60 minutes after initiation. If there is an inadequate clinical response, please see the bottom of the CPAP prescription for advice on adjustment of CPAP settings.

Setting up CPAP:

- See appendices 4 and 5 for instructions on how to assemble CPAP circuit and set-up Phillips Dreamstation CPAP machine.
- See appendix 6 for instructions on how to start the patient on CPAP, and how to stop CPAP.

Observations of patients on CPAP :

- Patient should be reviewed one hour after commencing CPAP, ideally by the person who commenced it.
- Continuous pulse oximetry monitoring should be used where available.
- Cardiac monitoring is suggested on initiation of CPAP, and for patients for escalation to ICU, particularly if the patient has a significant tachycardia or arrhythmia, when available.
- General Observations to be performed regularly:
 - NEWS2
 - Respiratory Observations: colour, use of accessory muscles, bilateral chest expansion
 - Mask-fit/leak
- There is no need to perform regular ABGs. SpO₂ monitoring is sufficient. It may be appropriate to perform an ABG in the event of clinical deterioration.
- To minimise the infection risk to staff, regular chest auscultation is not required, but may be appropriate in the event of sudden clinical deterioration.

Care of Patients having CPAP :

Patient Comfort :

Rationale: Patient co-operation is essential for CPAP therapy.

Action: Give full explanation and reassurance.

Relieve pressure points - Granuflex on bridge of nose and sponge around the harness straps and under mask to prevent air leaks.

Re-examine mask strapping for displacement regularly

Patients should be taken off CPAP at least 4 hourly to allow for eating, drinking, mouth-care and pressure sore prevention.

Where necessary, nursing staff can adjust CPAP pressures in 2.5cm increments

Treatment Goal: Patient is not distressed or unable to comply with CPAP treatment and to avoid pressure sores.

Promoting breathing :

Rationale: Improves gaseous exchange

Action: Keep patient positioned upright or high side lying, to promote good ventilation – consider physio input.

Avoid the slump position.

Early mobilization and sit out in chair.

Listen for air entry to determine which side position is required (if unilateral pathology usually lie the patient with the quieter side upper most).

Encourage patient to take deep breaths every hour.

When coughing and expectorating remove the CPAP mask.

Use saline nebuliser if secretions are thick, viscous and difficult to expectorate (prescribed regularly 2-4 hourly).

Ensure the patient is adequately hydrated, as dehydration causes thick secretions.

In-between CPAP treatment use humidified oxygen.

Treatment Goal: Workload of breathing is reduced, oxygen saturations increased and improved V/Q mismatch and reduced FiO₂.

Preventing dry and swollen eyes :

Rationale: Eyes become dry and oedematous if the position of the mask prevents blinking and if air is leaking around the mask.

Action: Ensure the mask is positioned to allow the patient to blink.
Re-position to prevent air leaks or plug the leaks with foam.
Lubricate eyes using Hypermellose eye drops if necessary.

Treatment Goal: Patient does not develop eye problems as a result of CPAP.

Mouth Care:

Rationale: Mouth and lips become very dry because of the high gas flow.

Very dry mucus membrane will inhibit expectoration of secretions.

Action: Frequent mouth care to moisten lips/mouth.
Apply Vaseline cream to the lips

Treatment Goal: Mucous membranes do not become too dry, so patient is able to expectorate secretions.

Nutrition and hydration :

Rationale: To maintain hydration and nutrition, and ensure secretions are not too thick to expectorate.

Action: If short breaks to CPAP therapy can be tolerated, these should be given at meal times if possible.

Administer oxygen via venturi mask/nasal specs; monitor SaO₂.

Small frequent meals, offer frequent drinks – depending upon fluid balance requirements.

If patient feels nauseous aspirate N/G tube. If patient is vomiting ensure face mask is removed promptly.

Treatment Goal: Patients receive optimal nutrition and hydration whilst having CPAP.

