Institute for Critical Care Medicine
A Guide to Admitting and Rounding on Critically Ill COVID-19 Patients
(Order Sets and Resources Listed Below)

Gathering the Information:

LABs:
Each patient needs at least one “full” set of labs for the current hospital admission, including:
  - CBC, CMP, PTT/INR, type and screen. If these labs have not been collected, ensure they are ordered (“ICU Order Set”). If the patient has an arterial line, collect an ABG upon ICU admission.
  - Order daily CBC and CMP as well as COVID-specific inflammatory markers (D-dimer, fibrinogen, CRP, IL-6, LDH, ferritin, procalcitonin). The timing of labs is not critical - please try to bundle nursing tasks. The “COVID Order Set” will help you order these labs.

EKG:
Each patient needs an EKG upon ICU admission and daily. Pay attention to QTc, rhythm, ST segment elevations/depressions, and T wave inversions.
  - If QTc >500 msec, discontinue QT prolonging medications (hydroxychloroquine, azithromycin, ondansetron).
  - Ischemic changes (ST segment changes, T wave inversions) as well as heart block may be evidence of myocarditis. If present, trend cardiac enzymes and EKG q8 hours.

CXR:
Patients admitted to the ICU will have had a CXR in the ED. Repeat the CXR only if an ETT or feeding tube has been placed since (to confirm position). Daily CXR is not indicated.

Home Medications:
Many home medications are HELD upon ICU admission, including:
  - Antihypertensives (most patients are hypotensive from sepsis or sedation)
  - Tamsulosin (exacerbates hypotension)
  - Metformin (causes metabolic acidosis, manage glucose with insulin)
Home medications worth CONTINUING include:
  - Steroids (with stress dose if indicated)
  - Anticoagulation/antiplatelets

Assessment of vascular access (is the current access adequate?):
- ICU patients not on pressors need two peripheral IVs (preferably at least 20g).
- ICU patients on high dose pressors (NE, AVP) need central access.

**Intake/Output:**
- Report daily fluid balance. We are attempting to use a fluid-restrictive strategy to minimize pulmonary edema.
- Low dose furosemide (20 mg IV BID) is recommended if blood pressure will be tolerated.

**Reviewing and Generating a System Based Plan:**

**Palliative Care/ Goals of Care:**
Think about this FIRST and again LAST. Accelerate the discussion with family/health care proxy ASAP. This may limit futile interventions and provider exposure, as well as relieve suffering. Beeper 9399 and 24 hour phone (332-215-3020).

**Neuro/Sedation:**
Typical sedative infusions include propofol 20-80 mcg/kg/min, fentanyl 50-150 mcg/hr, hydromorphone 1-2 mg/hr, midazolam 1-3 mg/hr.
- Orders should be written to titrate to a RASS score of -4 to facilitate ventilator synchrony.
- Paralytics can be added if the patient is asynchronous on two or more sedative infusions. Start cisatracurium at 2 mcg/kg/min and titrate to ventilator synchrony. Orders for these medications can be found under “CSICU Medications.”

**Respiratory:**
Oxygenation: **Goal SpO₂ >88% and PaO₂ >55**
- Is the patient on: NC, facemask, HFNC, BiPAP, ETT?
- If SpO₂ <88%, will need to increase FiO₂ or upgrade type of support.
- Calculate P/F ratio (PaO₂/FiO₂) daily or as indicated:
  - >150 then continue current therapy with the lowest FiO₂ possible
  - <150 utilize the following strategy:
    o Sometimes no change or small changes are best if the SpO₂ is > 88%
    o TV 6ml/kg based on IBW and RR to achieve a MV about 10L/min is a suitable start
    o As FiO₂ requirement approaches 0.8 consider:
      - Paralysis with cisatracurium infusion
❖ Prone positioning (proning team lead by Dr. Acquah)
❖ VV ECMO - rarely needed in COVID

The ARDSNet protocol will guide you.

### Ventilation:

**Goal pH 7.20-7.40**

- If a patient is on BiPAP or mechanically ventilated, place an arterial line and measure ABGs every six hours at minimum. If pH <7.20, increase RR by 4 and repeat ABG. Continue until pH >7.20.

