

Medical Management of COVID-19



SUMMARY OF THE:
SCCM SURVIVING SEPSIS GUIDELINES, 3/20/2020
CDC GUIDELINES FOR TREATMENT OF COVID-19 2020
WHO CLINICAL MANAGEMENT OF SEVERE ACUTE RESPIRATORY
INFECTION(SARI) WHEN COVID-19 IS SUSPECTED 3/13/2020

3/24/2020

COVID-19: SARS-CoV-2

Novel Coronavirus 2019



- As this is an ever changing problem, we will try to keep this slide set updated in a timely fashion.
- Please feel free to e-mail us with any questions, concerns or changes @
 - anthony.Hericks@avera.org
 - travis.hanson@avera.org

COVID-19: SARS-CoV-2

Novel Coronavirus 2019



- **Biology**
 - 30kbp, +ssRNA, enveloped coronavirus
 - Likely zoonotic infection
 - ✦ Source/reservoir unclear” ? Bats/pangolins → people
 - Now spread person to person
 - ✦ Asymptomatic carries
 - Spread by **droplets**
 - Viral S spike binds to ACE2 on type 2 pneumocytes
 - ✦ Effect on ACE/ARB is unclear
 - ✦ ACE vs ARB’s may have the opposite effect
 - Other routes of infection possible
 - ✦ Enteric, contact, etc...

COVID-19: SARS-CoV-2

Novel Coronavirus 2019



- **Epidemiology**

- Attack rate = 30-40%
- $R_0 = 2-4$ (similar to influenza)
- Case Fatality Rate (CFR) = up to 3.4% worldwide, but changing daily
- Incubation period = 4-14 days
 - ✦ Reports of up to 24 days
- Timeline
 - ✦ China notified WHO 12/31/2019
 - ✦ 1st case in US → Seattle 2/15/2020
 - ✦ WHO declared Pandemic 3/11/2020
 - ✦ National Emergency 3/12/2020

COVID-19: SARS-CoV-2

Novel Coronavirus 2019

Presentation

- Symptoms:
 - Cough 65-80%
 - Fever 45% initially with 85% during the illness
 - Dyspnea 20-40%
 - URI 15%
 - GI (diarrhea) 10%
 - Some asymptomatic carriers

Diagnostics

- Leuko-/lymphopenia 80%
- Low Platelets
- Elevated BUN/Creat
- Elevated AST/ALT/Tbili
- Elevated D-dimer, CRP, LDH, Ferritin
- Increased IL-6
- Low Procalcitonin

COVID-19: SARS-CoV-2

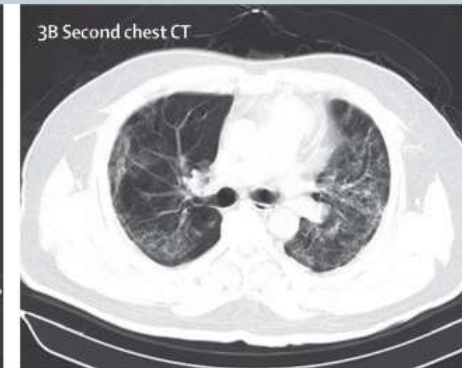
Novel Coronavirus 2019



- **Imaging**

- CXR: hazy, bilateral, peripheral pulmonary infiltrates
- CT chest: ground glass infiltrates, crazy paving, consolidation
 - ✦ ** Rarely unilateral

❖ **CT NOT REQUIRED → ONLY CHECK IF THERE IS AN INDICATION**



COVID-19/SARS-Cov-2

Presentation and Definitions



- Mild symptoms → Pneumonia → Severe Pneumonia → ARDS → Sepsis → Septic Shock
- Mild Illness to Pneumonia
 - Fever, cough, shortness of breath, and sore throat
 - Diarrhea, anorexia, myalgias, headache, nasal congestion
 - No hypoxemia and stable vitals
- Severe Pneumonia
 - Fever and/or suspected infection plus:
 - ✦ RR > 30 OR severe respiratory distress OR SpO₂ < 94%

COVID-19/SARS-Cov-2

Presentation and Definitions



- **ARDS**

- Occurs usually within ~1 week
- Bilateral pulmonary infiltrates
 - ✦ Consistent with pulmonary edema
 - ✦ No evidence of acute CHF
- Hypoxemia
 - ✦ Mild: PaO₂/FiO₂ ratio: 200-300 OR PEEP ≥ 5
 - ✦ Moderate: PaO₂/FiO₂ ratio: 100-200 OR PEEP ≥ 5
 - ✦ Severe: PaO₂/FiO₂ ratio: ≤100 OR PEEP ≥ 5

COVID-19/SARS-Cov-2

Presentation and Definitions



- **Sepsis**

- Altered mental status (AMS), tachypnea, tachycardia, hypoxemia, low urine output, weak pulse, cold extremities, hypotension, skin mottling, coagulopathy, thrombocytopenia, acidosis, lactic acidosis, hyperbilirubinemia
- qSOFA
 - ✦ AMS
 - ✦ RR > 22
 - ✦ SBP \leq 100
 - ✦ Score \geq 2 = high risk or a poor outcome from an infection

