

Care of COVID-19 Patients in Surguja

GUIDANCE DOCUMENT

TABLE OF CONTENTS

1. <u>Approach to a patient in ICU/Emergency</u>	<u>2-3</u>
2. <u>Predicting prognosis in patients with COVID</u>	<u>4</u>
3. <u>Treatment of severe/critical disease</u>	<u>5</u>
4. <u>Critical care checklist and lines in ICU</u>	<u>6-7</u>
5. <u>Acute resuscitation and ICU management- acute hypoxemic respiratory failure</u>	<u>8-11</u>
6. <u>Medications</u>	<u>12-16</u>
7. <u>Final steps and other considerations</u>	<u>17-18</u>
8. <u>Appendix</u>	<u>19-20</u>

Approach to a patient in ICU/Emergency

WHO criteria

Critical COVID-19 – Defined by the –

criteria for acute respiratory distress syndrome (ARDS), sepsis, septic shock, or other conditions that would normally require the provision of life-sustaining therapies such as mechanical ventilation (invasive or non-invasive) or vasopressor therapy.

Severe COVID-19 – Defined by any of: ◦ Oxygen saturation 30 breaths/min in adults and children > 5 years old; ≥ 60 breaths/min in children < 2 months old; ≥ 50 in children 2–11 months old; and ≥ 40 in children 1–5 years old; ◦ Signs of severe respiratory distress (accessory muscle use, inability to complete full sentences, and, in children, very severe chest wall indrawing, grunting, central cyanosis, or presence of any other general danger signs).

The oxygen saturation threshold of 90% to define severe COVID-19 was arbitrary and should be interpreted cautiously when used to define disease severity. For example, clinicians must use their judgment to determine whether a low oxygen saturation is a sign of severity or is normal for a given patient with chronic lung disease. Similarly, a saturation > 90–94% on room air is abnormal (in patient with normal lungs) and can be an early sign of severe disease, if patient is on a downward trend. Generally, if there is any doubt, it is suggested to err on the side of considering the illness as severe.

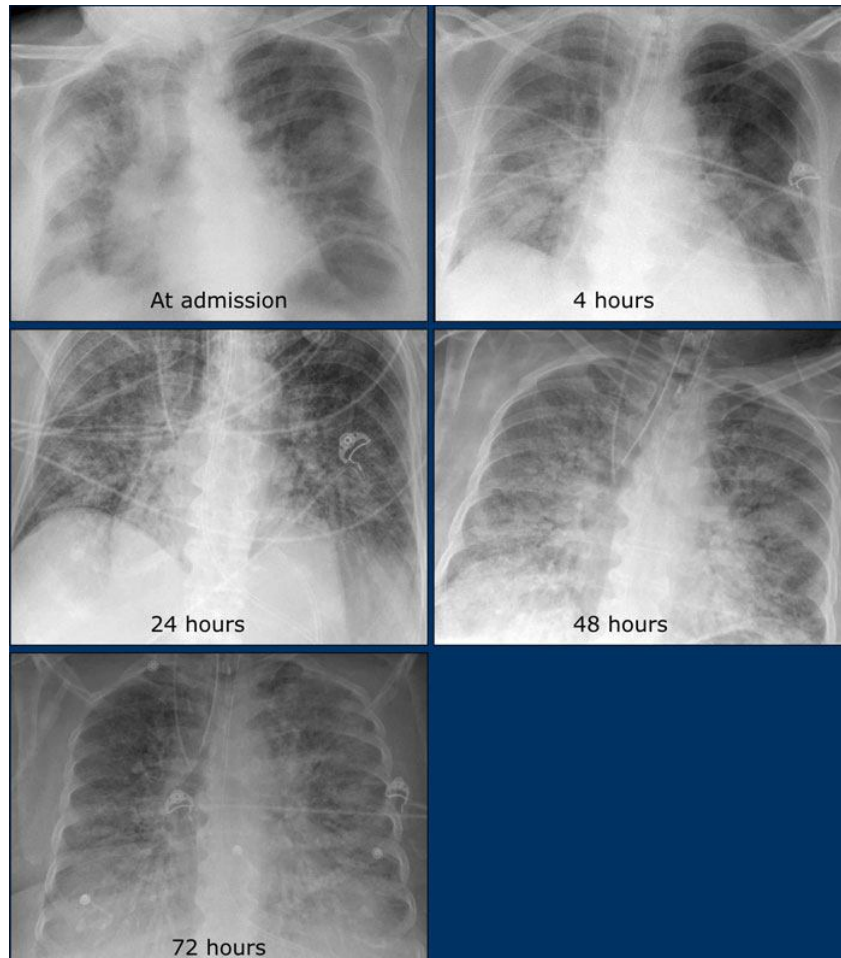
Basic Workup for an Admitted Severe Infection COVID-19 Patient, Presumed

