

YNHHS System ICU Committee Practice Guideline For The Care of Patients with COVID-19 (3/29/2020)

Scope: Adult Critically Ill patients in YNHHS with COVID-19 or PUI

Definitions:

- 1) COVID-19 refers to those with positive testing
- 2) PUI refers to Person Under Investigation

Leadership and Decision Making:

- 1) System ICU Guidelines arrived at through consensus jointly with leadership from physician, nursing, respiratory, and anesthesia.
- 2) System ICU Committee will assist in global triage and support of all ICU patients with COVID-19 including assistance with allocation of resources and training with goal to standardize care across system.

Clinical Workflow:

- 1) Staffing: Decided by local RN/MD/RT leadership in conjunction with YNHHS(s) leadership - will vary based on volume and staffing needs/availability
- 2) Shift Handoff: In person hand-off with patient (and testing) status at start/end of shift
- 3) Morning Huddle: Review status of all patients (COVID-19/PUI) with Admitting Attending/ICU Director or Designee
- 4) Daily Rounds: Standard process outside of room – plan for single provider to evaluation/examine patient unless emergency occurs. Goal is to minimize contact and preserve PPE. *Discussion shall include travel plans and testing with goal to cluster care (e.g. medications/procedures/food delivery etc) (example: MD adjusts vent settings under supervision of RT in line of sight but standing outside door)*
- 5) Evening Rounds: Required for all COVID-19/PUI to assess status and overnight plans to minimize travel and patient contact and ensure testing (COVID-19/PUI) is timely and in progress
- 6) Consultants: Inform all consults that patient is COVID-19/PUI to minimize visits to minimize contact and preserve PPE
- 7) Tele-ICU/Tele-Medicine to be used when available to minimize contact and preserve PPE
- 8) Delayed Recognition: If person not previously thought to be COVID-19/PUI is determined to be at risk then place mask upon patient, exit room, and contact ICU Charge RN and MD leadership.
- 9) Evaluations of non-ICU Patients:
 - a. ED: Query risk prior to in-person evaluation
 - b. Y-Access: Query risk and if unable to obtain information then should be assigned to negative pressure room upon arrival (may not have risk factors but often unable to assess risk immediately of critically ill patients)
 - c. For Y-Access Requests please confirm COVID-19//PUI status when making request
 - d. Acute Care Wards: Ask regarding COVID-19/PUI status before evaluation patient.
- 10) Defer PT/OT/SW visits until no longer PUI. In COVID -19 confirmed patients, defer PT/OT/SW visits until evidence that this has cleared.
- 11) Fiberoptic endoscopic evaluations for swallowing (FEES) will not be performed on COVID-19/PUI until no longer PUI or evidence that it is cleared.
- 12) Nasogastric tube placement in non intubated COVID-19/PUI should be deferred.
- 13) RT/RN and other staff should cluster care
- 14) Consults: Notify consulting service that patient is COVID-19/PUI and ask that it be urgent so that there are no delays in diagnostic testing that requires travel. If trainees involved consult must be reviewed with consulting

attending early so that there are not multiple visits to the patient's room and no delays since any intervention or testing it likely to be delayed by their status.

- 15) Rapid Response Team/Evaluation of Non-ICU Patients:
 - a. Lower threshold to accept patients to ICU with hypoxemic respiratory failure (limited options with NIV and HFNC hence lower intubation threshold)
 - b. Should not transport on HFNC/Bipap or with nebulizer
 - c. All discussion about COVID-19/PUI involve ICU attending prior to transfer
- 16) Respiratory Treatments: MDIs with spacer (see RT guidelines for COVID-19)
- 17) Extubations: Extubate to nasal cannula (less than 5L or use 100%NRB with blender) – similar precautions as for intubation (cannot give racemic epinephrine so if concern about airway (no cuff leak or difficult intubation) give steroids and repeat the next day)
- 18) Bundling of procedures is recommended eg- intubation, OGT, TLC and A line as needed.