Proning whilst on CPAP :

For patients with persistent hypoxia, Awake Prone Positioning may be appropriate to improve oxygenation, lung recruitment, and drainage of secretions. Please see appendix 2 for quick reference guide.

Discontinuation of CPAP :

CPAP should be discontinued once all the following are achieved

- Respiratory rate < 25.
- Oxygen saturations > 93%.
- FiO₂ <40%.
- Normal work of breathing (no respiratory distress, no use of accessory muscles, no tracheal tug)

Staff Training :

- All staff undertaking CPAP will attend a study session or review the video demonstration created for this purpose.
- The Respiratory Team will provide continued education; support and advice.
- All staff undertaking CPAP will have completed CPAP competencies.

Cumulative Oxygen use and flow rate monitoring :

The total oxygen flow rates to Ward 48 and 49 are 284L/min and 330L/min respectively. Exceeding these flow rates could lead to a rapid pressure drop in the oxygen supply, reducing oxygen delivery. This could pose a potentially significant risk to multiple patients simultaneously. To mitigate this risk, the nurse in charge or delegated person should record the current oxygen use for each patient, and total oxygen usage for the ward three times per day. If the total oxygen usage is approaching the maximum flow rate for the ward, patients not needing CPAP may need to be transferred to other areas in the hospital.

Designated areas for CPAP are D and H bays on ward 48 and D and H bays on ward 49.

Medical Records :

- All patients medical records will be managed confidentially at all times and stored securely.
- All documentation relating to CPAP must be filed within the patient's medical records when completely filled in or the patient no longer requires treatment; death or discharge.

Audit :

- Compliance with this policy will be audited following the cessation of this seasonal service. Any issues will be escalated to Clinical Directors and Divisional Managers for action.
- Any instances of non-compliance with this policy should be raised with governance team and recorded as a Datix if necessary.

MONITORING COMPLIANCE STANDARDS WHERE APPLICABLE EXAMPLE

Standard policy measured against Eg,ISO,CQC,NICE, CIPD	Minimum Requirements	Process for monitoring i.e audit, annual report	Responsible individual for Audit & action Plan	Frequency of audit	DATIX Registered Audit ID number & Month, Year registered	Responsible Committee for review of audit results & review of action plan
No national guidance	Review of service	Service report	Respiratory Team	6 months	NA	Hospital wide Governance committee
	Other policy minimum requirements					

GLOSSARY OF TERMS

A glossary of any terms/abbreviations used within the document must be provided.

CPAP: Continuous Positive Airway Pressure

IPPV: Invasive Positive Pressure Ventilation

AGP: Aerosol-generating procedure

RR: Respiratory Rate

FiO₂: Fraction of inspired oxygen

SpO₂: Peripheral oxygen saturation

CFS: Clinical Fragility Scale

GCS: Glasgow Coma Score

CKD: Chronic Kidney Disease

ICU: Intensive Care Unit

APPENDIX 1: PATIENT ASSESSMENT

We are dealing with two distinct groups of patients:

- 1. Patients without significant pre-existing respiratory disease presenting with suspected complications of COVID-19 infection.**
 - These are the patients we are aiming to treat with respiratory support. Please discuss directly with ICU if appropriate.
 - If ICU or CPAP is inappropriate, ensure palliative care measures are in place where appropriate
- 2. Patients with known COPD, obesity hypoventilation or chest wall disease, who are presenting with an exacerbation, whom we would usually treat with NIV during an exacerbation**
 - Do not withhold usual treatment
 - Maximise medical treatment – nebulisers, antibiotics, steroids, controlled oxygen with target SpO₂ 88-92% etc
 - Urgent ABG and CXR, and reassess at one hour.
 - If decompensated type 2 respiratory failure due to exacerbation of underlying condition, still consider NIV (discuss with on call respiratory consultant). This must be started on Ward 48.
 - If clinical picture is strongly suggestive of COVID-19 pneumonitis (eg bilateral infiltrates or consolidation on CXR), NIV is highly likely to be futile and may prolong suffering, and conservative management is likely to be more appropriate

Determine ceiling of treatment and DNACPR status for all patients on admission

Use clinical frailty scale (CFS) to support decision making where appropriate

NB: CFS is not suitable for younger patients, patients with stable long-term disabilities (eg Cerebral Palsy), learning difficulties, or autism.

