Royal Derby Hospital Critical Care Unit
Interim clinical guidance for the care of the patient with confirmed or suspected COVID-19 ICU
Version 1.1 - Prepared by Dr Chris Beet
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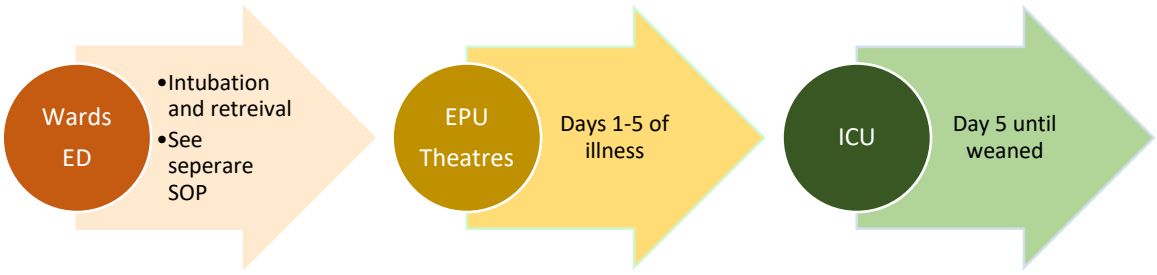
Purpose

This document acts as a guide for the care of a patient with confirmed or suspected COVID-19 beyond the first 1-5 days. This document is a work in progress and may be updated.

Patient pathway / clinical trajectory / general principles

Most patients follow a similar clinical course, and patients will be cohorted into clinical areas according to the stage of their illness.



ICU will focus predominantly on patients who are beyond day 5 of their disease. At this stage, they may have demonstrated a degree of improvement compared with admission. However, a degree of further deterioration is to be anticipated at this stage, usually associated with an increased secretion burden.

The focus at this stage of illness is to identify those who can be weaned from mechanical ventilation while supporting those that deteriorate and managing end-of-life care where appropriate.

THESE PATIENTS ARE AMONG THE HIGHEST INFECTIVITY AND STAFF EXPOSED TO HIGH VIRAL LOADS EARLY IN DISEASE MAY HAVE POOR OUTCOMES. FULL HCID PPE AND USE A HMEF!

Ventilation and sedation

- Lung-protective ventilation is vital to avoid ventilator-induced lung injury.
- The patient's height should be measured with a tape measure, **not estimated** to determine their ideal body weight.
- The target tidal volume should be **6ml/kg ideal body weight** in the first instance. This may require adjustment, but in general, the respiratory rate should be used to control $PaCO_2$
- Aim to minimise peak pressure (ideally <35cmH_2O)
- **The target SpO_2 is 88-92%**
- Use permissive hypercapnia: **pH > 7.25 is the target**, do not target 'normal' $PaCO_2$
- Initially, patients should be sedated with midazolam, fentanyl and cisatracurium

- Use I:E ratio 1:1.5 or 1:1 for higher FiO_2 requirements
- As the patient improves, aim to discontinue cisatracurium in the first instance, then aim to switch the midazolam to propofol to facilitate weaning.
- Aim to establish the patient on spontaneous breathing as soon as possible.

FiO_2	**PEEP (cmH_2O)**	**Sedation**	**Mode of ventilation**	**Position**
0.8 or more	10 (initially, can be adjusted)	Midazolam Fentanyl Cisatracurium	V-SIMV	Consider prone
0.7				Consider prone
0.6		Midazolam Fentanyl	BiPAP	Supine
0.5				
0.4	5-8	Propofol Fentanyl	Aim for ASB	Supine
0.3	5			

- The dosing of sedation and cisatracurium will primarily be managed by the ICU nurses, but there are separate guidelines for these.
- N-acetylcysteine is not demonstrated to have any mortality benefit and will not be used.

Prone position ventilation

- This should be considered in all patients with high Oxygen requirements. There is a separate SOP for the technique.
- Patients should be proned for 16 hours.
- When turned supine, review the need for further proning after 4 hours. Avoid deciding earlier as there is often some transient deterioration after returning to the supine position.
- If the FiO_2 remains <0.70, the patient can be left supine. Otherwise, return them to the prone position.
- If the patient does not demonstrate improvement with prone positioning, a further attempt can be made.
- After two attempts, the patient may be considered a 'non-responder' and may not benefit from further proning – discuss this with an ICU consultant.
- Based on our observation, patients beyond day 4-5 do not benefit from proning, but this should not be considered an absolute contraindication.