Diagnostic Testing:

Goal is to minimize travel and room entry by staff and maximize utility of testing

- 1) Maximize portable CXR/AXR and POC ultrasound
- 2) Lab should to be clustered
- 3) Respiratory specimens must be walked to micro/virology lab
- 4) Review testing that requires travel off-site with Attending of record before ordering
- 5) Equipment used (e.g. ultrasound/CXR equipment) must be fully decontaminated per Infection Control/Hospital Epi guidance
- 6) *Avoid daily CXRS (no indication if clinical status unchanged)

Therapeutic Guidelines:

- 1) Central venous/hemodialysis catheter placement:
 - a. Appropriate PPE for COVID-19 will be worn during central line placement, with the following adjustment:
 - i. Double glove prior to entering room with 2 pairs of non-sterile gloves. Once in the room and ready to begin the procedure, remove outer non-sterile gloves leaving the inner gloves in place. Then apply alcohol-based hand sanitizer to the inner non-sterile gloves.
 - ii. A sterile gown will be placed over other PPE.
 - iii. Sterile gloves will be placed over the inner gloves with the sterile gown tucked into the sterile gloves.
 - b. Left Internal jugular will be the preferred site for line placement (so that location can be accessed via ultrasound) and left side preserves right site for dialysis catheter if needed.
 - c. Ultrasound will be used to confirm wire placement, catheter placement and absence of pneumothorax before and after the procedure. These steps are intended to reduce/eliminate the need for an X-ray after line placement. Please send VBG from brown port as ancillary confirmation. CXR to be performed only if prior approaches inconclusive.
 - d. The equipment needed to place and secure the line should be assembled BEFORE entering the room to avoid a situation in which personnel are leaving and re-entering the room repeatedly.
- 2) Endotracheal Intubation (see Respiratory Care guidance for full documentation:
 - a. Consider early intubation. Recommend anesthesia involvement in all intubations given need to minimize attempts and BVM. A video laryngoscope should be used if available.
 - b. The equipment needed to place and secure the endotracheal tube should be assembled BEFORE entering the room. As with any other providers and staff, only people who have been trained in PPE should enter the patient room. Minimize people in the room as much as possible (eg – intubating provider + medication pusher and RT).
 - c. The pre-procedure checklist and timeout should be performed before entering the room.
 - d. PPE should include N95+face shields or PAPRs, **head covers, foot covers, impermeable gowns** for providers at head end.