For patients in whom CFS is inappropriate, an individualised holistic assessment is recommended, taking into account physiological reserve and long-term prognosis.

Consider co-morbidities likely to adversely affect prognosis:

Congestive cardiac failure with symptoms at rest or on minimal exertion

Chronic lung disease with symptoms at rest or on minimal exertion

Severe and irreversible neurological disease










Chronic Liver disease with Child-Pugh score ≥ 7

CKD 5

Diabetes mellitus requiring medication

Uncontrolled/active malignancy

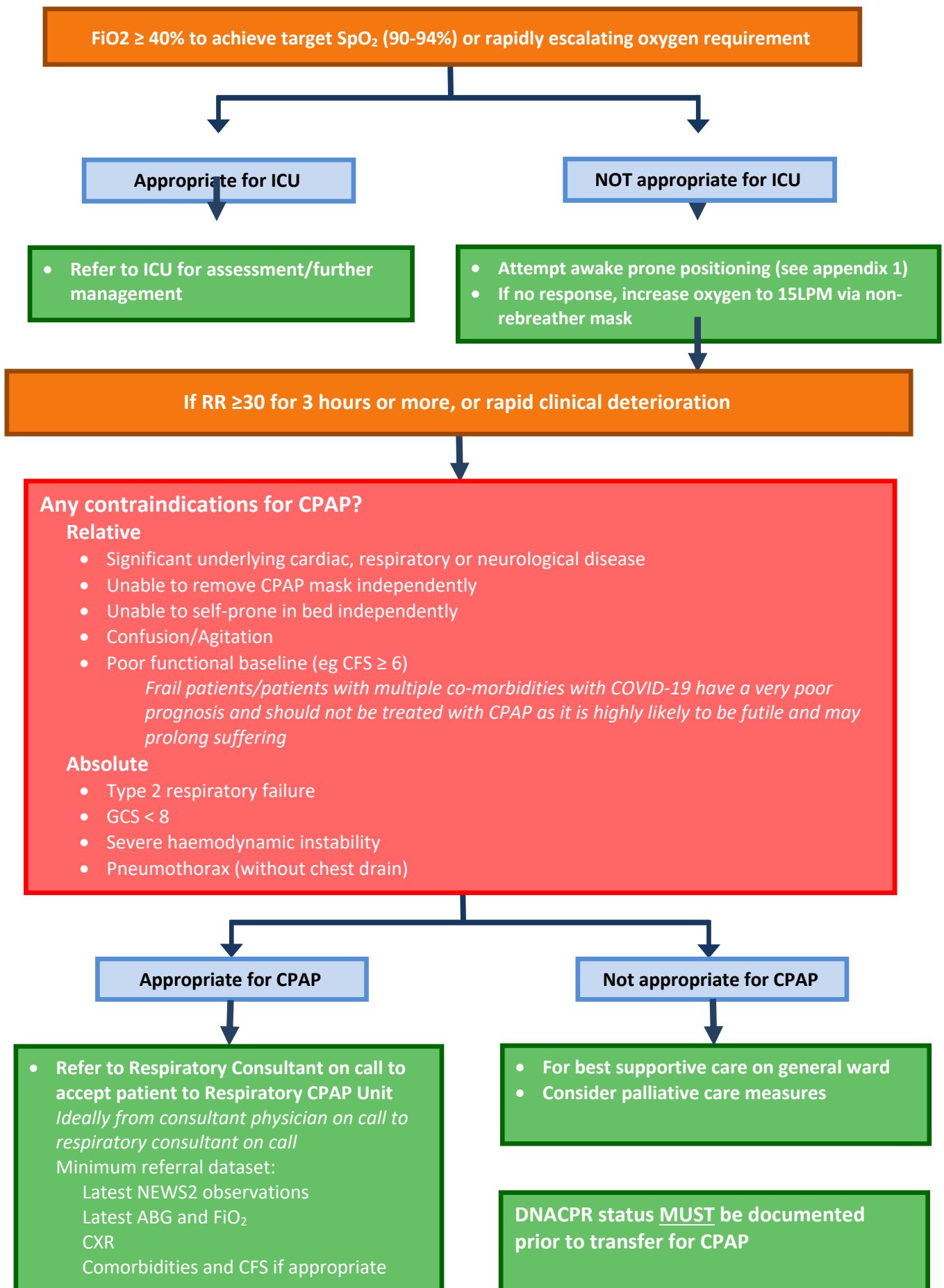
Clinical Frailty Scale*

 1 Very Fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.	 7 Severely Frail – Completely dependent for personal care, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).
 2 Well – People who have no active disease symptoms but are less fit than category 1. Often, they exercise or are very active occasionally , e.g. seasonally.	 8 Very Severely Frail – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.
 3 Managing Well – People whose medical problems are well controlled , but are not regularly active beyond routine walking.	 9 Terminally Ill - Approaching the end of life. This category applies to people with a life expectancy <6 months , who are not otherwise evidently frail .
