

Care for the Critically Ill COVID-19 Patient

Institute for Critical Care Medicine

and

Department of Anesthesiology, Perioperative and Pain Medicine

Icahn School of Medicine at Mount Sinai

The Mount Sinai Hospital

Evan Leibner, MD, PhD

Jean Hsieh, MD, MS

Glen Chun, MD

Nina Sung, MD

Dan Katz, MD



**Mount
Sinai**

Outline

- ❑ COVID-19 basics
- ❑ Recognition and care of patient who is
 - Critically ill / decompensating
 - Hypotensive
 - In acute respiratory failure
 - Mechanically ventilated
- ❑ COVID-19 unit workflow
- ❑ Assessing patients respiratory status
 - Signs and symptoms
 - Basics of blood gas analysis
 - Choice of support device: Nasal cannula (NC), Non-rebreather (NRB), High flow nasal cannula (HFNC), Non-invasive ventilation (NIV), Mechanical Ventilation (MV)
 - Escalation pathway
- ❑ Ventilator Basics
 - Intro to ventilator and settings
 - Lung protective ventilation initiation and management
 - Troubleshooting a ventilator

COVID-19 Basics

☐ Level of Care:

- Patients with confirmed COVID-19 with rapidly increasing O2 requirements, non-rebreather, or NIV should be carefully monitored

☐ PPE (PUI & COVID-19 positive):

- All common areas:
- In patient room: surgical facemask, face shield, isolation gown, gloves
- N95 (instead of surgical facemask) is used for (1) aerosol-generating procedures (e.g., intubations, cardiac arrest, chest physiotherapy) and (2) in rooms with PUI/COVID+ patients on HFNC/bipap
- Isolation gown: offers full protection against droplets; **same** gown can be worn when interacting with COVID-19 patients in isolation cohort (discard if visibly ripped or soiled)

☐ Patient Room:

- Isolation designation: Special Droplet + Contact precautions
- If requiring frequent aerosolized procedures (e.g., HFNC, bipap), preferred to be in a negative pressure room if available
- Cohorting is allowed for COVID-19 positive patients; NOT allowed for PUI (must be single room)

☐ Patient Visitors:

- No visitors
- Encourage patients to communicate with family / friends using their own personal communication devices

☐ Patient Transport:

- Necessity should be confirmed by MD prior to transport
- Non-intubated patients should wear a facemask, nasal cannula under facemask, or nonrebreather during transport
- No HFNC
- Intubated patients should be transported with viral filter
- Staff transporting patient should wear a mask

☐ Mobility:

- Standard care, with precautions

☐ Personal clothing & Equipment:

- Use ONLY disposable stethoscopes
- Clean personal devices (phone, pager, etc) frequently with rubbing alcohol

COVID-19 Basics

LABORATORY TESTING

- ❑ Obtain procalcitonin, LFTs, EKG in addition to routine testing
- ❑ A negative result in a symptomatic patient who is not improving and with a high suspicion for COVID-19 may represent a false negative. Consider retesting or if intubated sending a bronchial sample
- ❑ In critically ill, consider arterial line to aid ABGs, blood draws, BP monitoring with less staff exposure

IMAGING

- ❑ Consider utility of bedside and other imaging/diagnostic studies in context of personnel exposure and potential for equipment contamination
- ❑ Batch indications for CXR together (i.e., intubation, central line, NGT)
- ❑ Consider use of bedside ultrasound for evaluation of lung pathology and assessment for cardiomyopathy
- ❑ Limit use of CT scans when possible

RESPIRATORY SUPPORT

- ❑ Limit use of aerosol-generating modalities whenever possible (e.g., sputum induction, nebulized medications)
- ❑ Use MDI instead of nebulized medications
- ❑ Supplemental oxygen if SpO₂ <92%
 - Nasal cannula and non-rebreather masks may be used as usual
 - A monitored trial of Non-Invasive Ventilation (HFNC & BIPAP with filter on exhalation port) Patient ideally would be in an airborne isolation room and HCP need to use N95 and face shield for PPE
 - BIPAP should have a filter on exhalation port

COVID-19 Basics

INTUBATION:

- ❑ N95 (instead of surgical mask), face shield, double gloves, gown, and hat
- ❑ Plan for rapid sequence intubation by experienced physician. Ideally minimally number of people in room during intubation. (see Intubation Guidelines in APPENDIX for details)

VENTILATOR MANAGEMENT:

- ❑ Initiate all patients on low tidal volume ventilation immediately (4-6cc/kg IBW)
- ❑ Goal SpO₂ no higher than 96%
- ❑ Consider moderate to high PEEP (minimize plateau) strategy
- ❑ Require heavy sedation with ventilator dyssynchrony
- ❑ Consider early prone positioning
- ❑ If persistent ventilator dyssynchrony or persistently high plateau pressures consider neuromuscular blocking agents
- ❑ Consider inhaled epoprostenol or iNO
- ❑ ECMO team should be consulted when proning is being considered so team can be mobilized quickly if the patient declines.

