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Overview of the Management of Patients with COVID-19 for the Non-ICU Provider

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PPE and ROOM ETIQUETTE:

Let's start with what's on everyone's mind. *How do I stay safe?*

All the time:

- Wash your hands (you can inoculate yourself by touching your eyes, nose or mouth)
- Don't touch your face (see above)
- Practice social distancing even at work when possible. We are just as likely to get it from each other as from the patients.

Prior to Entering Patient's Room:

- Don ACE-level PPE:
  - N95 respirator
  - Gown
  - Gloves
  - Eye protection (faceshield/goggles)
- Try to bundle care. Make sure you have everything you need before you go into the room (ie. double check to make sure you have all your arterial or central line supplies)

In the Patient's Room:

- Once you are in your PPE in the room, DO NOT re-adjust your PPE (ie: you should not reach up and tug or pull at your mask/N95.)
- If there is visible soiling of your gloves, you should use a wipe to clean your gloves, doff them, hand sanitize and don new gloves in the patient room.
- If there is visible soiling of any other part of your PPE, you should remain calm and come up

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with a plan with your doffing buddy if possible.
- Patients on the ventilator are on a closed circuit with HEPA filtration at the inhalation and exhalation ports so environmental contamination is minimal unless the circuit is broken.
- Keep doors to rooms closed. Turn monitors and pumps so you can see them from the door.

Exiting the Patient's Room:

- Doffing PPE should be done slowly and methodically to prevent self-contamination.
- Remember to hand sanitize between each step in doffing. Make sure to rub your hands together until the hand sanitizer is dry. (If your hands ain't dry, the virus didn't die!)
- Once you doff out of the patient room, make sure to store your N95 mask in an open paper bag labeled with your name so that it can dry. If it is visibly soiled, request a new one.
- The last thing you should do is go wash your hands with soap and water up to your elbows.

COURSE of COVID 19

These are the observations of clinicians at Emory who have cared for patients with COVID-19

Phase 1: Prodrome

- Viral URI symptoms often with poor PO intake and/or N/V

Phase 2: Slow Smoldering

- Require between 2-10L NC
- Do not feel subjectively SOB
- CXR with diffuse reticular infiltrates
- May have difficulty mobilizing secretions

Phase 3: Worsening hypoxia

- Require between 10-15L NC
- More anxiety and subjective SOB
- Coughing requires increased effort, secretions worsen
- Pt should be admitted to ICU at this point

Phase 4: Respiratory Failure

- Requires non-rebreather, HFNC or Intubation to maintain saturation or for increased work of breathing despite maintaining oxygen saturations > 92%
- Once intubated, the patients show:
- Relatively normal compliance, i.e., not the usual "stiff lungs" of classic ARDS
    - pulmonary edema and effusions
    - initially single organ failure (pulmonary)
    - lack of shock in general
    - thick, copious secretions

Phase 5: Death or Resolution

- Either progression to multi-system organ failure or,
- Resolution over several days to extubation with rapid return to near baseline.

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MANAGEMENT PRIORITES for CONFIRMED PATIENTS with COVID-19

- When to call critical care for help:
  - Every admission or death
  - When requested by critical care attending (e.g., for follow-up after a particular intervention or to provide an update on a topic brought up on rounds)
  - When patient is being intubated, any unexpected extubation, going on pressors, vent settings are increasing or patient becomes anuric.
  - PEEP>12 or FiO_2>60%
  - Fentanyl>4mcg/kg/hr plus Propofol>50mcg/kg/min and/or ketamine>0.4mg/kg/hr
  - Norepinephrine>0.1mcg/kg/min
  - Troponin>1.0 or $ScVO_2$<50%
  - Before starting either intermittent or continuous paralysis
  - Lactate>2.0

NEUROLOGICAL

- Utilize opioids (e.g., Fentanyl)/Propofol/Ketamine as primary sedative agents. Consider the use of enteral agents to allow for a steadier basal state, e.g., long-acting opioids.
- Wean sedation to a minimum goal RASS 0 to -1. If dyssynchronous consider a goal RASS -1 to -2 (What is RASS? click here).
- If paralysis is required, titrate Propofol or other sedation for a BIS of 50-60 (not burst suppression) when available. If BIS is not available, leave sedation at current levels while paralysis is running.
- We recommend prophylactic use of wrist restraints to help prevent self-extubations given the delayed time to bedside for donning PPE.

PULMONARY

Pre-Intubation:

While some patients may benefit from high-flow nasal cannula (HFNC; e.g., Airvo, Optiflow), patients that continue to have increased work of breathing (e.g., a respiratory rate > 25 and FiO_2 > 60%) despite initiation of HFNC should be evaluated for early intubation.

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Post-Intubation:

- ARDS:
  - Remember to treat these patients just like any other ARDS patient—the 4 goals for treatment of ARDS are as follows:
    - Low tidal volume ventilation (4-6cc/kg ideal body weight (IBW), remember your need the patient's height to calculate IBW)
    - Goal SpO_2>92% if possible
    - Permissive hypercarbia, goal pH>7.25 or greater
    - Plateau pressure <30 (to measure perform an inspiratory hold on the ventilator) but as long as your peak pressure is <30 then you know your plateau pressure is good.
    - Consider use of high PEEP ladder (link)
  - Once patient is down to appropriate settings (PEEP<8, FiO_2<40%), daily spontaneous breathing trials should be performed to assess readiness for extubation.
- Refractory hypoxia with ARDS: If your patient is difficult to oxygenate, on high PEEP or FiO_2 settings (>10 PEEP or >60% FiO_2) and/or you cannot get your plateau pressures <30 even on 4cc/kg IBW, in consultation with the critical care attending, consider the following:
  - Consider intermittent paralysis using rocuronium or 48 hour paralaysis with cisatracurium if unable to achieve adequate ventilator synchrony with sedation
  - Initiating prone positioning (shown to have survival benefit in ARDS when done for at least 16 hours if P/F<150 on at least 10 PEEP and/or 60% FiO_2. After 16 hours prone, the patients can be turned supine for up to 8 hours before being re-proned if necessary. Criteria for re-proning include immediate desaturation when turning supine or a P/F<150 at the 7 hour mark supine. WATCH ETT position when proning or turning supine.) NEJM has good video on how to prone (link).
  - Initiating inhaled flolan or nitric oxide
  - ECMO may be available in some units.
- Post-Extubation:
  - Extubate to a face mask followed by titration down to a nasal cannula. Some patients may need HFNC due to risk for reintubation or body habitus.
  - After extubation, encourage aggressive pulmonary toilet, e.g., with acapella valves, Aerobika and incentive spirometry.
  - Do not use NIPPV (CPAP/BiPAP) in COVID-19 patients, as there are not adequate protections against aerosolization.

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CARDIOVASCULAR

- There are reports of myocardial dysfunction in COVID-19 patients leading to cardiogenic shock and/or sudden cardiac death after the patient begins pulmonary recovery.
- Most of these patients do not develop florid septic shock.
- Consider checking daily troponin and SvO_2 for all patients, and daily EKG for those on QT prolonging agents (ie azithromycin, plaquenil, anti-psychotic agents).
- For patients with a drop in SvO_2 or new vasopressor requirement, a repeat EKG, point of care ECHO if possible and STAT troponin should be done.
- If you do need to start a pressor, norepinephrine is your first line.
- With rising lactate or new pressor requirement, think secondary infection (bacteremia, ventilator-associated pneumonia etc). Consider culturing, obtain a procalcitonin level where available and starting antibiotics.

GASTROINTESTINAL

- Place dobhoff for early enteral feeding if possible.
- Nutrition consult for tube feeding as needed.

RENAL

- Place foley for strict I/O's
- Keep $Mg>2.5$ and $K>4.5$
- Keep patients as "dry" as possible.

ANTI-VIRAL TREATMENT OPTIONS

- All patients with confirmed COVID-19 should have an ID consult. The ID team will determine the best treatment options for each patient.

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LABORATORY ASSESSMENT

A Powerplan is in the works which will include many of the labs below but for now consider ordering the following:

- The following labs are recommended:
  - Daily: CBC with diff, CMP, Mg, Phos, LDH, CRP, BNP, D-dimer, CK, PT
  - Q12hr: Troponin, ABG and VBG
  - No routine daily CXR

ACCESS

- All intubated patients with confirmed COVID 19 infection need the following:
  - L internal jugular triple lumen central venous catheter. This is preferred so that the R IJ is available for trialysis/vascath placement or potential ECMO cannulation.
  - Arterial line

CPR

- There is a statute in Georgia that makes it illegal to mandate that an individual be DNR.
- We encourage early discussions with families about code status and early palliative care consult.
- EVERYONE must be in PPE prior to entering the room.
- If you must code someone with COVID-19, the code leader determines how long the code should last as they normally do.
- Crowd control will be VERY important. Ideally, no more than 6 people should be in the room: code leader who can also run the defibrillator, nurse giving meds, uone to two people on the airway (RT or a nurse) and 2 people rotating between compressions.
- If the patient is already on the ventilator, leave them on the ventilator (DO NOT BAG) to minimize risk of aerosolization.

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PEOPLE WILL STILL GET "Regular" things!

What do I mean by this? It's important to remember that not every patient who comes into the hospital will have COVID; it's also important to remember that patients with COVID-19 can also get other things like sepsis or an MI or a perforated bowel. We can't get tunnel vision. We need to remember to keep our differentials broad. We also can't be so fearful of patients having COVID that they die of "regular" things like bacteremia or influenza.

DEFINITIONS

- ARDS: acute respiratory distress syndrome defined by acute hypoxia, bilateral opacities on chest imaging and not explained by heart failure or volume overload.
- PEEP: positive end-expiratory pressure. This pressure prevents the lungs from fully exhaling which keeps the alveoli in the lung from collapsing improving oxygenation and decreasing atelectatic trauma.
- P/F Ratio: PaO_2/FiO_2 ratio, measure degree of hypoxia. (PaO_2 comes from your ABG, FiO_2 from the ventilator (50% is recorded as 0.5)). A P/F<200 is moderate ARDS and P/F<100 is severe ARDS
- Plateau Pressure: Pressure applied to the small airways and alveoli during mechanical ventilation. It is measured during as inspiratory hold on the ventilator to exclude any resistance from the ventilator tubing and endotracheal tube. Plateau pressure should be less than 30cm H_2O in ARDS.
- Prone Positioning: placing a patient face down on the bed to help improve oxygenation and lung compliance.
- Ideal Body Weight (IBW): body weight calculated for a patient based on the patient's height and sex. (click here for link to calculator)
- RASS: Richmond Agitation-Sedation Scale is used to measure a patient's level of alertness or agitation in order to prevent over or under-sedation. It ranges from +4 to -5 with +4 being extremely agitated/combative to -5 being in a coma.
- HFNC (Airvo, Optiflow): High flow nasal cannula, often heated and humidified, provides supplemental oxygen up to a FiO_2 of 100% and flow rates up to 60L/min. A small amount of PEEP (up to 6) may be achieved at higher flow rates. It is used primarily to support oxygenation, not ventilation.

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