 4 Vulnerable – While not dependent on others for daily help, often symptoms limit activities . A common complaint is being “slowed up”, and/or being tired during the day.	
 5 Mildly Frail – These people often have more evident slowing , and need help in high order IADLs (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.	
 6 Moderately Frail – People need help with all outside activities and with keeping house . Inside, they often have problems with stairs and need help with bathing and might need minimal assistance (cuing, standby) with dressing.	

Scoring frailty in people with dementia
The degree of frailty corresponds to the degree of dementia.
Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.
In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.
In **severe dementia**, they cannot do personal care without help.

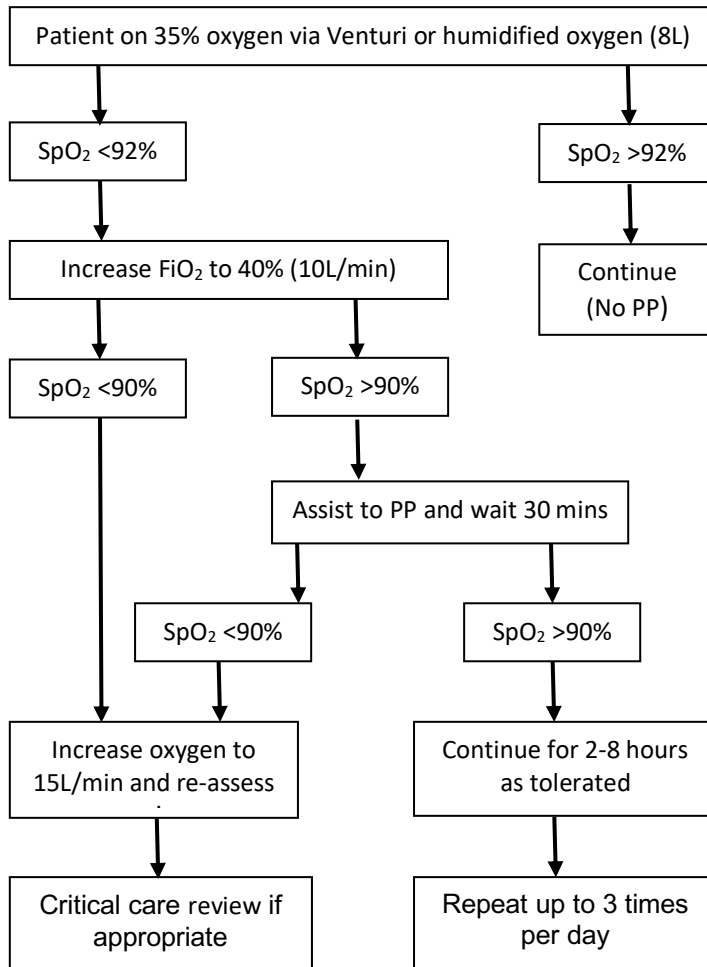
* 1. Canadian Study on Health & Aging, Revised 2008.
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For patients without pre-existing Respiratory Disease:



APPENDIX 2: AWAKE PRONE POSITIONING (PP)

Guidance for awake prone positioning (PP) of patients prior to a trial of CPAP



Assess for Suitability

SpO₂ <92% on minimum of 8LPM O₂ (35% via a venturi or humidified circuit)
 Bilateral changes on CXR or CT Chest
 COVID-19 is confirmed or highly likely
Able to co-operate with procedure

Exclusion/Cautions:

Resp: RR >40 / Respiratory distress / secretions
 +++
 CVS: HR >125 / SBP <100
 Neuro: Unable to follow instructions
 MSK: Unstable spine / Body habitus (BMI >40)
 Poor SpO₂ trace

Assisting Patients into Prone Position (PP):

1. Explain plan and position to patient
2. Ask Patient to position themselves unassisted (max assistance of 2) and help with comfort
3. 2-3 pillows under chest allows space between facemask and bed
4. 15° reverse Trendelenburg may aid comfort
5. Continuous SpO₂ monitoring for 30 mins
 Aim 2-8 hours (but stop if discomfort)
If not tolerating or deteriorating then assist supine, give 15L O₂ and escalate as planned

APPENDIX 3:

RESPIRATORY CPAP UNIT: COVID-19 CPAP PRESCRIPTION

Patient Label

Date and Time	
Middle Grade OR Consultant Decision Maker	

Initial Blood Gas (ABG):

Date	Time	pH	pCO ₂	pO ₂	HCO ₃	BE	SaO ₂	FiO ₂ %

Initial CPAP Settings: (Suggest CPAP 10cmH₂O and 10 L/min entrained oxygen)

CPAP Level (cmH ₂ O)	Oxygen (L/min)	Target SpO ₂	
		88-92% <input type="checkbox"/>	
		90-94% <input type="checkbox"/>	
Has CPAP been explained to patient:	Yes	No	If No, why not:
Resuscitation Status:			

Assess CPAP response in 30 – 60 mins, review by Middle grade doctor or Consultant

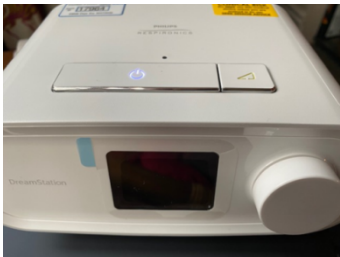



Clinical Status	Suggested Action
Good Response (RR and SpO ₂ stable or improved)	Continue CPAP and O ₂ at current settings, monitor patient closely for further 6 hours.
No improvement (e.g. SpO ₂ below target, increased RR)	Adjust CPAP settings: <div style="text-align: center; margin: 10px 0;"> <div style="border: 1px solid black; padding: 5px; display: inline-block; background-color: #e6f2ff;">Increase entrained oxygen to 15 L/min</div> <div style="font-size: 2em; color: blue; margin: 5px 0;">↓</div> <div style="color: red; font-weight: bold; margin: 5px 0;">Assess Response</div> <div style="border: 1px solid black; padding: 5px; display: inline-block; background-color: #e6f2ff;">If insufficient improvement, Increase CPAP to 15cmH₂O</div> </div> <p><i>If struggling to tolerate CPAP, reduce PEEP as required to a minimum of 10cmH₂O</i></p>
Unable to tolerate CPAP or Further Deterioration (despite optimisation of CPAP settings)	If not for further escalation, consider whether palliation is appropriate

APPENDIX 4: COVID-19 CPAP PATIENT INTERFACE / FILTER / OXYGEN SET-UP GUIDE

This guide is intended to show the user how to set up the CPAP circuit. A separate guide on how to set up the CPAP Dreamstation is available.