**Measure the plateau pressure (Pplat) daily to avoid traumatic injury to the lungs.**

This is done by pressing the “inspiratory pause” button on an ICU ventilator. If Pplat is >30 cm H₂O, decrease TV by 1 cc/kg IBW and increase RR by 2 to maintain minute ventilation.

**Evaluation for SAT/SBT:**

If the patient has adequate oxygenation and ventilation on minimal vent settings (FiO₂ 40%/PEEP 8), wean sedation and attempt SBT. If respiratory mechanics are adequate (TV >4 cc/kg, RR <35, pH >7.30, RSBI <100), consider extubation. Most of these patients are marginal, so strongly consider extubation to facemask or HFNC.

**Cardiac:**

Goal MAP is >65 mmHg using vasopressors preferentially to fluid

- Norepinephrine 2 mcg/min or phenylephrine 20 mcg/min are first line (starting doses)
- Vasopressin 2.4 U/hr is second line
- Consider utilizing inopressors (epinephrine) in refractory cases
**ID:**

Every COVID-19 + patient under our care should have an ID consultant. Current medications are:

- Hydroxychloroquine (HCQ) 400 mg BID for 5 days, then 400 mg daily for 4 days is given to most patients. Daily EKG, hold for QTc > 500 ms.
- Azithromycin: Five day course. Daily EKG, hold for QTc >500 msec
- Tocilizumab (needs special labs, ID consultant, perhaps guided by IL-6 levels)
- Remdesivir, an antiviral thus far with disappointing results
- COVID-19 Ab-rich plasma is in development as part of a live Sinai research protocol

**Co-Infection:**

Many COVID patients are started on empiric antibiotics for bacterial infections. If a patient is on antibiotics:

- Order at least one set of blood cultures.
- Common empiric antibiotics are vancomycin and cefepime.
- For patients with normal renal function, collect a vancomycin trough prior to the fourth scheduled dose.
- For patients with renal impairment, dose by level.
- Consider discontinuing empiric antibiotics after a three day course. If the patient is decompensating (worsening hypotension or hypoxemia), consider broadening antibiotics in consultation with the ID team.

**Endocrine/GI:**

Nutrition in the first 48-72 hour period is of secondary importance. Enteral feeds are best. Glucose levels should optimally remain < 200 mg/dl. Use regimens that do NOT require hourly or bi-hourly monitoring! A dietician should be leaving notes with recommendations for patients. Dr. Mechanick has developed a “Simple Metabolic Protocol for the ICU,” consult him early.

**Renal:**

Attempt to maintain near even or slightly positive fluid balance. Monitor electrolytes closely while also trying to minimize blood draws (not easy). Increased Cr, K+, and PO₄ are signs of worsening renal function

**ICU Prophylaxis:**

- GI: Indicated for intubated patients. Famotidine 20 mg IV q12 hours (q24 hours for renal impairment)
- Bowel regimen: Miralax daily and Senna
- DVT: Enoxaparin 40mg SQ daily or SQH 7500 SQ BID (esp if CrCl<30ml/min) and SCDs
- Foley: For all intubated patients
- The above can be found under “CSICU Order Set.”

**Documentation:**

Every day each patient needs 2 pieces of documentation:

- A daily ICU note: This is an H&P on the day of ICU admission and a progress note each day thereafter. The note should be written by the resident, PA, or NP caring for the patient and then either edited or cosigned by the attending.
- A “Goals Sheet” which should be written by a resident, PA, or NP on rounds who is not actively presenting. This is done by clicking the “ICU Daily Goals” tab and entering the 5 main goals for the patient for the day.

Procedures (central line placement, arterial line placement, and endotracheal intubation), require a “Procedure Note.”

Discuss each patient with the ID team who is following each day. The unit Social Worker can be very helpful. The palliative care team (332-215-3020) is an amazing resource to help update families and facilitate goals of care conversations.

**Useful Order Sets:**

“COVID Order Set” - Includes COVID-specific labs
“CSICU Medications” - Pressors and sedation (with starting doses and titration parameters included)
“CSICU Order Set” - ICU general nursing orders (vitals), vent orders, prophylaxis, and labs
“CSICU Electrolyte Replacement”

**Useful Resources:**

ARDSNet Protocol
COVID19.sccm.org
https://www.mountsinai.org/about/covid19/staff-resources/critical-care-education
Caroline Gross MD
Tony Vullo MD