SEDATION:

- ❑ Keep more sedated because of risk of self-extubation
- ❑ Daily Spontaneous Awakening Trials with HCP in room

COVID-19 Basics

OTHER PROCEDURES

- ❑ Consider (1) arterial line to facilitate blood draws and reduce contact time, (2) central line if requiring pressors / difficult veins, (3) NGT at time of intubation to assess placement using same CXR
- ❑ Procedures should be performed by an experienced physician in order to minimize clinician time spent in close proximity to patient
- ❑ 2 providers (2 MDs or MD + RN) should be in the patient's room for the duration of the procedure
- ❑ If increased risk of aerosolization, use N95
- ❑ Non-disposable equipment (e.g. ultrasound) should be wiped down with green wipes in the room (>2min contact time). Repeat after exiting room.
- ❑ Avoid bronchoscopy unless absolutely necessary (high risk of aerosolization)

HEMODYNAMIC MANAGEMENT

- ❑ Use multimodal assessment strategy (skin temp, capillary refill, lactate) to guide fluid resuscitation
- ❑ Conservative fluid strategy, keep net negative, avoid maintenance fluids
- ❑ Prefer buffered crystalloids over colloids/unbalanced crystalloids
- ❑ Target MAP 60-65 using levophed as first-line agent, and vasopressin if 2nd agent needed
- ❑ If shock w/ cardiac dysfunction despite IVF and levophed, add dobutamine or epinephrine
- ❑ If refractory shock or chronic steroid use, consider stress dose steroids (hydrocortisone 50mg q6h)
- ❑ Be mindful of the potential for development of cardiomyopathy in COVID-19 patients

COVID-19 Basics

PHARMACOLOGIC TREATMENT (see *TREATMENT guidelines in APPENDIX*)

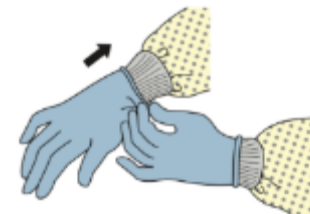
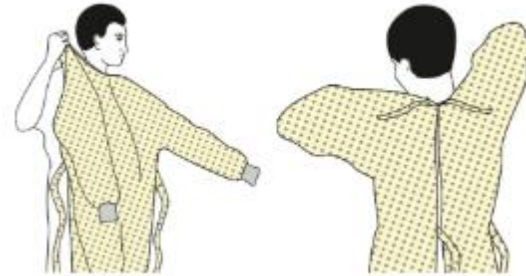
- ❑ Acetaminophen for **fever** (no clear evidence that ibuprofen can make COVID-19 worse, can avoid if concerned)
- ❑ **Bacterial co-infection may occur**, treatment of bacterial pneumonia should be based on clinical suspicion (CAP or HCAP as appropriate). Consider stopping antibiotics after 48-72 hours if no evidence of infection
- ❑ **Viral co-infection is rare**, but may occur.
- ❑ **Nebulized medications** should be **avoided** whenever possible; **use MDI instead**
- ❑ Steroids can be used
- ❑ Multiple trials for experimental COVID-19 treatments, discuss with ID team

CARDIAC ARREST

- ❑ Don PPE **before** entering room – **N95**, eye protection, **hat**, gown, **double** gloves; room door remains closed
- ❑ Use automated external compression device (LUCAS) if available
- ❑ **Hold compressions during intubation** to minimize aerosolization

Donning PPE

- **Engage** donning coach
 - Perform **hand hygiene**
 - Don **yellow gown**
 - Coach makes sure gown covers your back
 - Tie straps on the side of your body
 - Put on **mask**
 - Do not cross straps
 - Pinch nose to ensure tight fit
-
- Put on **eye protection** (face shield or goggles)
 - Put on **gloves**
 - Make sure thumbs are in gown thumb hole
 - Gloves over yellow gown so no skin exposed
 - *N95 instead of mask for aerosolizing procedures*
 - *OR*
 - *if patient is COVID-19+ or PUI and on HFNC or bipap*



Doffing PPE

Remember front of gown / face shield / mask can be contaminated, so don't touch the front

