Covid 19 – guideline for basic adult intensive goals to support those not normally working in Intensive Care Medicine

All guidelines referenced can be found on the intranet – directory – critical care.
This guideline is to provide a basic framework for ICU goals for anaesthetists not normally working in critical care who may need to support critical care services during a pandemic. COVID 19 is a new disease and recommendations are constantly evolving. We should continue to maintain best practice in standard ICU goals/attention to detail – and aim to do the basics well while continuing to evaluate new data as it becomes available.

1 Airway

1.1 Follow NHSL guidance on COVID 19 intubation action card and use COVID 19 intubation checklist with particular attention to PPE.

1.2 A SACETT tube should be used for intubation given the high risk of VAP in this patient group.

1.3 At RIE, tracheal tubes should routinely be cut – but please consider that tubes may need to have a clamp applied in the event of circuit disconnection, and many of these patients will be prone, so allow sufficient tube length to do this. SJH ICU prefer tubes left uncut in COVID patients.

1.4 Be cautious around extubation. COVID 19 patients seem to be having a high extubation failure rate – some with airway swelling and stridor.

2 Breathing

2.1 The goal of invasive ventilatory support is safe physiology while avoiding injurious ventilation. PaO_2 should be targeted at > 8 KPa and hyperoxia should be avoided. hypercapnoea should be tolerated as long as the hydrogen ion is < 60. See NHSL guidance on ARDS management, but be aware that patients in the early phase of disease may have preserved compliance and may not behave as classical ARDS.

2.2 Lung protective ventilation is the cornerstone of supportive therapy. Initial mode of ventilation should be SIMV with autoflow if using a Drager Evita.

2.3 Tidal volumes should be kept to 6 ml/kg of **PREDICTED** body weight or less. Predicted body weight can be calculated from the olecranon-ulnar ruler posters in the ICU. If these are not available use the patient's height - this should be available on TRAK or from patient relatives – and calculate using online calculator or formula in ARDS guidance.

2.4 We should avoid plateau pressures higher than 30 cmH_2O, and aim for plateau pressures < 26 cmH_2O where possible.

2.5 Set initial PEEP to 10 cmH_2O and titrate up or down depending on response/FIO_2/airway pressures. A higher PEEP strategy is suggested for patients with moderate or severe ARDS – P:F ratio < 27 KPa. Some patients with COVID seem to have compliant lungs in the early ICU stage of the disease – and a less aggressive PEEP strategy early on may be beneficial.

2.6 Initial I:E ratio should be 1:2 – this can be changed to 1:1 if airway pressures are high. There is no evidence to support inverse ratio ventilation.

2.7 Prone ventilation is an evidence based intervention for ARDS patients with P:F ratio < 20 KPa and FIO2 > 0.6 – and we should do this in these patients. There is a suggestion that COVID 19 patients will respond well to proning. See NHSL proning guideline and COVID 19 proning simulation scenario and video. We should aim to prone this patient group early and may need to do this multiple times.

2.8 Neuromuscular blocking agents should be considered for patients with moderate/severe ARDS – P:F ratio < 20 KPa). We have found that many of the COVID patients are weak in the recovery phase – and if using neuromuscular blocking drugs should aim to wean these as early as possible and ideally within 48 hours of intubation.

2.9 Patients failing conventional ventilation should be considered for ECMO. The ECMO National Referral Pathway can be accessed via Signpost. Direct dial to Aberdeen Royal Infirmary is 01224 607 018, or the ECMO co-ordinator is on 07917068628 if any issues accessing referral process through signpost/referapatient.

2.10 When patients are in the recovery/weaning phase we will use CPAP/ASB as the mode of ventilation.

2.11 Many of these COVID 19 patients will require a tracheostomy to wean from invasive ventilation. Decision making around timing of tracheostomy is complex and guidance is evolving.

2.12 When a decision is made to escalate beyond ward based oxygen therapy RECOVERY RS suggested that CPAP was the non-invasive therapy of choice. Some patients will not tolerate facial CPAP well, and HFNO2 combined with self proning is a reasonable alternative.