Blood

- CBC (aka TC / DC)
- Serum Electrolytes
- Serum Creatinine
- CRP
- ALT
- PT/INR
- Optional- ABG, IL-6, Ferritin, d-dimer

Imaging

- Chest X-ray
 - What might a COVID-19 X-ray look like?
 - Ground glass opacifications and consolidations in bilateral lungs often with an either peripheral or diffuse distribution



(Taken from: The Scope email newsletter, 17 April 2020)

Rule Outs of Other Diseases:

- PS-MP or RDK for malaria
- + / - ECG (for myocardial infarction though confounded by COVID-19 myocarditis)

Consider repeat labs q24h or on an SOS basis.

Predicting prognosis in patients with COVID-

Table 2 | Final 4C Mortality Score for in-hospital mortality in patients with covid-19. Prognostic index derived from penalised logistic regression (LASSO) model

Variable	4C Mortality Score
Age (years)	
<50	—
50-59	+2
60-69	+4
70-79	+6
≥80	+7
Sex at birth	
Female	—
Male	+1
No of comorbidities*	
0	—
1	+1
≥2	+2
Respiratory rate (breaths/min)	
<20	—
20-29	+1
≥30	+2
Peripheral oxygen saturation on room air (%)	
≥92	—
<92	+2
Glasgow coma scale score	
15	—
<15	+2
Urea (mmol/L)	
≤7	—
7-14	+1
>14	+3
C reactive protein (mg/dL)	
<50	—
50-99	+1
≥100	+2

Comorbidities- Chronic cardiac disease, chronic kidney disease (Egfr<30), Malignant neoplasm, Moderate to severe liver disease, chronic lung disease (excluding asthma), clinically defined obesity

Risk group	Derivation cohort		Validation cohort	
	No of patients (%)	No of deaths (%)	No of patients (%)	No of deaths (%)
Low (0-3)	2574 (7.3)	45 (1.7)	1650 (7.4)	20 (1.2)
Intermediate (4-8)	8277 (23.3)	751 (9.1)	4889 (21.9)	486 (9.9)
High (9-14)	18091 (51.0)	6310 (34.9)	11664 (52.2)	3666 (31.4)
Very high (≥15)	6521 (18.4)	4320 (66.2)	4158 (18.6)	2557 (61.5)
Overall	35463	11426	22361	6729

Treatment of Severe/Critical disease-

1. **Oxygen therapy-** as per **Oxygen therapy in COVID document**
2. **Steroid-** Dexamethasone 6 mg od or Prednisolone 40 mg OD or Methyl Prednisolone 32 mg OD or Hydrocortisone 50 mg TID. One can go upto 1-2 mg/kg equivalent of Methyl Prednisolone for 5-10 days for all severe and critical patients.
3. **Enoxaparin- 1mg/kg OD or 0.5 mg/kg BD or Unfractionated Heparin 5000 Unit S/C BD in the absence of any contraindications.**
4. **Remdesivir-** to be considered based on a decision of a senior clinician for patients-
 - a) within 10 days of symptom onset
 - b) Without renal or hepatic dysfunction (eGFR<30 and AST/ALT>5 times ULN)Dose- 200 mg I.V. on day 1 f/b 100 mg I.V. OD for the next 4 days
5. **Tocilizumab-** not available at present. This section would be updated soon.
6. **Antipyretic-** Use Paracetamol/Diclofenac as injectable options and Tablet PCM or Tablet Ibuprofen for fever/bodyache/joint pain.
7. **Antibiotics-** antibiotics are not needed to treat COVID illness and are not helpful. Unnecessary use will promote antibiotic resistance and promote fungal infection. Secondary infection at the time of admission to the ICU is not common in COVID. They may be used judiciously in cases where hospital acquired infection is suspected based on clinical condition, lab investigations and certain risk factors like- length of ICU/hospital stay, use of invasive devices like cannulas and catheters, insufficient application of standard precautions and lack of infection control measures, severe underlying patient condition etc.
8. **Ulcer prophylaxis-** for all patients needing NIV/critical disease using Pantoprazole 40 mg I.V. OD or Ranitidine(whichever is available)

DAILY CRITICAL CARE

A systematic, checklist based approach to care produces better patient outcomes across multiple clinical specialties. Use the following mnemonic when rounding on our patients daily: "O FAST HUG BIID LAB FC D(l):

O: Oxygenation- Check SPO₂, Oxygen support modality (O₂ by mask/prongs, flow rate, IPAP/EPAP, HFNC) and document any change in need

- Goal 92 – 96%

F: Fluids / Food – Does this patient need maintenance fluids? Can they eat? In ARDS, we will generally be keeping patients dry.