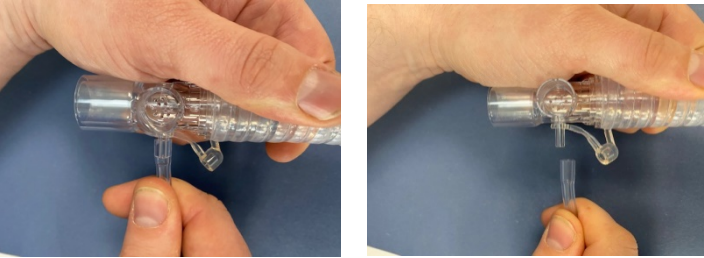

The addition of an HMEF bacterial / viral filter between the mask and the exhalation port reduces the risk of aerosolisation of Covid-19 virus.

Equipment required

<p>Dreamstation CPAP ventilator</p>	
<p>Interface (Mask, full face mask, Hood (if available)) For size guide re mask fit please see mask packaging</p>	
<p>Connecting tubing with bacterial/viral filter</p>	
<p>HMEF Filter (square or round)</p> <p>These are bi-directional (It doesn't matter which way round they are fitted)</p> <p>Can be used up to 72 hours (if remains dry)</p>	

Set up

A. Tubing / filter

<p>Open tubing set</p>	
<p>Disconnect narrow tubing from side port at non filter end (A)</p>	
<p>Close / cap off the inlet pipe Discard narrow tubing.</p>	

Important step

Connect HMEF filter between mask and tubing.

HMEF Filter is bi-directional – It doesn't matter which way round it is fitted.



Filtered air from the patient will escape through the side port of the tubing.



Connect fixed filter end of tubing to CPAP machine



B. Entrained Oxygen

For mask:
Attach entrained oxygen from wall directly to mask port



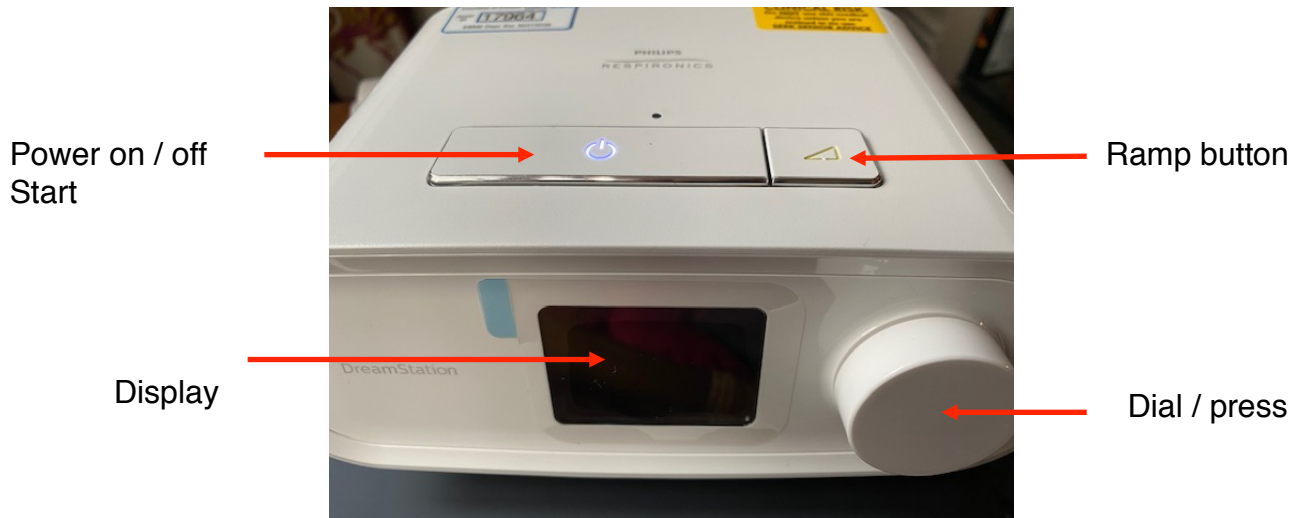
For full face mask:
Attach entrained oxygen from wall to side of valve