If ante-room

- doff all PPE in ante-room

If no ante-room

- Doff all PPE except face mask inside room (at least 6 feet away from patient)
- Exit room, perform hand hygiene, then doff face mask and perform hand hygiene again

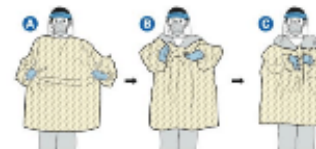
Method 1 – Gloves, then Gown Removal

1. Engage doffing coach
2. Remove **gloves** using non-touch technique
3. Perform **hand hygiene**
4. Remove **face shield**
 - Leaning forward, lift head band at the back of your head, pull away from your face and discard
5. Grasp inner neck of **gown**, break apart
 - Pull gown off and away from shoulders
 - As you go, turn gown inside-out and roll into inside-out bundle
 - discard
6. Perform **hand hygiene**
7. Remove **mask*** by grasping individual straps at back of head
 - Leaning forward, first remove bottom strap, then remove top strap and discard
8. Perform **hand hygiene**
9. If any **breach** is noted, perform hand hygiene immediately. Record breach on Breach Log



Method 2 – Simultaneous Gown and Glove Removal

1. Engage doffing coach
2. Untie **gown**
 - Roll off gown inside out into a bundle, peeling off **gloves** inside out at the same time
 - Bare hands only touch inside of bundle. Discard.
3. Perform **hand hygiene**
4. Remove **face shield**
 - Leaning forward, lift head band at the back of your head, pull away from your face and discard
5. Remove **mask*** by grasping individual straps at back of head
 - Leaning forward, first remove bottom strap, then remove top strap and discard
6. Perform **hand hygiene**
7. If any **breach** is noted, perform hand hygiene immediately. Record breach on Breach Log



*N95 instead of mask for aerosolizing procedures, or if patient is COVID+ or PUI and on HFNC or bipap

COVID-19 Unit Workflow

- ❑ Think of the common workspace as being effectively cross contaminated and routinely bleach/wipe your workstations.
- ❑ Remember that your safety is paramount and even in a crash scenario, you should NEVER enter a room without donning appropriate PPE
- ❑ On admission:
 - Use COVID-19-order set
 - New admissions- perform a medication reconciliation of home meds (using collateral from family/nursing homes/outpatient pharmacies/prior discharge meds
 - Identify the health-care proxy and/or surrogates and confirm accurate phone numbers- make sure this is documented in the advanced care planning tab and also an advanced care planning note
 - Confirm code status with patient or with NOK/HCP/surrogate if pt is incapacitated
 - Consult ID to discuss treatment/clinical trial options

Pre-Rounding/Rounding in the COVID-19 unit

- ❑ Step 1: Get signout from the overnight team on new admissions and major overnight events
- ❑ Step 2: EPIC pre-rounding for vitals, labs, gtts/rates, blood gas/lactate and vent support required, new microbiology data, ins/outs
- ❑ Step 3: see patients. Minimize exposure, in/out.

Sample Presentation for Rounds

- ❑ Overnight events
- ❑ Vitals: Tmax, HR, BP (specify pressors/doses), SpO2 or PaO2 (in context of ventilator settings or O2 support)
- ❑ Drips: Sedation and doses, other pertinent drips
- ❑ Medications: antibiotics (day x of y), COVID-19 directed treatment
- ❑ Example: "Tmax is 102.4 over 24 hours, with HR in the 70s, and blood pressure systolics 90s on Levophed at 18 mcg and vasopressin at 1.8. The pt is saturating in the mid-90s on Volume-Control with an FiO2 of 70% and PEEP of 19 with the most recent ABG as 7.35, pCO2 50, and paO2 of 67. Current gtts include propofol at 50mcg, fentanyl at 100 mcg."
- ❑ Work of the day:
 - Consults
 - Orders
 - Titration of meds/drips/vent settings
 - Updating family- should occur on a daily basis

7. MSHS COVID-19 AIRWAY MANAGEMENT GUIDE

Preparation:

1. Respiratory Therapy should prepare the ventilator in the room prior to intubation
2. Take only the things that you need with you into the room, but make sure to take everything you need
3. Prepare medications and intubation equipment outside of the patient's room
4. Suggested hypnotic agent and succinylcholine 1-1.5 mg/kg, or ~~rocuronium~~ 1.2 mg /kg
5. Verify intravenous access
6. See equipment checklist
7. Have a dedicated provider outside the room not in PPE to hand additional equipment/medications that may be needed and to come in to assist if needed

Airway Management:

We recommend starting supplemental O2 for $\text{SPO}_2 < 92\%$ and aim for maintaining a SPO_2 of no higher than 96%. There should be a low threshold for early intubation for adult patients. (Consider discussions with pediatric critical care team for children unless patient is unstable). Patients with worsening respiratory failure should be intubated early. A short trial of High Flow Nasal Cannula (HFNC) can be used on COVID-19 patients, ideally in a negative pressure room with a surgical mask over the HFNC. If HFNC not available, non-invasive ventilation with BiPAP with a filter on the exhalation port can be considered for a short trial.