- e. If available a difficult intubation cart should be available outside the room with a PPE protected provider (preferably RT) who is ready to enter the room with the equipment if needed.
 - f. A ventilator should be in the room with settings preset prior to intubation.
 - g. If code is in progress, goal is immediate intubation to minimize exposure.
- 3) Non-Invasive Ventilation and HFNC (see Respiratory Care guidelines for full documentation):
- a. There is an increase in risk of aerosolizing with Venturi mask, NIV and HFNC. The use of NIV/HFNC should be carefully considered considering the potential risk. Transport on anything other than mechanical ventilator or 100% NRB is discouraged. Venturi mask is not recommended.
 - b. Ensure minimal leak on HFNC – maximal settings recommended 100%/30L.
 - c. For NIV – ensure < 20% leak. Consider use on a case by case basis for hypercarbic respiratory failure, pulmonary edema, mild ARDS. Not recommended for metabolic acidosis. Repeat ABG in 2 hours. Maximal settings for COVID-19/PUI are 12/8.
- 4) Emergent cardiopulmonary resuscitation:
- a. Healthcare workers should not enter the room without appropriate PPE even in emergency circumstances, and healthcare workers who have not been trained in appropriate PPE should not enter the room under any circumstances. Resuscitative efforts, if performed, would be made by the primary team caring for the patient. PPE should include N95+face shields or PAPRs, **Head covers, foot covers, impermeable gowns** for providers.
 - b. A modified adult medical emergency “code blue team” may consist of: team leader, primary nurse, two clinicians (RN or provider) for chest compression, RN for drug administration, respiratory care, anesthesiologist. Outside the room, at least 1 RN may remain to manage the crash cart and other supplies. Please refer to cardiac arrest guidelines for further details.
 - i. A clinician will be assigned to observe responders donning and doffing PPE when entering and exiting the room. A log will be made of resuscitation responders per patient. Any breaches in donning and doffing PPE will be documented and referred to Infection Prevention and Occupational Health for evaluation.
 - c. Equipment:
 - Crash cart remains outside the room. The clinician assigned to the crash cart wears PPE to minimize exposure as the door is opened and closed. Supplies can be handed into the room for use to minimize door opening/closing. Disposable supplies remain in the room for use or are discarded. Clean hands/gloves must be worn to touch supplies in the crash cart. A clinician from inside the room may pass out a pink basin for the crash cart clinician to place supplies into to prevent crash cart contamination. Supplies within the trays and intubation box are disposable, (including items in the adult intubation box), with the exception of the CPR board, suction regulator and the oxygen flowmeter.
- 5) Mechanical ventilation
- a. Early elective intubation is the key intervention to avoid HCW exposure and a complex intubation
 - If COVID-19 (+) move from 5L to 100% NRB – if any clinical worsening such as increased WOB or low PaO₂ (less than 100 on 100%NRB)
 - HFNC/NIV not a good choice for worsening oxygenation b/c risk to HCW and rapid worsening and lack of evidence of either for hypoxemic respiratory failure in this setting.
 - b. Low Tidal Volume Ventilation (ARDSnet Protocol) – Recommend trial of YNHHS High PEEP protocol
 - c. Pronation therapy strongly recommended has been very effective in COVID-19 ARDS with hypoxemia (improved oxygenation – no outcomes data) but per standard approach for ARDS is should improve outcomes
 - d. Travel ventilators need filter on exhalation port
- 6) Therapeutic adjuncts :
- a. Use of inhaled nitric oxide or epoprostenol can be considered as clinically appropriate.

- 7) ECMO: ECMO can be done under highly selected circumstances. The risk to health care workers in this circumstance has not been well characterized. Request/consideration for ECMO should involve Medical Critical Care leadership on ALL patients prior to surgical consults (see ECMO guidelines).
- 8) Neuromuscular Blockade: Limited evidence but continue to use for refractory hypoxemia and ventilator dyssynchrony leading to elevated plateau pressures
- 9) Bronchoscopy: Avoid unless absolutely necessary – high risk of aerosolization.
- 10) Novel/Experimental (See drug therapies algorithm on COVID resource page; Consult Service being developed):
- 11) Pulmonary embolism (PE):
 - a. Confirmed PE in a COVID-19 + patient - treatment with anticoagulation only is recommended. Avoid catheter directed therapy (CDT) if possible. This includes all intermediate/submassive patients in order to preserve PPE and minimize the number of staff exposed to COVID-19. In the event that the patient deteriorates or has high-risk/massive PE, would favor systemic lytic therapy rather than CDT.
 - b. Confirmed PE in a PUI - treatment with anticoagulation only, until COVID-19 testing results are finalized. If COVID + would treat as above. If COVID-19 negative would treat as usual PERT team guidelines and CDT if appropriate.
 - c. COVID + patients with suspicion for PE - rely on other bedside exam findings such as TTE and LE dopplers rather than CTA to help confirm PE. If high suspicion for PE, start on anticoagulation. For COVID PUI patients with high suspicion of PE, start on anticoagulation and complete CTA once COVID testing is negative.

12) Hyperglycemia Management

Insulin drips require substantial nursing resources and ideally should be limited in COVID -19 patients to decrease PPE use and support staff safety.