A: Analgesia: Pain control, often PCM/NSAID plus a narcotic.

S: Sedation: Generally for intubated patients (see below)

T: Thromboprophylaxis: Recall that both immobility (as happens when intubated and sedated) or infection (including COVID-19) are thrombogenic states. For DVT prevention in all COVID-19 patients (without contraindications to DVT prophylaxis), please **use heparin/Enoxaparin**.

H: Head Up: At least 35° for intubated patients

U: Ulcer Prophylaxis: Among the critical ill, generally Ranitidine (**Rantac**) 20 mg IV BD.

G: Glycemic Control: Often q6h GRBS among those who are NPO. Oral / IV steroids will also make pre-diabetics and diabetics very prone to hyperglycemia.

B: Bowel / Bladder: Monitoring of intake and output. Can also include daily weights.

I: Indwelling Lines: A check of every line, every day, if it is functioning, and removal as soon as it is no longer necessary. Often the foley catheter is the first line to go.

I: Inotropic support: is the patient on any inotropic support? Can it be tapered down? If not, why?

D: Drugs: Current medications and a check of dosages (e.g. in setting of acute kidney injury)

LAB: Are any lab reports to be ordered? Pending?

F: Family: Is family updated about patient's status and prognosis? Do they have any questions?

C: Code Status:

D: Disposition: Where should this patient be in the hospital? Generally, either the Respiratory HDU, the Respiratory IPD or, if improved, a safe discharge home (see below).

I: Insurance – is the appropriate Smart Card package (or something similar) blocked?

Lines

- **NG tube placement**
 - May be required for administration of oral meds / nutrition Require N95, goggles or visor, gloves and gown as placement is a high risk, aerosolizing generating procedure
 - In patients not on pressor support, can be used for early enteral nutrition
- **Central lines:** If patient is requiring pressor support for > 24-48 hours AND reasonable possibility of survival, consider placement of central venous catheter. Regularly required in ICU case series published to date.
 - Internal jugular or subclavian or femoral veins
 - Need platelet count and PT / INR < 24 hours old to confirm safety of subclavian site placement
- **Foley – likely required once intubated and sedated**
 - Will tolerate lower hourly urine outputs than we normally do

Acute resuscitation and ICU management- acute hypoxemic respiratory failure in COVID

Before Intubation / Initial Steps

- **Placement of two high quality peripheral IV's** including a second IV cannula in the external jugular vein
 - Latter for possible pressor use
 - May consider pressors running simultaneously with intubation as ICU case series with peri-intubation hypotension
 - **Proning of patients early, both before and after intubation**
 - Frequent position changes, consider left lateral or right lateral decubitus
 - Pregnant women – use left lateral decubitus position to avoid IVC compression
- Is intubation worth pursuing?
 - Decide at admission re: if intubation would be pursued (see criteria below)
 - Family discussion (if possible)
 - Requiring intubation is a very poor prognostic feature Often 10 – 14 days on the ventilator
- Initial lab workup (as per above)

Recognizing ARDS

In higher resource settings, the Berlin Criteria (PaO₂ / FiO₂) can be used to identify patients with ARDS (assuming no evidence of cardiogenic pulmonary edema). In our setting, and assuming either an interstitial filling pattern (“B lines”) on pulmonary Ultrasound or characteristic CXR findings, we will be using the Kigali Modification of the Berlin Criteria⁶:

- SpO₂ / FiO₂ ≤ 315 (and no evidence of cardiogenic / volume overload related pulmonary edema)
 - Example: Patient has an SpO₂ of 88% while on 40% FiO₂
 - $88 / 0.4 = 220$ (worrisome for ARDS)
 - Example: Patient has an SpO₂ of 95% on room air.
 - $95 / 0.21 \sim 452$ (no ARDS)

Avoiding / Delaying Intubation

- Once the patient has an oxygen requirement, they should lie prone in bed as much as possible (with frequent position changes).
 - Place IV's / draw labs prior to proning
- Run patients “dry”
 - 50% of standard maintenance fluids unless clinical state dictates otherwise
 - Diarrhea
 - Pre-renal acute kidney injury (AKI)
- Supplemental O₂: What masks in what order?
 - First: Nasal cannula with surgical mask on top
 - No Aerosol Generating Procedure (AGP) PPE required
 - Second: Venti FaceMasks with Surgical Mask on top
 - No Aerosol Generating Procedure (AGP) PPE required