Personnel:

1. The provider on the team with the most intubation experience should intubate the patient
2. The Difficult Airway Response plan should be activated in the event of a difficult airway following the standard protocol
3. There should be no more than 3 people, ideally 2 people in the room during intubation
4. Designate a person outside the room to help with supplies if needed, and to monitor for breaches of PPE

Pre-intubation:

1. Ventilator should ideally be set up prior to intubation.
2. Advance planning and clear communication are paramount
3. If patient is not in a single patient room, separate from other patients by 6 feet using curtains or screens
4. Set up and confirm ETCO2 waveform ~~capnography~~ is working
5. Minimize personnel
6. All equipment/medications that are needed should be setup and brought into the room prior to the start of the procedure, see intubation check List
7. Don PPE (gown, gloves, n95 respirator, eye protection, hair cover) outside of the patient's room

Intubation:

1. Prolonged pre-oxygenation for more than 5 minutes with 100% FiO2 non rebreather (caution: expiratory ports may aerosolize secretions)
2. Most experienced provider should intubate, second provider should push medications and assist
3. Goal is Rapid Sequence Intubation (RSI)
4. Can use push dose vasopressors for post intubation hypotension if needed
5. If manual ventilation is needed, use 2 hands to provide good seal, place filter between mask and bag, and deliver small tidal volumes.
6. Do not use non-invasive ventilation if it can be avoided
7. Preferred use of video-laryngoscopy (using the device that the ~~intubator~~ is most experienced with and hand-held device if available) to increase the distance
8. Inflate cuff immediately after intubation
9. Doff outer gloves after intubation and prior to touching other equipment
10. Attach filter to ETT, then the rest of the system
11. Institute mechanical ventilation on volume control mode at 6-8cc/kg IBW flowing the ARDS net titration.
12. Use disposable stethoscope to auscultate from the patient's side
13. Avoid awake intubation (risk of aerosolizing the virus during ~~topicalization~~ and coughing)
14. Avoid ~~supraglottic~~ airway (LMA) ventilation, unless warranted for a difficult airway

Post-intubation:

1. Connect the patient to the ventilator and secure the tube
2. If need to disconnect the patient from the ventilator, put it in standby first
3. Dispose used and all disposable items that were brought into the room in trash in the room
4. Video Laryngoscope: thoroughly wipe all surfaces with peroxide wipe prior to doffing PPE making sure to fully saturate the surface following standard droplet cleaning protocols.
5. Doff PPE, ideally in anteroom if available (can remove all pieces including N95, and wash hands) but if anteroom is not present, then doff in patient's room (at least 6 feet away from the patient), except for the N95 mask, which is removed outside of the room. Hand hygiene.
6. Wipe Video Laryngoscope again with peroxide wipe after doffing PPE. After this it is ready for next patient use and can be returned to its storage location

Intubation Check List:

- ☐ Working IV (ideally two IVs)
- ☐ BVM (\pm PEEP Valve) on Oxygen
- ☐ Waveform Capnograph on BVM
- ☐ Video Laryngoscope
- ☐ Backup Laryngoscope
- ☐ ET tube the size your plan to use and 1 size smaller
- ☐ ET tube stylet
- ☐ Oral airway
- ☐ Bougie
- ☐ LMA sized for the patient
- ☐ Suction
- ☐ NRB for pre-oxygenation
- ☐ Nasal Cannula for Apneic Oxygenation
- ☐ Paralytic (succinylcholine 1-1.5 mg/kg or rocuronium 1.2 mg /kg)
- ☐ Induction Agent (Suggest ketamine 1-2mg/kg or etomidate)
- ☐ Flushes
- ☐ Post intubation sedation (hydromorphone or midazolam) (setup on PCA or Pump)
- ☐ Orogastric tube
- ☐ Norepinephrine on pump only if needed
- ☐ Bolus dose of phenylephrine

Assessing Patient's Respiratory Status

When asked to consider patient's respiratory status assess the following:

- ❑ Vitals: Heart Rate, Respiratory rate, SpO₂
- ❑ Physical exam and appearance: grimacing, using abdominal and accessory muscles, or tachypnea without distress
- ❑ Arterial blood gas analysis: pH / pCO₂ / pO₂ / lactate

Warning Signs of Respiratory Decompensation

- ❑ Rapidly escalating O₂ requirement (eg RA--> 6L NC--> NRM in short period of time, eg minutes to hours)
- ❑ Inability to maintain sats in the 90s on escalated O₂ therapy
- ❑ Respiratory distress including: tachypnea, accessory muscle use, inability to speak in full sentences
- ❑ Note that patients with COVID-19 often feel very little dyspnea despite being profoundly hypoxemic, for unclear reasons.

Oxygenation

- ❑ Generally speaking, most patients who require O₂ escalation will escalate from NC--> NRM--> intubation
- ❑ Non-Invasive Ventilation (HFNC and BiPAP) can be used for patients in resp failure
- ❑ Patients with increased work of breathing or hypoxia despite high level of non-invasive support is an indication for intubation.

Note that these patients have very little reserve and decompensate QUICKLY and PROFOUNDLY. BE VIGILANT AND ESCALATE YOUR CONCERNS EARLY

Ventilator Basics

- ❑ Goal: Support both oxygenation and ventilation of patient by improving pO₂/SpO₂ and removing CO₂
- ❑ Most commonly patients will be on Volume control or VC mode
 - In this mode, ventilation is by setting the Tidal Volume (V_t), Flow, and Respiratory rate
 - Oxygenation is controlled by setting the FiO₂ and PEEP

Basic Ventilator Settings: Lung-Protective ARDS Settings

- ❑ **Tidal Volume Selection.** Multiply Ideal Body Weight (IBW) x 6cc/kg (eg. Pt with 60kg IBW would get a tidal volume of 360).
- ❑ **Respiratory Rate:** will need to be titrated based on the pt's blood gas- increasing rate blows off more CO₂ which is needed if the pt is acidemic (pH < 7.4, pCO₂ > 40)
- ❑ **FiO₂:** Start with 100% and back-down slowly
- ❑ **PEEP:** Recommended to titrate for high PEEP ladder from the ARDSnet protocol
- ❑ **Most patients will need high vent settings (eg 100% FIO₂ and PEEP >10) up-front**
- ❑ **GOAL:** Achieve oxygen saturations over 90% and a pH > 7.3, while minimizing ventilator induced lung injury

A close-up look...

Actual output as measured by the ventilator. This is what the patient is doing.

Pressure-time and flow-time curves

Vent settings:

f = respiratory rate

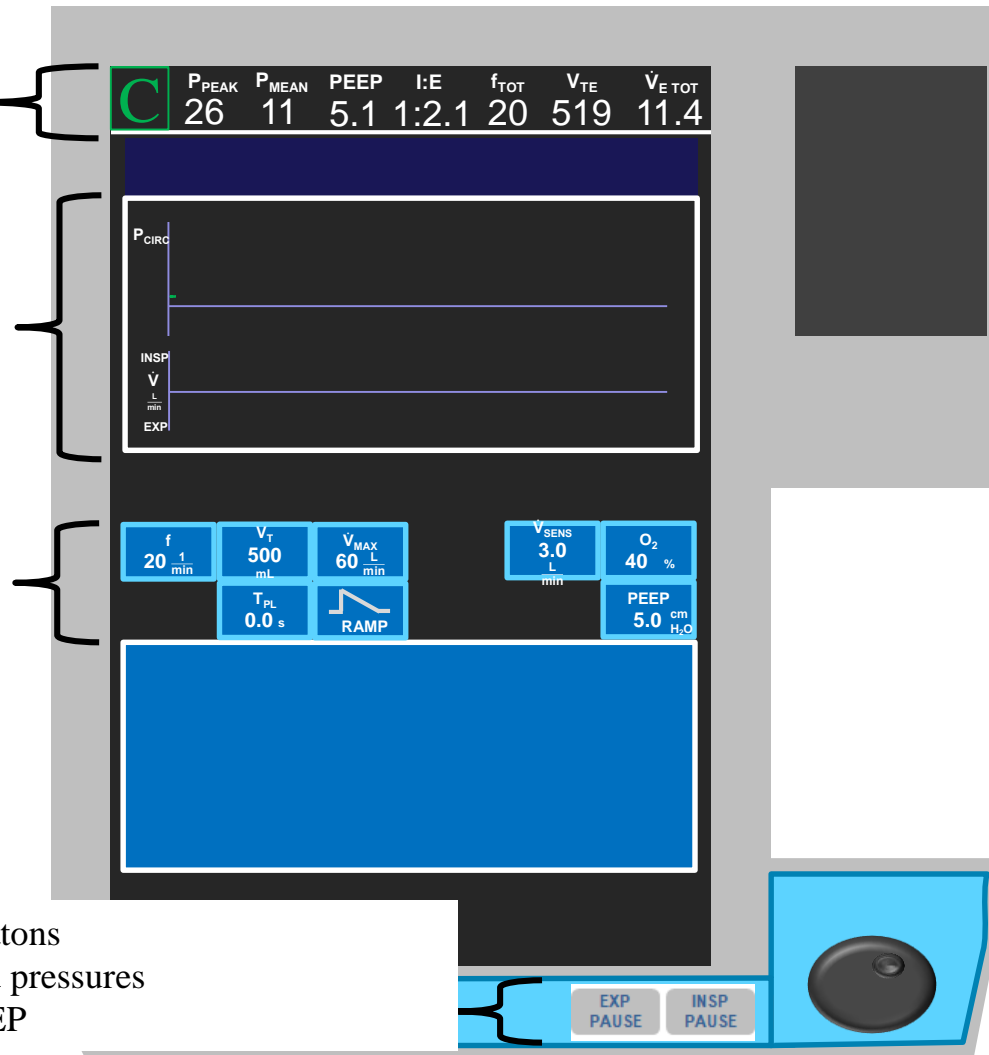
V_t = Tidal volume

V_{max} = Flow in Liters per minute

Inspiratory and expiratory hold buttons

Inspiratory pause measures plateau pressures

Expiratory pause measure autoPEEP



Oxygenation goals

- ❑ SpO2 in the 90s
- ❑ PaO2 on ABG minimum of 55
- ❑ Can wean vent settings (FiO2 or PEEP) if oxygenation is much better than that
- ❑ Remember that we will preferentially wean FiO2 before we wean PEEP, per the ARDS Network High PEEP ladder **(In other words, FiO2 decreases to 50% before you begin to wean PEEP)**

Management of Refractory Hypoxemia

- ❑ As ventilator settings become very high, you may consider:
 - Nimbex, a medicine that will paralyze the patient so they can rest their lungs completely
 - Prone ventilation (rolling the pt to a facedown position)
 - Inhaled flolan or inhaled NO therapy
 - ECMO

Desaturating Intubated Patient

- ❑ Confirm a good SpO₂ waveform, make sure vent is connected
- ❑ Increase FiO₂ to 100%
- ❑ Check peak/plateau pressure
- ❑ Performing a lung ultrasound to evaluate for lung sliding and other pathology
- ❑ The ett must be connected to a filter before bvm and you must be in n95 as it is considered aerosolizing

Shock

- ❑ Can trial a small boluses PRN (250cc at a time)
- ❑ However most patients need vasopressors. Recommend:
 - Levophed as the first line agent.
 - Discuss with attending about adding 2nd vasopressor
 - Add vasopressin when levophed > 15 mcg/min
 - Avoid dopamine as it predisposes to arrhythmias
 - Some pts develop cardiogenic shock/myocarditis --> inotrope (dobutamine) would be helpful
- ❑ If levophed dose >15mcg/min, stress dose steroids may be added, discuss with your attending:
- ❑ Hydrocortisone 100mg bolus followed by 50mg q6h
- ❑ +/- Fludricortisone

Sedation of Intubated COVID-19 patients

- ❑ To prevent accidental extubation
 - Recommend sedating heavily (RASS -4/-5) for patients on high ventilator settings (anything greater than PEEP > 8 and FiO₂ >50%)
- ❑ Sedation can be weaned when oxygenation improves and patient is a candidate for spontaneous breathing trials (SBT).
- ❑ Propofol
 - recommended unless pt is in high shock state, as it can cause profound hypotension
- ❑ Opiates: Fentanyl/Dilaudid
- ❑ When getting ready for SBT --> consider dexmedetomidine (Precedex)
- ❑ Benzodiazepines
 - Versed- least preferred due to delirium, however may be needed for adjunctive therapy in critically ill patients to tolerate the ventilator