Weaning of mechanical ventilation

Step 1 – determine suitability for weaning

The patient should meet the following criteria for a minimum of 24 hours – beware of early improvement; this may precede a further deterioration:

- FiO_2 0.30
- PEEP 5cmH_2O
- PaO_2 > 8kPa
- SpO_2> 94%
- Minimal or no noradrenaline
- Normal pH
- Breathing spontaneously on ASB 10-15

Step 2 – perform a sedation hold

Patients on a FiO_2 < 0.40 should have their sedation switched to propofol and fentanyl to facilitate this process.

Stop **all** sedation – do not leave the opiate running for 'background analgesia'. When the patient is starting to wake, commence a spontaneous breathing trial:

- Set the ASB to 0 and leave the PEEP at 5cmH_2O
- Observe the patient for 30 minutes
- **If none of the following criteria is met**, the spontaneous breathing trial has been successful, and the patient can be extubated. Ensure that staff are wearing full PPE before extubating the patient. Extubate the patient to a standard face mask. The use of $HFNO_2$ and/or NIPPV as a 'bridging therapy' is strongly discouraged.
    - Criteria for the failure of sedation hold
        - **Clinical**
            - Agitation
            - Reduced consciousness
            - Sweating
            - Increased respiratory effort
        - **Objective**
            - SpO_2 < 92%
            - Increasing $PaCO_2$
            - HR > 140/min
            - Sys BP > 180
            - Arrhythmia (new)
- **If the spontaneous breathing trial is unsuccessful**, re-sedate the patient with propofol and fentanyl. Aim to identify and address any factors that may have contributed to the failure. Make a further attempt the following day.
- **After two unsuccessful attempts,** a tracheostomy will be considered.
    - There is a dedicated tracheostomy service provided daily by the ENT and MaxFax teams.
    - Tracheostomy will take place in Theatre 9.
    - Consent for the procedure ('two-doctor consent') will be done by the ITU/anaesthetic team.
    - Percutaneous tracheostomy will not be offered

Weaning a patient with a tracheostomy

- Stop **all** sedation as soon as possible after the procedure (as soon as muscle relaxant has worn off). Do not leave the opiate running for 'background analgesia'.
- Establish the patient on ASB as quickly as possible.

- Aim to reduce the level of ASB support daily until the patient is established on **ASB 10 for 24 hours**. At this point, the ASB should not be reduced further. **Commence trache-mask trials.** Use the weaning chart to facilitate this. Use the following schedule as a guide:
    - Day 1 – 1 hour twice daily
    - Day 2 – 2 hours twice daily
    - Day 3 – 4 hours twice daily
    - Day 4 – 6 hours twice daily
    - Day 5 – trache mask from 0800-2200
    - Day 6 – trache mask for 24 hours
    - Day 7 – assess for decannulation

- General principles
    - Weaning **should not be delayed or interrupted** for patient care such as washing/turning/mobilising/physiotherapy
    - All 'rest periods' (i.e. when the patient is not on trache mask) should be on **ASB 10 PEEP 5cmH_2O**. Further reductions in support provide inadequate rest and may precipitate weaning failure.
    - If the patient does not tolerate their target (criteria for failure are similar to those for spontaneous breathing trial), rest on ASB for the remainder of the day. The next day, revert to the last target that the patient was able to tolerate. Avoid starting the process from the beginning.

Antibiotics and antivirals

- Secondary bacterial infection is a recognised complication of COVID-19; therefore, all patients will be treated with IV antibiotics on admission. However, by day 5, the majority of antibiotics will have been discontinued.
    - Temperature, CRP and WCC continue to rise beyond day 5 in COVID-19 patients, and are therefore **not** useful markers for antibiotic stewardship, nor is the evolution of CXR changes
- The routine use of antifungals is not recommended. Candida in sputum is a common finding in ventilated patients and usually represents colonisation. It does not need to be treated.
- The use of antivirals, steroids, hydroxychloroquine and other such agents is lacking in evidence, and these agents **will not be used** at present. All patients will be enrolled in the RECOVERY trial. The R&D team will facilitate this process; you don't need to do anything