- **Third: Any form of non-invasive ventilation that provides some PEEP support but does not require the use of a ventilator (with Surgical Mask on top)**
 - Full “tight” facemask via water seal (depth of water correlates with PEEP) with surgical mask on top
 - Bubble CPAP machine with adult sized (size 4 or 5) nasal prongs with surgical mask on top
 - BiPap machine (Default 10 / 5 cm H2O settings) with surgical mask on top
 - Aerosol Generating Procedure (AGP) PPE required
 - **NOTE: Surgical Mask on top appears to decrease aerosol generating risk – needs more elaboration**

For details refer to the document- Oxygen Therapy in COVID

- Non-Standard Indicators for Intubation
 - When hypoxemic, monitor comfort levels and mental status (GCS)
 - Hypoxemia alone not sufficient to intubate
 - When tachypneic, monitor for “tiring out” / respiratory distress
 - Tachypnea alone not sufficient to intubate
 - If etCO2 starts to rise, worrisome

Who do we intubate during COVID-19?

Due to resource limitations and a growing body of anecdotal data, we would like to minimize the number of intubated patients / delay intubation as long as safely possible. This is different than our normal pattern. Please note that 1) tachypnea and 2) hypoxemia are not as clear cut of reasons to intubate during COVID-19 as for other diseases (see above).

FLWSHEET – “Should I intubate this person?”

?: Is a ventilator available?

If no, do NOT intubate If yes, proceed to next question.

?: Does this person look like they will die in the next 5 minutes (BP not recordable, pulse not palpable, no spontaneous respiratory efforts) before the entire team can be safely wearing appropriate PPE?

If yes, do not intubate.

If no, thereafter, at care team’s discretion.

Changes in Our Standard Intubation / Ventilation Protocols for COVID-19

BEFORE

- Have ventilator ready and set to appropriate values for patient BEFOREHAND

DURING

- Absolutely no bagging until the cuff is inflated and, ideally, no bagging at all
 - Connect to Ventilator ASAP and confirm intubation (placement of ETT) with breaths from ventilator
- If possible, fix the tube after already connected to the ventilator

AFTER

- Do not disconnect patient from ventilator if at all possible

- Ideally, ETT should never be open to air
- If must disconnect ETT, please clamp ETT with forceps prior to disconnection
- HME filters X 2, patient's expiratory loop tubing (5-7 days) and pre-intubator on expiratory loop (until soiled)
- All suctioning done with closed suctioning circuits (enclosed in plastic)
- Goal etCO₂ higher than standard
 - 40 – 60 mm Hg

After Intubation / On Mechanical Ventilation

- Strategies that limit tidal volumes (Start at 8 ml/kg Predicted Body Weight (PBW)) and can down-titrate to 4 ml/kg (**Please see Appendix** - Table 1 for women and Table 2 for men)
 - In a profoundly malnourished person, the PBW can be higher than the actual body weight
- Goal Pplateau < 30 cm H₂O (Pplateau usually more than this value in COVID)
- Adult patients with severe ARDS receive prone positioning for more than 12 hours per day (generally 12-16 hours / day)
 - For pregnant women, place in left lateral decubitus position
- Early and ongoing fluid restriction (RL > NS / DNS) – 50% of maintenance fluids
 - For a 40 – 50 kg adult, plan on 1 – 1.5 L / 24 hours
- Early pressor support via EJ (see “Vasoactive Medicines”)
- Fluids until a mildly collapsible Inferior Vena Cava (IVC) per point-of-care ultrasound (POCUS)
 - Must be bleach cleaned after each patient
- Goal etCO₂ higher than standard
 - 40 – 60 mm Hg

EXAMPLE INITIAL VENT SETTINGS

Mode:

- Options: Generally, ventilation is divided into either volume control or pressure control modalities. In the former, we can control the tidal volume (the “size” of the breath). In the latter, we can control the maximum pressure produced in the airways (and more pressure will produce a bigger breath). As a general rule of thumb, we will start with volume control based ventilation strategies in intubated COVID-19 patients.
 - As a general rule, start with volume control alone with deep sedation.

Tidal Volume: Start at 8 ml / kg Predicted Body Weight (see Appendix Table 1 and 2)

Rate: In our setting, respiratory rate is often a surrogate for acid-base status (i.e. higher respiratory rates correlate with lower pH's). Generally start with a rate slightly lower than the patient's rate prior to intubation as it is a surrogate for the minute ventilation the patient needs. Generally, we do not set rates < 8 breaths per minute (bpm) or > 30 bpm.