2.13 Decision making around when a trial of non-invasive support has failed, and the timing around escalation to invasive ventilation, is challenging and needs to be guided by senior clinician decision making at the bed-side.

3 Circulation

3.1 In most ICU patients we will target a MAP of > 65 mmHg.

3.2 Beyond the resuscitation phase we should aim to avoid an excess positive fluid balance. Because these patients are presenting to critical care often around 7-14 days into their

illness they are often dehydrated at presentation and may need a degree of careful fluid resuscitation.

3.3 Some invasively ventilated patients will need vasopressor support to achieve MAP goals.

3.4 First line agent for blood pressure support will be noradrenaline for most patients. Single strength noradrenaline in ICU is 8 mg % (8mg in 100 ml or 20mg in 250ml).

3.5 If patients are requiring greater than 20 ml/hour of single strength noradrenaline we should consider a focused echo to help elucidate the cause. If the cause is thought to be predominantly vasodilatory shock as a result of sepsis we should consider adding in hydrocortisone (50mg qds) and vasopressin. Dexamethasone should be stopped while on this dose of hydrocortisone, and restarted again when hydrocortisone is discontinued, if still within 10 days of commencement of steroid therapy. See NHSL guidance on vasopressor resistant septic shock.

3.6 We do not routinely use cardiac output monitoring, but PICCO monitoring is available.

4 Sedation/neurological

4.1 Propofol and alfentanil are first line analgo-sedation for most ICU patients.

4.2 Propofol should not be administered at doses of > 4 mg/kg/hour because of risk of Propofol infusion syndrome.

4.3 Benzodiazepines should generally be avoided where possible due to risks of delirium, but if there become issues with supply of propofol/alfentanil then midazolam/morphine is an alternative sedation strategy.

4.4 Clonidine is our current second line agent, with dexmedetomidine available for challenging agitation/delirium. See NHSL guidance for both of these drugs.

4.5 In the acute phase of ARDS we will often target deep sedation to ensure lung protective ventilation. During the recovery phase/ if deep sedation is not needed we will aim to get patients breathing spontaneously with a sedation target of “eyes open to voice”.

4.6 All patients in ICU are screened for delirium. Please see NSHL guidance on delirium management.

5 Renal/electrolytes/fluids

5.1 Beyond the resuscitation phase we will usually aim to target a negative fluid balance in ARDS patients. A conservative fluid strategy is associated with improvements in oxygenation and ventilator free days. This often requires furosemide. On some occasions it is necessary to institute renal replacement therapy to achieve a negative fluid balance. We need to

balance this against the fact that due to the late presentation to critical care COVID 19 patients are often dehydrated at the start – and it may be that we are best to aim to avoid an excess positive balance rather than overly aggressively target a negative balance in the early phases of the illness.

5.2 Standard maintenance fluid is 1 ml/kg/hour of 0.18% saline/4% dextrose. If hyponatraemia develops this should be changed to plasmalyte. If the patient is on multiple intravenous infusions or has fluid overload the rate of maintenance fluid should be reduced or stopped. Maintenance fluid should be stopped when enteral feed is established.

5.3 We should keep electrolytes including sodium, potassium, magnesium and phosphate in the normal range. There is NHSL guidance on electrolyte replacement.

5.4 The mode of renal replacement therapy in critical care is continuous veno-venous haemodialysis (CVVHD) with regional anticoagulation with citrate used as first choice anticoagulation. There are extensive guidelines on RRT and citrate anticoagulation available in NHSL.

5.5 Classical indications for RRT include hyperkalaemia, refractory acidosis, uraemia and fluid overload. We should aim to initiate RRT before major complications of AKI develop, and in ARDS patients we may initiate early to manage fluid balance.

6 Gastrointestinal

6.1 We should aim to feed all patients enterally through a nasogastric tube where possible.

6.2 Metoclopramide and/or erythromycin should be added in as prokinetics if aspirates are high.

6.3 It is important to ensure patients in critical care maintain bowel movements. See NHSL constipation guideline.

6.4 Patients should receive pantoprazole 40 mg IV daily for stress ulcer prophylaxis. This should be reviewed when enteral feeding is established.

