

***Critical Care Master Plan***

**1.) ER**

- Pt is identified by team as suspect- test is sent
  - If declining respiratory status occurs
    - High flow o2 only by nasal cannula up to 15L
    - Early intubation
      - Intubation performed by ER physician
      - Anesthesia acts as back up
    - Prefer using glidescope
      - Protective box/shield when available
    - MDI inhalers as per ER protocol
  - Move to COVID unit/rule out
  - Consults if required
    - ID/pulmonology/cardiology

**2.) COVID unit- Rule out/Positive**

- Precaution PPE
- Monitoring
  - If respiratory status is declining and pt needs intubated
    - Anesthesia first line
    - Pulmonary/trauma
    - Other MD comfortable with intubation
    - Glidescope preferred
    - Preferable no bag/mask ventilation
    - For intubation- will have to use RSI kits with glidescope in omnicell
      - Pharmacy to restock after use

- **COVID critical care schedule**

1. Implemented when first critical (rapidly) declining/ intubated with positive pt
  2. One team for Herrin
  3. One team for Carbondale
    - Team lead- Pulmonary physician on call and first
      - 1<sup>st</sup> Replacement anesthesia/trauma
- If lead physician gets overwhelmed/ large number of positive/critical patients- next line of help
    1. Dr. Hornik (when on) at MHC
    2. Anesthesia provider on call
      - Dr. Bajwa from anesthesia is critical care trained and has offered to come on call if one of the providers is sick
    3. If these teams are unavailable, next used is trauma- followed by cardiology (need schedule)
  - Liaison for knowing next physician to help is Ginger Funk - can be reached via perfect serve
  - Anesthesia will be helping with most of the intubation on the floor
  - See next page for schedule

## **Management of Hypoxemia**

- Supplemental Oxygen:
- Humidified nasal cannula (NC) 1 to 8 LPM for target SpO<sub>2</sub> 92-96%
- If a patient requires > 8 LPM NC, initiate dry Venturi mask (non-humidified to reduce aerosolization risk)
- Start Venturi mask /nasal cannula at 9 LPM and FiO<sub>2</sub> 28%
- Up-titrate FiO<sub>2</sub> to goal SpO<sub>2</sub> of 92-96% (not exceeding FiO<sub>2</sub> 35%)
- If FiO<sub>2</sub> > 35% then increase flow to 15 LPM maximum- notify ICU/ anesthesia to evaluate for early intubation

Avoid high-flow nasal cannula (HFNC) and non-invasive positive pressure ventilation (NIPPV; i.e. CPAP/BiPAP) for ARDS.

Early intubation: recommend early consultation with anesthesia for possible intubation in the setting of rapidly progressive hypoxia.

## **Initial Mechanical Ventilation**

Should be performed by anesthesia team, who can facilitate early and appropriate ventilator settings

- Use “Mechanical Ventilation with Sedation” order set.
- Avoid bag mask, ventilation if possible during intubation.
- Use glidescope whenever available
- Use PPE as per recommendations
- Pulmonary and critical consult for ventilator management
  - Initial respiratory rate 16-24, higher if acidosis present.
  - Initial PEEP based on BMI:
  - Initial FiO<sub>2</sub>: -100% on intubation then rapidly wean to SpO<sub>2</sub> 92-96%
- Avoid portable CXR to confirm endotracheal tube location unless indicated for other clinical reasons
- Within 30 minutes of intubation, obtain an ABG (preferred) or a VBG and adjust ventilation and oxygenation as needed

## **PEEP and Mechanics**

- Initiate PEEP based on BMI
- If there are changes in clinical parameters (e.g., hypoxia), titrate PEEP according to ARDSnet Lower PEEP table (below).

- Current recommendations are to use ARDSnet Lower PEEP table. This table is selected primarily to avoid initial harm to patients with poor lung compliance.
- After best PEEP determined, obtain respiratory mechanics plateau pressure (with goal <30 )

Obtain arterial blood gas:

Goal pH 7.25 to 7.45

Calculate P/F ratio from initial post-intubation ABG

### **Targeting Sedation for Ventilator Synchrony**

- Initially target RASS -2 to -3 (see table below):
- Maintain deep sedation immediately post-intubation while paralyzed (assume 60 minutes for Rocuronium, 10 minutes for succinylcholine)
- Preferred initial sedation regimen:
  - Fentanyl (boluses +/- infusion) + Propofol: target analgesia first while decreasing sedative requirements
  - Measure triglycerides and lipase every third day on propofol or earlier if other reasons for hypertriglyceridemia
  - Adjunct agent: Midazolam
- Use dexmedetomidine when nearing intubation

Target ventilator synchrony: Ventilator-induced lung injury (VILI) is common in patients who are not synchronous with the ventilator and can cause significant lasting damage

- Once at target RASS after paralytics have worn off, assess patient synchrony with the ventilator (e.g., signs of breath stacking, double triggering, other ventilator alarms).
- Titrate sedatives/analgesics to ventilator synchrony allowing for deeper RASS.
- If patient remains dyssynchronous despite deep sedation (RASS -5), initiate continuous paralytics (ensure BIS 40 to 60 prior to initiating and during paralysis).