APPENDIX 5:

PHILLIPS DREAMSTATION COVID-19 CPAP SET-UP GUIDE

This guide is intended to show the user how to operate the ventilator and also set / alter the CPAP (Continuous Positive Airway Pressure) ventilator settings
This guide should also be read in conjunction with CPAP interface / filter / oxygen set-up guide



1. Plug power cable into the machine



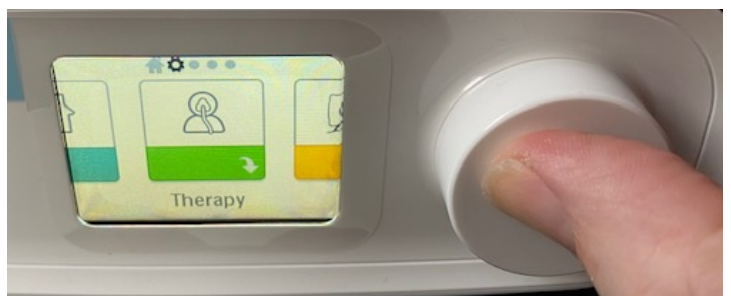
2. Press power on

3. Turn dial button until 'My Set up' seen



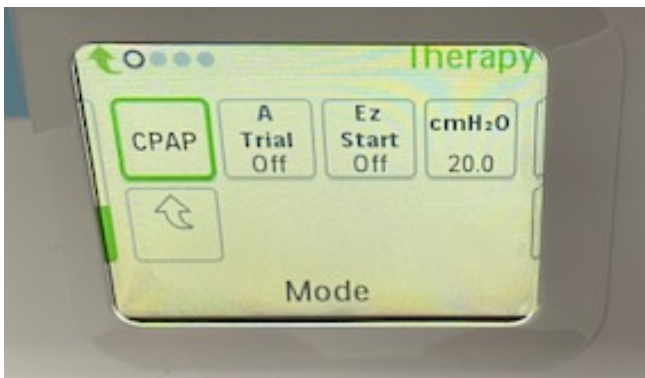
4. Press Ramp button **and** Dial for 5 seconds until screen changes to 'Therapy'

5. Press the dial button

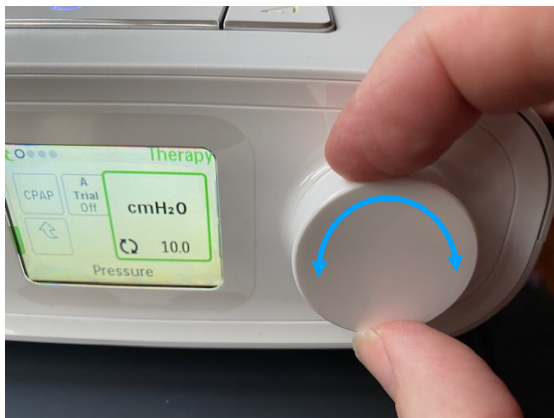


6. Turn the dial to the cmH₂O box

The box outline turns green, press the dial button to select.