PEEP and FiO₂:

- Via ARDSNet / Anecdotal evidence
 - If *hemodynamically unstable* after intubation

- Plan for higher FiO₂ and lower levels of PEEP
 - FiO₂: Start on 100% FiO₂ and down-titrate as able. Goal is < 60% (oxygen toxicity) and ≤ 40% for extubating.
 - PEEP: Start at 5 cm H₂O and uptitrate PEEP as hemodynamics and Pplateau allow.
 - If *hemodynamically stable* after intubation
 - Plan for moderate FiO₂ and moderate to high levels of PEEP
 - FiO₂: Start on 60% and uptitrate rapidly to 100% if not maintaining SpO₂. Goal is < 60% (oxygen toxicity) and ≤ 40% for extubating.
 - PEEP: Start at 10 cm H₂O and uptitrate PEEP as hemodynamics and Pplateau allow (see below).
- If Pplateau < 30 cm H₂O with good Tidal Volumes, can increase PEEP by 2's until Pplateau starts to rise
 - Argues there is recruitable lung

REASONABLE GOALS RE: ARDS VENTILATION (from ARDSNet)

- If Pplat > 30 cm H₂O, decrease Vt by 1 ml / kg until reach 4 ml / kg PBW
- If Pplat < 25 and Vt < 6 ml / kg – increase Vt by 1 ml / kg until Pplat > 25 cm H₂O or Vt = 6 ml / kg PBW (whichever comes first)

(ARDSNet Pocket Handout available at: http://www.ardsnet.org/files/ventilator_protocol_2008-07.pdf)

Medications

(*this section will be regularly updated)

Induction of Intubation

PARALYTICS

Succinylcholine / Scoline (comes in 10 mL vial, 1 mL = 50 mg, total 500 mg)

- Dose: 1 – 2 mg / kg IV X 1
 - Onset: ~15 – 60 seconds until paralysis; wait for eyebrow / palpebral fasciculations
 - Shortcomings: Beware hyperkalemia; short acting

Atracurium (1 ampule contains 25 mg)

- Dose (for intubation): 0.4 – 0.5 mg / kg IV X 1 (some anecdotal evidence for 1 mg / kg in our population)
 - Onset: 2 – 5 minutes
 - Shortcomings: Longer acting, so if intubation fails will have to bag mask ventilate for a prolonged period
- Dose (for continuous neuromuscular blockade): 0.4 – 0.5 mg / kg IV bolus X 1 then 4 – 20 mcg / kg / minute
 - Preparation: For a 40 kg person
 - Put 4 ampules (100 mg) in 120 total mL NS
 - Start at 28 drops / minute (10 mcg / kg / min) and uptitrate to 58 drops / minute (20 mcg / kg / min)
 - Preparation: For a 50 kg person
 - Put 8 ampules (200 mg) in 120 total mL NS
 - Start at 18 drops / minute (10 mcg / kg / min) and uptitrate to 36 drops / minute (20 mcg / kg / min)
 - Positives: There is evidence for possible mortality benefit with 48 hours of early neuromuscular blockade / paralysis.
 - This may not be possible in our setting. Consider SOS dosing to overcome vent desynchrony.
 - Shortcomings:
 - Much longer lasting than cis-atracurium / vecuronium
 - Expensive
 - Long term myopathy / weakness issues
 - Take Homes:
 - We will generally avoid use of paralysis / neuromuscular blockade in our setting.

Propofol

- Dose
 - Age < 55 years old
 - 2 – 2.5 mg / kg IV bolus
 - Age ≥ 55 years old
 - 1 – 1.5 mg / kg IV bolus
 - Preparation: Comes in 20 mL vials with 200 mg of propofol total (10 mg / mL)
 - Positives
 - Rapid Acting: 10 – 60 seconds
 - Lasts for 3 to 10 minutes

- Shortcomings
 - Limited supply
- Take Homes:
 - Likely can only be used to intubate at JSS but not maintain sedation given limited supply.