- a. Tolerate blood glucose (BG) up to 200 mg/dl
- b. Trial of subcutaneous (SQ) insulin RISS Q6hrs, with transition to Lantus early (ie after 24 hrs) if the Regular total daily dose is above 10-15 units per day (this will allow for less frequent RISS administration).
- c. Resorting to insulin infusion mainly for those with persistent BGs >300 mg/dl despite (b) or in patients with concomitant DKA or HHS, or in pts with coexisting type 1 diabetes when their ICU glycemic management is proving very difficult with broad swings in BG.
- d. For patients who require insulin infusion, existing protocol should be followed.

13) Cardiovascular Evaluation and Management:

There is emerging recognition of the cardiovascular manifestations of COVID-19 which appear to be associated with substantial morbidity and mortality. The primary CV manifestation seems to be myocarditis, which can vary from a transient elevation in cardiac troponin with mild and reversible decrement in ventricular function to a fulminant presentation with cardiogenic shock and circulatory collapse.

Given the above, the following recommendations are made for all patients with known or suspected COVID-19 in the ICU setting:

- a. Obtain ECG and biomarkers (troponin, BNP, CRP) at admission/baseline.
- b. Patients with elevated troponin, should have serial testing every 8 hours for 24 hours and/or with changes in clinical status
- c. Early consultation with cardiology is recommended for COVID-19 patients with systolic heart failure, cardiomyopathy, shock or unexplained, new significant ECG abnormalities.
- d. Patients with persistent hypotension requiring intervention (e.g. 1 pressor, sustained IVF), hypoxemia out of proportion to chest x-ray findings, significantly abnormal ECG, clinically significant arrhythmias, or abnormal cardiac biomarkers should undergo screening bedside echocardiography to grossly assess LV function or formal echocardiography depending on availability. If possible, the images should be uploaded to Epic for review by a cardiologist (call Echo Attending on Service). In instances where a bedside echocardiography is not readily available and the patient is stable, cardiology consultation prior to a formal echo may assist us in managing our echo/sonographer resources.
- e. Persistent myocardial dysfunction even as the patient recovers from a pulmonary perspective may be a marker for sudden, unexpected adverse outcomes. Further monitoring and/or other strategies will be considered on a case-by-case basis in conjunction with cardiology.

Goals of Care:

- 1) Ensure appropriate goals of care discussions in ED and ACW (floors)
- 2) Recommend DNR in advanced ARDS with MSOF (not different than regular patients)
- 3) Avoid HFNC/Bipap offers to DNI patients with poor prognosis

High risk clinical features:

- 1) Age > 60
- 2) Morbid obesity with BMI > 40
- 3) Chronic heart disease
- 4) Chronic lung disease
- 5) Immunosuppressed state

COVID-19 Specific lab orders:

- 1) LFTs (AST/ALT)
- 2) Troponin (elevated in some cases)- if elevated check q8 for 24 hours and then every 24 hours
- 3) BNP
- 4) CRP can be elevated : Order baseline and every 12 hours
- 5) Procalcitonin can be normal or low : Order baseline and every 12 hours
- 6) Ferritin : Order baseline and every 12 hours
- 7) LDH : Order baseline and every 12 hours
- 8) D- Dimer, fibrinogen, PT/PTT : baseline and every 12 hours
- 9) HIV-1/HIV-2 antibody/antigen
- 10) CBC with differential (lymphopenia in severe cases)
- 11) Cytokine panel in severe cases : baseline and every 48 hours

Laboratory Testing:

- Recommend team huddle on admission for PUI (“rule-out”) to ensure testing sent as soon as possible to speed time to result and reduce PPE use and HCW burden

Post mortem care and considerations:

1. Post mortem care should be performed following the YNHHS post mortem care policy.
 - a. For medical examiner referral or post mortem examination:
 - i. Endotracheal tubes may be capped with a filter appropriate for viral protection (pall or viral/bacterial filter) if already in the room of the patient. In the event that a filter is NOT already in the room, the ETT should be clamped.
2. Patient’s endotracheal tube should be removed by registered nurse in PPE required for extubation (see Respiratory Care-Adult COVID-19 Practice Guidelines).

Please contact hospital or system ICU leadership with any questions related to these practice guidelines.