7 Haematology

7.1 A haemoglobin target of 70 g/L is the standard for most ICU patients. This can be modified to 90 g/L if there is a particular indication e.g. acute myocardial ischaemia or traumatic brain injury.

7.2 All patients should receive prophylactic dalteparin unless there is a contraindication in line with NHSL guidance. There is specific enhanced thromboprophylaxis guidance for COVID 19 patients which should be followed, and all of these patients should have anti Xa level monitoring and discussion with haematology.

7.3 All patients should have TEDS and flowtrons while immobile.

7.4 Lymphopaenia and mild thrombocytopaenia seems to be common in patients with COVID 19.

8 Infection – Please also refer to NHSL "TREATMENT OF ADULTS HOSPITALISED WITH COVID-19 WITH CORTICOSTEROIDS AND/OR REMDESIVIR AND/OR TOCILIZUMAB AND/OR CASIRIVIMAB/IMDEVIMAB " guidance – the intranet version is frequently updated.

8.1 Patients with severe or critical COVID 19 as defined by the WHO should receive treatment with corticosteroids. This is any patient with: ARDS, sepsis or septic shock, other conditions that would normally need life-sustaining therapies such as ventilation or vasopressor therapy, signs of severe respiratory distress, oxygen saturation <90% (or deteriorating) on room air, increased respiratory rate (>30). In practice any patient needing critical care admission with COVID 19 will fit into this group. Patients should receive 6 mg dexamethasone once daily by either IV or enteral route for 7-10 days. Consideration should be given to gastric ulcer prophylaxis. Intravenous hydrocortisone 50 mg tds is an alternative if dexamethasone is not available or is contra-indicated. In pregnancy RCOG guidance is that intravenous hydrocortisone 80 mg bd, or oral prednisolone 40 mg od, is used instead of dexamethasone. At day 10 if there is not clinical improvement consideration can be given to extending the course of corticosteroids on a case by case basis.

8.2 If patients have been commenced on remdesivir pre ICU this should be continued for the prescribed 5 day course. Patients should receive a maximum of 5 days of remdesivir. In patients with significant immunocompromise consideration should be given to completing an extended 10 day course of remdesivir, in consultation with ID. If the patient is not receiving remdesivir at time of ICU admission, remdesivir use should be discussed with the ID Consultant on call on a case by case basis, particularly if there is any immunocompromise.

8.3 Following results from the REMAP-CAP and RECOVERY trials it is recommended that clinicians consider prescribing intravenous IL-6 inhibitors (tocilizumab or sarilumab) for selected hospitalised patients with COVID 19. This includes patients within 24-48 hours of commencement of any form of respiratory support (including high flow nasal oxygen therapy) who have not already received an IL-6 inhibitor as part of this admission. Tocilizumab should be administered as a single dose of 8 mg/kg, up to a maximum of 800 mg, by intravenous infusion. Sarilumab should be administered as a single dose of 400 mg by intravenous infusion. Cautions include pre-existing (non COVID) infection that may worsen, an ALT > 5 times the upper limit of normal and pre-existing immunosuppression. Sarilumab should not be administered if the platelet count is < 150 x 10^9/L. Both tocilizumab and sarilumab cause prolonged depression of CRP levels, making CRP a less reliable marker of active infection. The effects of IL-6 inhibitors on PCT in patients with COVID-19 are not fully known. The use of an IL-6 inhibitor must be documented in the patient's notes using

the Trak short code \IL6COV, and clinicians **must ensure the GP is aware the patient has received tocilizumab** and provide information to the patient to such effect.