SEDATIVES / AMNESTICS

Thiopentone (1 ampule contains 500 mg)

- Dose: Thiopentone 5 mg / kg IV X 1

Midazolam (1 vial contains 10 mL, 1 mg / mL, 10 mg total)

- Dose: 2 mg IV, repeat q3-5minutes SOS

Ketamine (10 mL vials, 1 mL = 50 mg, 500 mg total)

- Dose: Give 1 mg / kg IV NOW and repeat bolus dose of 1 mg / kg in 5 minutes if patient remains unседated

Sedation while Intubated:

- Narcotics
 - Morphine: Comes in 10 mL ampules that have 10 mg total (1 mg / mL)
 - Preparation: Place 10 mL (10 mg) of morphine in 90 mL of NS, 100 mL total
 - Start at 10 microdrops / minute (or 1 drop / 6 seconds) (1 mg / hour) and increase to a maximum of 50 microdrops / minute (or 1 drop / ~1 second) (5 mg / hour), titrating to effect
 - Populations to avoid in:
 - Chronic kidney disease
 - Populations to consider in:
 - Chronic narcotic users
 - If morphine unavailable:
 - Pentazocine 30 mg IV q3-4h scheduled
- Benzodiazepines
 - Midazolam 2 mg IV q1-2h SOS for agitation
 - Goal to minimize quantity of benzodiazepine as evidence of longer term complications in HDU / ICU patients
- Non-Narcotic Sedatives
 - Ketamine: Come in 10 mL vials with 500 mg total (50 mg / mL)
 - Preparation
 - Bolus: Give 1 mg / kg IV NOW and repeat bolus dose of 1 mg / kg in 5 minutes if patient remains unседated
 - Drip: Put 1 mL (50 mg) in 99 mL of NS (100 mL total)
 - Start at 12 microdrops / minute (or 1 drops / 5 seconds) (0.1 mg / min) and increase to a maximum of 60 microdrops / minute (or 1 drop / 1 second) (0.5 mg / min), titrating to effect
 - Populations to avoid in:
 - Increased intracranial pressure

- Cardiac disease especially ischemic disease
 - Psychiatric co-morbidities
 - Should always be administered with a benzodiazepine
 - Populations to consider in:
 - Asthmatics / Bronchospasm
 - Propofol
 - Preparation
 - Drip: 5 mcg / kg / minute
 - Issues: We have very little of this medication. Probably only useful for intubation but not maintenance of sedation.
- Recommended combinations (as supplies last): While ketamine has some data in certain types of airway disease, there is little data on the use of ketamine in ARDS and no comparison of ketamine versus narcotics in ARDS.
 - Morphine drip with Midazolam IV SOS
 - Can substitute bolus pentazocine if morphine supplies run out
 - Ketamine drip with Midazolam IV SOS

Medications for COVID-19 / ARDS we are using:

- Steroids (ONLY if requiring supplemental oxygen)
 - Dexamethasone 6 mg PO OD X 10 days (per the RECOVERY TRIAL)
 - If dexamethasone is not available, consider equivalent doses like
 - Prednisone 40 mg PO OD
 - Methylprednisolone 16 mg PO BD

If all are available, dexamethasone is the preferred agent because 1) little mineralocorticoid effect (i.e. no fluid retention, good in ARDS) and 2) longest half life (i.e. least risk of adrenal insufficiency)

Please use steroids for the shortest duration possible due to risk of complications from hyperglycemia like DKA or Mucormycosis.

- Steroids – in critically ill / crashing patients
 - Reasonable to consider increased doses like
 - Dexamethasone 20 mg PO OD
 - Methylprednisolone 125 mg IV q8h
- Anticoagulant (generally safe as bleeding uncommon in COVID-19 patients)
 - Consider “higher” doses for VTE prophylaxis
 - Enoxaparin 40 mg subQ BD
 - Heparin 5,000 IU subQ TDS

Would generally recommend against VTE prophylaxis at discharge as later data has argued that this is usually un-necessary (can obviously modify on a case-by-case basis).

For Bacterial Co or Super-Infection (remarkably rare especially when presenting from community)

- Standard antibiotics

Vasoactive Medications (Pressors / Stress Dose Steroids)

If patient's MAP < 65 mm Hg, consider vasoactive medicines to attempt to raise the MAP. This may be required more than in our usual HDU due to a restrictive fluid resuscitation strategy.

- If "No," do not provide vasoactive medications until such an IV access is in place.
- If "Yes," consider vasoactive medications.
 - Options include a IV placed in a proximal vein (proximal to the antecubital fossa including the EJ) or a central line

Which vasoactive medication should I select?