COVID-19 results and repeat testing

- COVID-19 sample results usually arrive within 48 hours. Negative patients should be flagged to the ICU team for consideration of transfer elsewhere.
- Routine repeat sampling to confirm negative status is not indicated
- Where there is a high index of clinical suspicion for COVID-19, but the result is negative, repeat testing can be done, but this **must** be discussed with an ICU consultant and microbiology first.
- Clinical suspicion is determined by:
    - History of contact/exposure
    - History of viral prodromal illness (myalgia/malaise/fevers)
    - Dry cough
    - Typical CXR features (interstitial picture – consolidation suggests alternative diagnosis)
    - Lymphopenia on admission

Nutrition and bowel care

- Commence enteral feeding as soon as the position of the NG tube has been confirmed (this should have been inserted on admission). Refer to the interim guidance for NG tube confirmation.
- NG aspirates of up to 500mls are not indicative of feeding failure, and feeding should be continued unless aspirates consistently exceed this amount
    - Use prokinetics if the NG aspirate volume exceeds 500ml (metoclopramide 10mg TDS IV for 5 days maximum)
- Commence laxatives early (ideally on admission) – senna and lactulose are recommended. Do not discontinue them unless there are persistent loose stools.
- Commence ranitidine 50mg TDS IV for 5 days or until full NG feed is established, whichever is earlier

Fluids and electrolytes / AKI

- Aim for K^+ >4.0 in most patients. Replacement should be enteral if the patient has a working gut, or neat K^+ via CVC. Avoid KCL diluted in fluids.
- Magnesium replacement is not necessary unless very low or the patient has arrhythmia
- We anticipate that patients will develop hypernatraemia. This does not need to be corrected unless extremely high.
- Patients in the weaning phase of the illness will benefit from PO_4^- supplementation if the serum level is <0.60
    - The enteral absorption of PO_4^- is excellent, and this is the preferred route of administration in patients that have a functioning gut. Sando-PHOS 2 tabs TDS via NG for a maximum of 5 days is more than sufficient
    - Phosphate polyfusors are expensive and wasteful (usually only ¼ of the bottle is given). Avoid them unless the patient is not absorbing NG feed (even when the serum PO_4^- is very low)
- The use of 'maintenance fluids' is highly detrimental in patients with ARDS and is strongly discouraged
- Boluses of Hartmann's 250ml can be used where necessary
- Urine output target is 0.2-0.3ml/kg/hr
- Patients who are generating a positive cumulative fluid balance will have a poorer outcome and diuresis should be commenced if the cumulative balance >2000ml.
    - Furosemide 20mg QDS IV
    - Spironolactone 500mg BD NG
    - A one-off dose of acetazolamide 500mg IV
- Most patients will develop mild-moderate AKI. This is not a reason to commence IV fluids. Very few patients will require CVVH. The decision to start CVVH will be made by the ICU team.

Cardiovascular support

Septic shock is unusual in viral pneumonia and should prompt consideration of an alternative or co-existing diagnosis. Noradrenaline is the first-line vasopressor.

Hydrocortisone 50mg QDS IV should be administered for septic shock (Noradrenaline >0.2 mcg/kg/min).

Myocarditis is a recognised complication of COVID-19, and this must be considered in a haemodynamically unstable patient. An echocardiogram will be required urgently. Please discuss these patients with the ICU team.

Resuscitation status and end-of-life care

The outcome of cardiac arrest in a ventilated, hypoxic patient is poor, and CPR is an invariably futile intervention, that in the context of COVID-19, places staff at significant risk of inoculation. Consider a RESPECT form for most patients. This **must** be communicated to the family. Remember that this is a medical decision, and you are not obliged to provide CPR. You are only required to inform the family of your decision (not seek their permission). These decisions are best made with a second opinion.

The decision to withdraw life-sustaining treatment will be made by an ICU consultant, usually supported by a second opinion. Clamp the tube and stop the ventilator. Discontinue any infusions except sedation. Discuss end-of-life care with the family by telephone.

Repeat imaging and other issues

- Perform a CXR at day 6
- We have observed in our cohort that IV paracetamol, when administered for pyrexia, causes significant hypotension in COVID-19 patients. Paracetamol **should not** be administered for pyrexia (we do not recommend enteral paracetamol)
- Avoid CTPA for investigation of PE. Consult the ICU team if PE is suspected
- Please do not independently or routinely make referrals to the ECMO service. This will be done by an ICU consultant.