7. Turn the dial to increase the CPAP pressure
10, 15 cmH₂O. Press / click to save.



8. Turn dial to 'up arrow' to get back to the Main menu / patient mode home

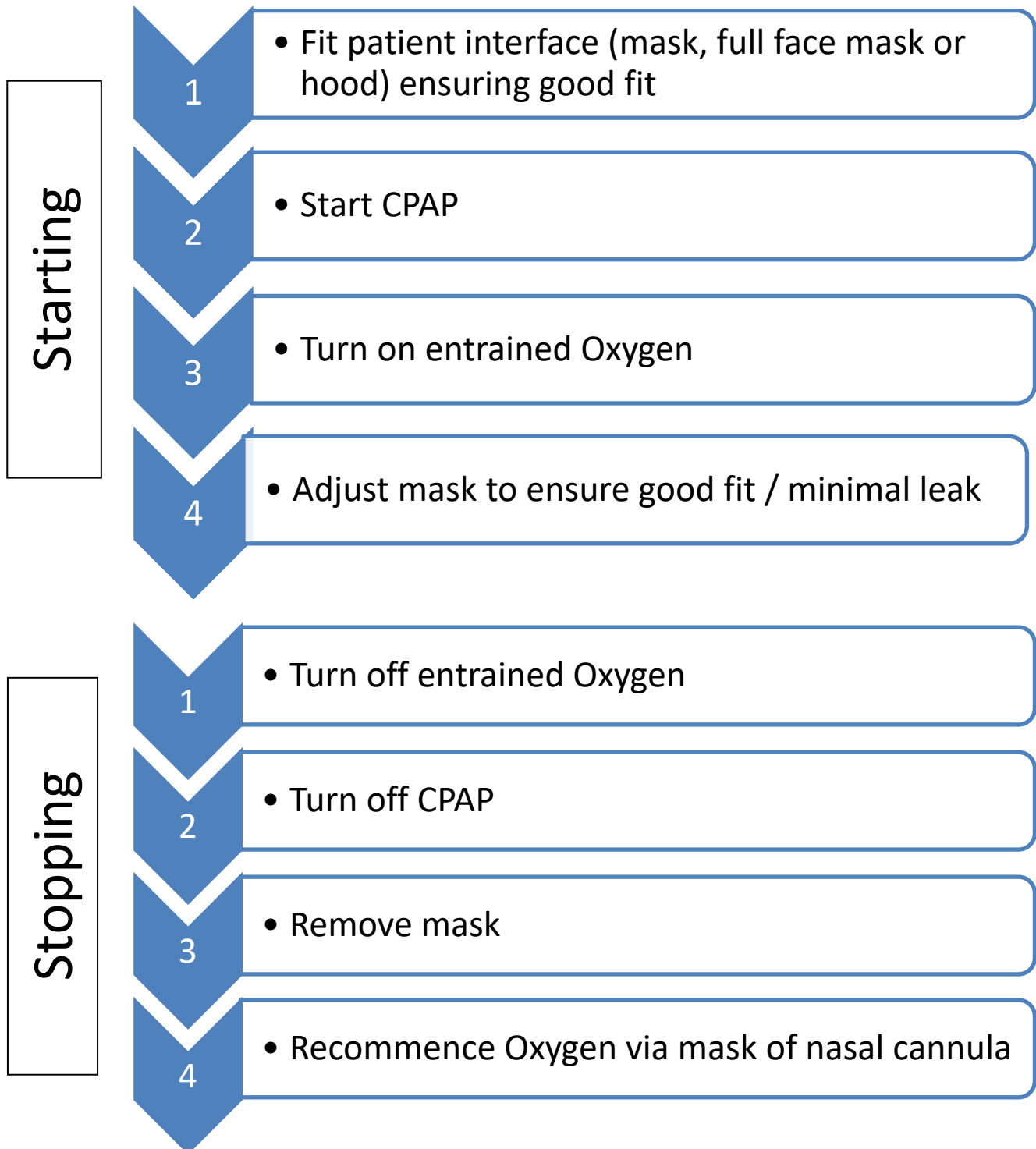


9. Attach the interface (mask, hood) to the patient then press power button - CPAP starts! (See CPAP: Mask / O₂ / filter set up guide)

10. To stop the CPAP , press the power button. Machine will shut down / sleep after 2-3 minutes.

APPENDIX 6: COVID-19 CPAP INITIATION GUIDE

TO REDUCE THE RISK OF INFECTION TO HEALTHCARE WORKERS IT IS IMPORTANT THAT THE ORDER OF ATTACHING THE MASK, STARTING AND STOPPING CPAP AND MASK REMOVAL IS ADHERED TO.



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Type of Document (policy,SOP , Guideline etc)	Policy
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