8.4 The combined neutralising monoclonal antibody therapy "Ronapreve", containing casirivimab and imdevimab was found in the RECOVERY trial to reduce the relative risk of mortality by 20% in hospitalised patients with COVID-19 who had not mounted an antibody response of their own to the virus. To be eligible for this therapy hospitalised patients with COVID 19 must be negative for serum anti-spike antibodies against SARS-CoV-2. The antibody test can be either point of care or lab based. The recommended dose of casirivimab and imdevimab is 2.4g (1.2g each of casirivimab and imdevimab) to be administered as a combined single intravenous infusion. The use of ronapreve must be documented in the patient's notes using the Trak short code \RONACOV. Patients with hospital onset of COVI-19 who were hospitalised for other reasons can also be considered for Ronapreve therapy, especially if they are thought to be at high risk of deteriorating to severe COVID-19 disease, or have an underlying condition that could be destabilised by COVID-19 infection. Patients in this group who subsequently deteriorate can be considered for a second dose of Ronapreve. The use of Ronapreve in this group, hospitalised for other reasons, should be discussed with ID.

8.5 The evidence and guidance regarding novel therapies is constantly evolving. As such all patients admitted to critical care with COVID 19 should be screened for eligibility for ongoing trials by the research team and have their management discussed with an ID physician.

8.6 Patients should receive respiratory investigation in line with NHSL COVID 19 order set, and new guidance on the diagnosis and virological monitoring of COVID 19 patients in the ICU. We should aim to send sputum/ an endo-tracheal aspirate for virology in addition to a throat swab.

8.7 Bronchoscopy carries risk of deterioration to the patient and risks to healthcare workers performing the procedure. If the patient develops a ventilator associated pneumonia, or there is a particular reason to perform a bronchoscopy (such as ruling out PJP in an immunocompromised patient) this can be assessed on a case by case basis, and consideration given as to whether a BAL or miniBAL is the safest investigation.

8.8 Many patients will have been commenced on antibiotics to treat a community acquired pneumonia at the onset of illness. The need for antibiotics should be reviewed daily and in the absence of positive cultures we would usually discontinue after a short course e.g. 5 days.

8.9 There should be a high index of suspicion for COVID 19 Associated Pulmonary Aspergillosis (CAPA) in COVID 19 patients. If there is a stepwise deterioration in respiratory function then there should be early discussion with Microbiology/ Infectious Diseases regarding consideration of empirical anti-fungal therapy. In addition to BAL/MiniBAL mycology testing, a BAL Galactomannan test should be requested. From early 2022, Aspergillus antigen testing on BAL sampling will replace BAL Galactomannan testing. Serum

Aspergillus antigen testing will be possible if a BAL/MiniBAL cannot be safely obtained. Aspergillus antigen testing on ETA samples is not validated. If empiric treatment is being started this should be as per the empiric "mould" therapy guidance in the antimicrobial companion app.

8.10 A Hyperinflammatory state, with features of secondary HLH, has been described in some patients with COVID 19. This should be considered if there is lack of clinical improvement. Additional blood tests including ferritin, d dimers, triglycerides, CRP and PCT; and calculation of the 'H score' may be useful in guiding MDT discussions. Some patients may benefit from further steroids and immune modulation. These patients require an MDT approach on a case by case basis.

9 Lines

9.1 All lines should be reviewed daily and removed if not needed or inflamed.

9.2 Central venous lines and dialysis lines should be considered for change from day 7 onwards as risks of infection increase beyond this time point.

9.3 PVCs should be considered for change after 72 hours.

10 Bundles and goals

10.1 Every day we should set a mobilisation goal, a sedation goal, a fluid balance goal and a ventilation goal.

10.2 All antibiotic indications and review dates should be reviewed daily.

10.3 All radiology should be reviewed daily.

10.4 We should adhere to care bundles to prevent ventilator associated pneumonia and catheter related blood stream infections.

10.5 "FLATHUG" is a good checklist to utilise on every patient.
F is review of feed and fluids.
L is review of all lines.
A is review of analgesia and sedation.
T is review of thromboprophylaxis.
H is ensuring the patient is nursed 30 degrees head up.
U is considering ulcer prophylaxis – both prescribing and stopping.
G is ensuring glycaemic control – we target a blood glucose of 5-10 mmol/L (see NHSL guidance on intravenous insulin therapy in critical care).

Critical Care Guidelines
FOR CRITICAL CARE USE ONLY

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