Cardiac Arrest of the COVID-19 patient

Mount Sinai Health System

Person Under Investigation (PUI)/COVID-19 Positive

Cardiac Arrest Guide

Important Things to Consider Before ACLS

- Enter the room after donning PPE - use N95 mask, face shield or other eye protection, bouffant, gown, gloves, and other equipment as indicated.
- Minimize staff and throughput within the room. **Do not enter the room if you are not needed.**
- Use automated external compression device (LUCAS) if available.
- If patient is already intubated: perform CPR, clamp the ET tube to prevent loss of PEEP if readily available, utilize BVM with PEEP valve, while leaving the HEPA filter in line to prevent aerosolization.
- If the patient is not intubated, proceed with bag valve mask ventilation with a viral filter using the two-person ventilation technique
- The airway should be prioritized once the intubation team arrives.
- Opening of the room door should be kept to a minimum for entering personnel and hand off items.
- Review advanced directives and explore goals of care as appropriate before and during ACLS.

Team Members (up to 7 in room, all wearing PPE):

1. Cardiac Arrest Leader
2. RN N1: Medication administration
3. Licensed Provider: CPR
4. Licensed Provider: CPR (If not using LUCAS)
5. Licensed Provider: Bag mask ventilation (ventilator) (2 handed vice grip)
6. Licensed Provider: Bag mask ventilation (squeezing the bag)
7. Respiratory therapist: Only if the patient is intubated or will be intubated for management of the ventilator after the code. Use ONLY two-person bag mask ventilation technique to ensure a seal. Ventilate with a bag valve mask (BVM) with a HEPA filter. If patient is already intubated, clamp ET tube prior to disconnect from ventilator if readily available, leave HEPA filter and continuous ETCO2 in line, connect BVM with PEEP valve, release clamp and bag according to ACLS guidelines.

Team Members (2) outside room:

1. Team member: Remains outside the room in PPE. Supplies medications and hands off materials as well as observes for breach in PPE of providers inside the room. The RN will be responsible for recording in the code narrator.

ACLS Process

1. The person who identifies patient in cardiac arrest (already in the room wearing PPE)
 - a. Activate Cardiac Arrest notification
 - b. Start chest compressions

2. 2nd person to arrive:

- a. Bring cardiac arrest cart and intubation box outside the room
- b. Don PPE
- c. Obtain defibrillator, defibrillator pads, and backboard
- d. Enter room
- e. Place backboard
- f. Place defibrillator pads on patient and connect to defibrillator.
- g. Check for appropriate IV/IO access (2 large bore IVs or IO)

3. 3rd person to arrive: (Designated Code Leader until relieved by Critical Care MD)

- a. Don PPE
- b. Assist critical care MD in setting up intubation equipment (if the patient is not already intubated) Prior to entering room, gather all needed supplies.
- c. Brings ACLS medications into the room.
 - Consider: epinephrine x 5; bicarb X 2; calcium x 1; flushes x 10
 - Bring additional supplies including IV fluid and IV start kit into the room.
- d. Assist with CPR, if LUCAS is not available

4. First Critical Care MD to arrive

- a. Don PPE
- b. Enter Room
- c. Assess need for definitive airway. If needed, insert definitive airway. Once airway is secure, proceed to step D. If not needed, proceed to step D.
- d. Assume Code leader role by announcing role and assigns responsibilities to team members (team members should provide a verbal response with acknowledgment of assignment).

****Follow standard ACLS protocol****

Intubating during code:

Because the most likely cause of the cardiac arrest in these patients would be a hypoxic respiratory failure, we recommend inserting an endotracheal tube as soon as possible (Follow the Mount Sinai Health System Airway Management Guide: Appendix 1).

1. Intubate using video-laryngoscope
2. Inflate the balloon prior to any ventilations.
3. Place a HEPA filter, continuous ETCO2, and Ballard between ET tube and BVM.
4. Clamp tube prior to disconnecting BVM to place patient on ventilator to prevent loss of PEEP during transition if readily available

Note: If the patient requires ventilation during the intubation process *only use a 2 person ventilation technique* with the BVM and a HEPA filter. One person uses both hands around the mask to develop a seal with the patients face and the other person squeezes the bag. This will ensure a proper seal and minimize aerosolization.

