Critical Care COVID-19 Management Protocol
(updated 5-4-2020)

Prophylaxis
While there is very limited data (and none specific for COVID-19), the following “cocktail” may have a role in the prevention/mitigation of COVID-19 disease.
- Vitamin C 500 mg BID and Quercetin 250-500 mg BID
- Zinc 75-100 mg/day
- Melatonin (slow release): Begin with 0.3mg and increase as tolerated to 2 mg at night
- Vitamin D3 1000-4000 u/day

Mildly Symptomatic patients (at home):
- Vitamin C 500mg BID and Quercetin 250-500 mg BID
- Zinc 75-100 mg/day
- Melatonin 6-12 mg at night (the optimal dose is unknown)
- Vitamin D3 1000-4000 u/day
- Optional: Hydroxychloroquine 400mg BID day 1 followed by 200mg BID for 4 days
- Optional: ASA 81/325mg/day
- Optional: In highly symptomatic patients, monitoring with home pulse oximetry is recommended

Mildly Symptomatic patients (on floor):
- Vitamin C 500mg PO q 6 hourly and Quercetin 250-500 mg BID (if available)
- Zinc 75-100 mg/day
- Melatonin 6-12 mg at night (the optimal dose is unknown)
- Vitamin D3 1000-4000 u/day
- Enoxaparin 60 mg daily
- Methylprednisolone 40 mg daily; increase to 40mg q 12 if poor response
- Optional: Hydroxychloroquine 400mg BID day 1 followed by 200mg BID for 4 days
- Optional: Remdesivir (if available)
- N/C 2L /min if required (max 4 L/min; consider early t/f to ICU for escalation of care).
- T/f EARLY to the ICU for increasing respiratory signs/symptoms and arterial desaturations.

Low-Flow Nasal Cannula
- Typically set at 1-6 Liters/Min

High Flow Nasal Cannula (Limitation on Flow Rate)
- Accept permissive hypoxemia (O2 Saturation > 86%)
- Titrate FiO2 based on patient’s saturation
- Accept flow rates of 60 to 80 L/min
- Trial of inhaled Flolan (epoprostenol)
- Attempt proning (cooperative proning)

Invasive Mechanical Ventilation
- Target tidal volumes of ~6 cc/kg
- Lowest driving pressure and PEEP
- Sedation to avoid self-extubation
- Trial of inhaled Flolan

Prone Positioning
- Exact indication for prone ventilation is unclear
- Consider in patients with PaO2/FiO2 ration < 150

VV-ECMO
- Indications remain unclear
- Early discussion with ECMO center or team may be advisable

Respiratory symptoms (SOB; hypoxia- requiring N/C ≥ 4 L min: admit to ICU):

Essential Treatment (dampening the STORM)
1. Methylprednisolone 80 mg loading dose then 40mg q 12 hourly for at least 7 days and until transferred out of ICU. Alternative approach: Hydrocortisone 50 mg q 6 hourly.

continued on next page
2. Ascorbic acid (Vitamin C) 3g IV q 6 hourly for at least 7 days and/or until transferred out of ICU. Note caution with POC glucose testing.

3. Full anticoagulation: Unless contraindicated we suggest FULL anticoagulation (on admission to the ICU) with enoxaparin, i.e 1 mg kg s/c q 12 hourly (dose adjust with Cr Cl < 30mls/min). Heparin is suggested with CrCl < 15 ml/min.

   Note: Early termination of ascorbic acid and corticosteroids will likely result in a rebound effect.

Additional Treatment Components (the Full Monty)

4. Melatonin 6-12 mg at night (the optimal dose is unknown).

5. Magnesium: 2 g stat IV. Keep Mg between 2.0 and 2.4 mmol/l. Prevent hypomagnesemia (which increases the cytokine storm and prolongs Qtc).

6. Optional: Azithromycin 500 mg day 1 then 250 mg for 4 days

7. Optional: Atorvastatin 40-80 mg/day.

8. Broad-spectrum antibiotics if superadded bacterial pneumonia is suspected based on procalcitonin levels and resp. culture (no bronchoscopy).

9. Maintain EUVOLEMA

10. Early norepinephrine for hypotension.

11. Escalation of respiratory support; See Graphic.

12. Treatment of Macrophage Activation Syndrome (MAS)

   • A sub-group of patients will develop MAS. A ferritin > 4400 ng/ml is considered diagnostic of MAS. Other diagnostic features include increasing AST/ALT and increasing CRP.

   • Methylprednisolone 120 mg q 8 hourly for at least 3 days, then wean according to Ferritin, CRP, AST/ALT (see Figure 6). Ferritin should decrease by at least 15% before weaning corticosteroids.

13. Monitoring: Daily: PCT, CRP, IL-6, BNP, Troponins, Ferritin, Neutrophil-Lymphocyte ratio, D-dimer and Mg. CRP, IL-6 and Ferritin track disease severity closely. Thromboelastogram (TEG) on admission and repeated as indicated.

14. Post ICU management

   a. Enoxaparin 40-60 mg s/c daily

   b. Methylprednisone 40 mg day, the wean slowly

   c. Vitamin C 500 mg PO BID

   d. Melatonin 3-6 mg at night