## Managing Ventilation

- Follow ARDS net ventilation where possible:
- Tidal volumes should be 4-6 cc/kg using IBW (see table above) to minimize volumes (and thus ventilator injury).
- Minute ventilation (respiratory rate x tidal volume) typically drives pH and PCO<sub>2</sub>: Titrate ventilatory parameters to pH, not PCO<sub>2</sub>.

To achieve low tidal volumes, we tolerate hypercapnia (functionally no limitation unless clinical sequelae) and acidemia (pH > 7.2).

Because tidal volumes are low, the respiratory rate often has to be high to accommodate; typical RR is 20-35 breaths/minute.

- pH goal is normally 7.25-7.45:

If pH > 7.45, decrease respiratory rate

If pH 7.15-7.30, then increase respiratory rate until pH > 7.30, or PaCO<sub>2</sub> < 25 (maximum RR= 35 breaths/minute)

If pH < 7.15, then increase respiratory rate to 35 breaths/minute

If pH still < 7.15, then perform the following:

- Tidal volume may be increased by 1 mL/kg until pH > 7.15 (until plateau pressure reaches 30 cm H<sub>2</sub>O or tidal volume reaches 8 cc/kg)
- Deep sedation advancing to RASS -5 if needed
- If no improvement, initiate continuous paralysis
- If still no improvement, initiate prone ventilation (may improve V/Q matching and better ventilation)

## Managing Oxygenation

- Minimizing oxygen toxicity:

PEEP and FiO<sub>2</sub> drive oxygenation

The goal is to deliver a partial pressure of oxygen to perfuse tissues (PaO<sub>2</sub> > 75, SpO<sub>2</sub> >92%) while limiting lung injury from high distending pressures (Ppl < 30) and hyperoxia (FiO<sub>2</sub> < 75, SpO<sub>2</sub> < 96%).

Lower limit goals PaO<sub>2</sub> > 55 and SpO<sub>2</sub> >88%

## **PEEP management:**

Initial PEEP should be set as explained above.

If patient is hypoxic on  $V_t = 6$  ml/kg and ideal PEEP from PV tool (or PEEP determination from ARDSnet table for non-Hamilton G5 ventilators), perform the following:

- Deep sedation, advancing to RASS -5 if needed; if no improvement then:
- Initiate continuous paralysis (cisatracurium bolus 0.2mg/kg followed by infusion at 0-5 mcg/kg/min titrated to patient-ventilator synchrony); if no improvement then:
- Initiate prone ventilation (see below); high consideration for use early in severe ARDS (<36 hours from ARDS onset, start discussion of proning when  $P:F < 150$ , prone within 12 hours of  $FiO_2 > 75\%$ )

## **Adjusting $FiO_2$ :**

Adjust  $FiO_2$  after optimizing PEEP

Goal  $FiO_2 < 75\%$ ; if  $FiO_2 > 75\%$ ; patient requires ventilator optimization. If you need assistance, pulmonary consultation is available (pager 11957)

It is reasonable to put a desaturating patient temporarily on 100%  $FiO_2$ , but remember to wean oxygen as rapidly as possible

## **Prone Positioning**

- Prone early:

We recommend early proning in severe ARDS without vasodilator trial < 36 hours from ARDS onset, start discussion of prone when  $P:F < 150$ , prone within 12 hours of  $FiO_2 > 75\%$

- Eligibility criteria for proning:

No high grade shock (either single agent norepinephrine 20 mcg/min or norepinephrine < 15 mcg/min and vasopressin)

Not on CRRT or at risk of impending renal failure (due to difficulties in maintaining dialysis access while prone)

The only absolute contraindications to prone ventilation are spinal cord injury and open chest; BMI and patient size are not contraindications

### **Managing a prone patient:**

- Prone as MICU protocol. ( Separate Document )
- Maintain deep sedation with target RASS -4 to -5 while prone.

Adjust oxygen parameters: re-assess lung mechanics (plateau pressure and P-V tool to determine optimal PEEP) and adjust PEEP and titrate FiO<sub>2</sub>

Assess tidal volume and adjust ventilation parameters .If V<sub>t</sub>< 6 ml/kg, may increase to maximum limit of 8 ml/kg while P<sub>pl</sub>< 30 (preferred maximum is 6 ml/kg)

If patient demonstrates improvement on prone then recommend discontinuing continuous neuromuscular blockade and re-assess ventilator dyssynchrony; re-institute if dyssynchronous

- Return to supine ventilation when following criteria are met:

P<sub>pl</sub>< 25  
FiO<sub>2</sub> < 50%  
pH> 7.3  
P:F> 200

- Repositioning and skin care while prone:

Currently we recommend continuing prone as per the MICU prone protocol. This may change in the future depending on availability of PPE and staffing.

### **Escalation if still hypoxic:**

If despite PEEP optimization, paralysis, prone ventilation, optimizing volume status, pulmonary vasodilators (when available) the patient meets the following criteria, and then consider ECMO/cardiology consult.

P<sub>pl</sub>> 30  
FiO<sub>2</sub> > 75%  
P:F< 80

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