- First Line
 - Noradrenaline (Norepinephrine) – best evidence in sepsis¹⁸
 - Preparation (the more concentrated plan to limit IV fluids):
 - 4 ampules (8 mg) in 50 mL NS
 - For a 40 kg person, start at 1 drop / minute (0.075 mcg / kg / min) and increase to 15 drops / minute (1 mcg / kg / min)
 - For a 50 kg person, start at 2 drops / minute (0.1 mcg / kg / min) and increase to 20 drops / minute (1 mcg / kg / min)
 - For a 60 kg person, start at 2 drops per minute (0.08 mcg / kg / min) and increase to 25 drops / minute (1 mcg / kg / min)

If you are at 75% of the maximum dose of noradrenaline or higher, consider starting either:

- Second Line
 - Adrenaline (Ephinephrine)
 - Preparation
 - 4 mg in 50 mL NS
 - For a 40 kg person, start at 3 drops / minute (0.1 mcg / kg / min) and increase to 9 drops / minute (0.3 mcg / kg / min)
 - For a 50 kg person, start at 4 drops / minute (0.1 mcg / kg / min) and increase to 12 drops / minute (0.3 mcg / kg / min)
 - For a 60 kg person, star at 5 drops / minute (0.1 mcg / kg / min) and increase to 14 drops / minute (0.3 mcg / kg / min)
 - Dobutamine
 - Preparation
 - 250 mg in 50 mL NS
 - For a 40 kg person, start at 2 drops / minute (5 mcg / kg /min) and increase to 10 drops / minute (20 mcg / kg / min)
 - For a 50 kg person, start at 3 drops / minute (5 mcg / kg / min) and increase to 12 drops / minute (20 mcg / kg / min)
 - For a 60 kg person, start at 4 drops / minute (5 mcg / kg / min) and increase to 15 drops / minute (20 mcg / kg / min)

We would recommend against starting a third vasoactive medication.

Anti-Coagulation

There are multiple case reports of COVID-19 predisposing to a hypercoagulable state and concerns that thrombotic phenomenon may explain some of the profound V/Q mismatching and hypoxia.

Prophylactic(for prevention of thrombotic phenomenon)

- Unfractionated Heparin 5,000 IU subQBD
- Enoxaparin 40 mg subQ OD or 1 mg/kg whichever is higher

Therapeutic(for treatment of confirmed or suspected DVT / PE etc)

- Unfractionated Heparin – can be given either via IV drip or subQ
 - IV Drip
 - Bolus: 80 U / kg (Max 5,000 IU) IV
 - Drip: 18 U / kg / hour (Max 1,333 IU / hour) IV
 - SubQ
 - Initial: 333 U / kg subQ
 - Maintenance: 250 U / kg subQ BD
- Low Molecular Weight Heparin (Enoxaparin) 1 mg / kg subQ BD or 1.5 mg / kg IV OD
 - Only for eGFR > 30 and weight < 100 kg, otherwise contraindicated

Therapeutic dose anticoagulation seems to be safe in COVID-19¹⁹ and in one retrospective trial delayed in-hospital mortality. Some institutions recommend therapeutic anticoagulation for anyone who is critically ill without contraindications.

Diuretics

While there is no evidence of a mortality benefit with diuretics, as a general rule “dry lungs” are “happy lungs” in ARDS. Consider gentle diuresis as able.

Symptomatic Care (with a focus on preventing aerosol generation)

- Cough suppressants – can be given via NG tube
- Nausea / Vomiting suppressants – can be given IV or via NG tube
 - Ondansetron (Ondem)
 - Metoclopramide (Perinorm)

FINAL STEPS

Who do we extubate?

- Those successfully weaning from the ventilator (as per our normal weaning protocols)
 - Minimal Vent Settings
 - $FiO_2 \leq 40\%$
 - $PEEP \leq 5$
 - Reasonable etCO₂
 - 30 – 50 mm Hg
- Individuals with evidence of permanent brain damage or grim prognosis
- Family members requesting transition to palliative / comfort care

Discharge Criteria

When is a possible / confirmed COVID-19 patient ready for discharge?

When ALL of the following criteria are met:

- Patient is hemodynamically stable off supplemental oxygen.
 - Exceptions can be considered for those with access to reliable home O₂ concentrator on < 4 Liters / minute oxygen per nasal prongs
- Patient has been provided with all home medications and supplies.
- Patient has been provided with all written discharge materials.
- Patient and family have been educated re: home and community safety including home quarantine / isolation as possible.
 - For hospitalized patients this will be 20 days from symptom onset.
- Patient has a confirmed home village / address.

OTHER CONSIDERATIONS

Special Populations:

- 1) Acute kidney injury / Chronic kidney disease: Acute renal failure requiring dialysis is a known (but not frequent) complication of COVID-19 infection. In such settings, transfer to a facility providing both dialysis and COVID-19 care will be considered.
- 2) Pregnant women – no higher risk than other, similar adults. Questionable / Possible evidence to date of intrauterine transmission of COVID-19 debated.²¹
- 3) Palliative Care – We will likely use bolus dosed midazolam 2 mg IV SOS and pentazocine 30 mg IV SOS to minimize agitation, pain and air hunger at the end of life.
 - a. Morphine will be saved for sedation during intubation.