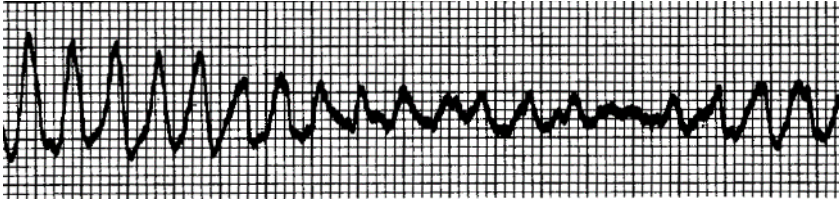
Aside from Vents, Pressors, Sedation

- The hallmark of good critical care medicine is attention to preventable harms, which include:
 - DVT ppx with SQH
 - GI ppx with h2 blocker or PPI for vented patients
 - Discussing antibiotic de-escalation
 - Providing early enteral nutrition with tube feeds and glycemic control
 - Ensuring things like: bowel movements, preventing hypernatremia, attempting to maintain an even or net negative fluid balance

Treatment of Hyperkalemia

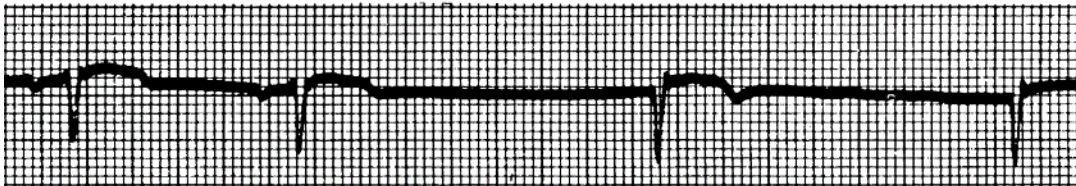
- ❑ Use Hyperkalemia orderset in Epic
 - Calcium Calcium Chloride or Calcium Gluconate
 - Insulin and glucose (be careful in patients with renal failure)
 - Sodium bicarbonate
 - Inhaled β_2 -agonists (avoid nebs in COVID-19 patients not through the vent)
 - Lasix
 - Sodium polystyrene sulfonate
 - Dialysis

Ventricular Fibrillation



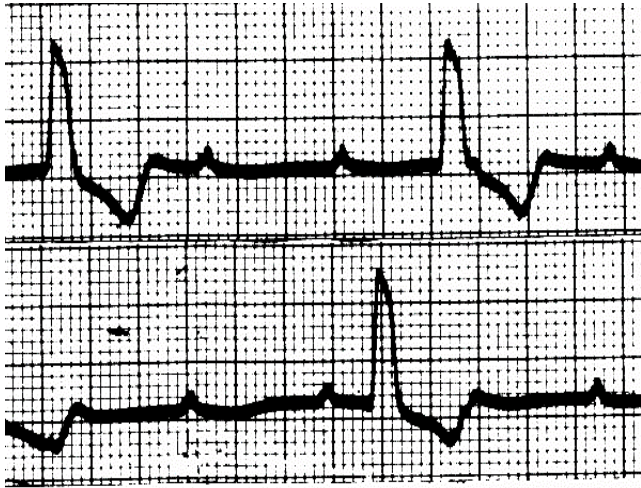
- Start CPR immediately
- Defibrillate as soon as possible
- Epinephrine, 1 mg Q3 min
- Antiarrhythmic agents-Amiodarone 300 mg followed by 150 mg

Pulseless Electrical Activity and Asystole



- Search for reversible causes H's and T's
- Epinephrine, 1 mg Q3 min

Bradycardia



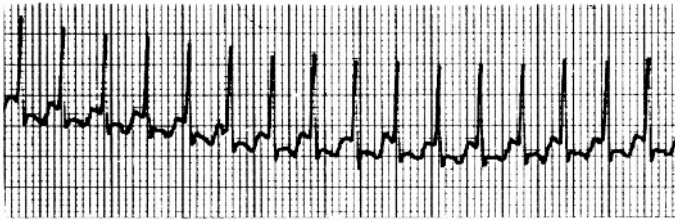
- Transthoracic/Transvenous pacing
- Atropine
- Epinephrine

Stable Narrow Complex Tachycardia



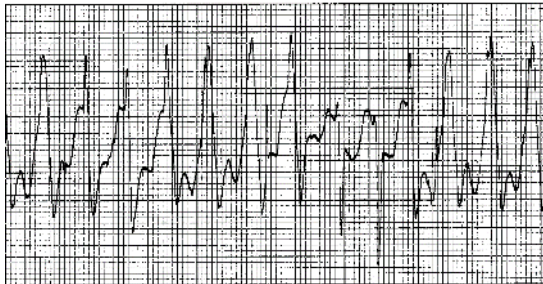
- Vagal maneuvers
- Adenosine
- Diltiazem
- β -Blocker

Unstable Tachycardia



- Initiate immediate cardioversion if the patient is unstable
- Use synchronized mode
- Premedicate if possible

Stable Wide Complex Tachycardia



- Amiodarone
- Magnesium (for torsades)
- Cardioversion