Medicines / Interventions-

- NSAIDs : Can consider on a patient-by-patient basis.
 - o Ibuprofen
 - o Diclofenac
 - o Aspirin
- Aerosolization Concerns
 - o Open suction devices
 - o Any aerosol generating procedure (AGP)
- Aggressive fluid resuscitation
 - o “Run them dry”
 - Exceptions include:
 - Diabetic ketoacidosis
 - Profound pre-renal state / hypovolemia

APPENDIX

Table 1. Predicted Body Weight (PBW) and Tidal Volume for Women (taken from Up-To-Date)

Predicted body weight and tidal volume for women								
Height			PBW	Tidal volume				
Feet/inches	Inches	Centimeters	kg	4 mL/kg	5 mL/kg	6 mL/kg	7 mL/kg	8 mL/kg
4' 0"	48	122	17.9	72	90	107	125	143
4' 1"	49	124	20.2	81	101	121	141	162
4' 2"	50	127	22.5	90	113	135	158	180
4' 3"	51	130	24.8	99	124	149	174	198
4' 4"	52	132	27.1	108	136	163	190	217
4' 5"	53	135	29.4	118	147	176	206	235
4' 6"	54	137	31.7	127	159	190	222	254
4' 7"	55	140	34	136	170	204	238	272
4' 8"	56	142	36.3	145	182	218	254	290
4' 9"	57	145	38.6	154	193	232	270	309
4' 10"	58	147	40.9	164	205	245	286	327
4' 11"	59	150	43.2	173	216	259	302	346
5' 0"	60	152	45.5	182	228	273	319	364
5' 1"	61	155	47.8	191	239	287	335	382
5' 2"	62	157	50.1	200	251	301	351	401
5' 3"	63	160	52.4	210	262	314	367	419
5' 4"	64	163	54.7	219	274	328	383	438
5' 5"	65	165	57	228	285	342	399	456
5' 6"	66	168	59.3	237	297	356	415	474
5' 7"	67	170	61.6	246	308	370	431	493
5' 8"	68	173	63.9	256	320	383	447	511
5' 9"	69	175	66.2	265	331	397	463	530
5' 10"	70	178	68.5	274	343	411	480	548
5' 11"	71	180	70.8	283	354	425	496	566
6' 0"	72	183	73.1	292	366	439	512	585

Table 2. Predicted Body Weight (PBW) and Tidal Volume for Men (taken from Up-To-Date)

Predicted body weight and tidal volume for men								
Height			PBW	Tidal volume				
Feet/inches	Inches	Centimeters	kg	4 mL/kg	5 mL/kg	6 mL/kg	7 mL/kg	8 mL/kg
4' 0"	48	122	22.4	90	112	134	157	179
4' 1"	49	124	24.7	99	124	148	173	198
4' 2"	50	127	27	108	135	162	189	216
4' 3"	51	130	29.3	117	147	176	205	234
4' 4"	52	132	31.6	126	158	190	221	253
4' 5"	53	135	33.9	136	170	203	237	271
4' 6"	54	137	36.2	145	181	217	253	290
4' 7"	55	140	38.5	154	193	231	270	308
4' 8"	56	142	40.8	163	204	245	286	326
4' 9"	57	145	43.1	172	216	259	302	345
4' 10"	58	147	45.4	182	227	272	318	363
4' 11"	59	150	47.7	191	239	286	334	382
5' 0"	60	152	50	200	250	300	350	400
5' 1"	61	155	52.3	209	262	314	366	418
5' 2"	62	157	54.6	218	273	328	382	437
5' 3"	63	160	56.9	228	285	341	398	455
5' 4"	64	163	59.2	237	296	355	414	474
5' 5"	65	165	61.5	246	308	369	431	492
5' 6"	66	168	63.8	255	319	383	447	510
5' 7"	67	170	66.1	264	331	397	463	529
5' 8"	68	173	68.4	274	342	410	479	547
5' 9"	69	175	70.7	283	354	424	495	566
5' 10"	70	178	73	292	365	438	511	584
5' 11"	71	180	75.3	301	377	452	527	602
6' 0"	72	183	77.6	310	388	466	543	621
6' 1"	73	185	79.9	320	400	479	559	639
6' 2"	74	188	82.2	329	411	493	575	658
6' 3"	75	190	84.5	338	423	507	592	676