COVID-19/SARS-Cov-2

Presentation and Definitions



- **Septic Shock**
 - Sepsis + persistent hypotension despite adequate volume resuscitation, requiring vasopressors to maintain a SBP \geq 65 and a serum lactate $>$ 2 mmol/L
 - ✦ Adequate volume = 30 mL/Kg

INFECTION CONTROL



- Aerosol generating procedures should require an PAPR or N95 respirator masks (or equivalent) in addition to PPE (gloves, gown, eye protection).
 - Opposed to surgical masks
- Aerosol generating procedures:
 - Intubation
 - Bronchoscopy
 - Open suctioning
 - Nebulizers
 - Disconnection from the ventilator
 - Non-invasive positive pressure ventilation (NIPPV)
 - CPR
 - Tracheostomy
 - Proning position
 - Bag ventilation

❖ Give patients a mask at initial contact and isolate

INFECTION CONTROL



- **Any aerosol generating procedure should be done in negative pressure room (CDC also recommends this)**
- **Non-ventilated patients**
 - Droplet/contact precaution
 - ✦ Surgical mask with eye shield is probably OK
 - ✦ N95 or PAPR *NOT* necessarily needed
 - Aerosol generating procedure
 - ✦ PAPR or N95
- **Intubated/Ventilated patients (closed circuits)**
 - Non-aerosol generating procedures
 - ✦ Droplet/contact precautions OK – Surgical mask/eye shield
 - Aerosol generating procedures
 - ✦ PAPR or N95

❖ **IF RESOURCES AVAILABLE: PAPR OR N95 /EYE PROTECTION IS RECOMMENDED**

INFECTION CONTROL



- **Negative pressure isolation**
 - All aerosol generating procedures
 - ✦ Highest risk
 - Intubation
 - Bronchoscopies
 - NIPPV
 - WHO recommendations
 - ✦ 12 air changes per hour
 - At least 160 L/second/patient
 - ✦ HEP filter
 - Portable HEPA filters should be consider if not available

INTUBATION



- **HIGH RISK** aerosol generating procedure
 - Ideally done in negative pressure room with airborne precautions
 - ✦ Consider earlier intubation at lower FiO₂ (? > 50%) and worsening respiratory status = planned vs emergent intubation
 - Recommend video-guided laryngoscopy over direct laryngoscopy
 - Intubation should be performed by most experienced HCP available to minimize attempts

LABORATORY/DIAGNOSTIC SPECIMENS



- Intubated patients
 - Lower respiratory tract (LRT) > Oropharyngeal (OP) > Nasopharyngeal (NP) specimens
 - ✦ **CDC RECOMMENDS: NP Swab and/or LRT specimen**
 - ✦ **SDDOH RECOMMENDS: ONLY NP swab → LRT specimen if signs of pneumonia**
 - ✦ Bronchoscopy with wash/BAL should be avoided if possible
- Non-intubated patients
 - Nasopharyngeal (NP) OR Oropharyngeal (OP) specimens
 - ✦ **CDC RECOMMENDS: NP swab and/or LRT in cough is productive**
 - ✦ **SDDOH RECOMMENDS: ONLY NP swab**
 - ✦ Avoid sputum induction

LABORATORY/DIAGNOSTIC SPECIMENS



- A single **NEGATIVE** swab from the upper airway does not rule out COVID-19 in a patient with **HIGH** suspicion
 - Repeat testing may be required
- Coinfection with other viral pathogens is possible: a **NEGATIVE** test does not rule out COVID-19 in a **HIGH** risk patient.
 - Repeat testing may be required
- COVID-19 has an extended incubation period of ~2 weeks and may have a prolonged interval of asymptomatic viral shedding for ~ 5 days

LABORATORY/DIAGNOSTIC SPECIMENS



- **Collect additional specimens**
 - Blood cultures
 - Sputum cultures
 - Comprehensive respiratory PCR panel

- **Imaging**
 - CXR is adequate
 - CT of the chest only if clinically indicated to rule out other etiology (i.e. rule out PE, etc...) or for other reasons

LABORATORY/DIAGNOSTIC STUDIES



- Hemophagocytic Lymphohistiocytosis
 - Some evidence for cytokine storm
 - Consider screening critically ill COVID-19 patient
 - **H-score (find in a med calc)**
 - ✦ Immunosuppression
 - ✦ Temperature > 101.1
 - ✦ Organomegaly
 - ✦ Cytopenias
 - ✦ Ferritin (> 2000)
 - ✦ Triglycerides >130
 - ✦ Fibrinogen > 250
 - ✦ AST > 30
 - ✦ Bone marrow aspirate with hemophagocytosis
 - **Soluble IL-2 Receptor**
 - **Soluble CD163**
 - **Treatment**
 - ✦ Steroids
 - ✦ Immunosuppressants

HEMODYNAMIC MONITORING



- **FLUID RESPONSIVENESS**
 - Dynamic skin temperature
 - Capillary refill time
 - Lactate levels
 - Passive Leg Raise (PLR) > Pulse Pressure Variation (PPV) and Stroke Volume Variation (SVV)
 - ✦ Static parameters (CVP, MAP, etc...) not recommend

HEMODYNAMIC SUPPORT



- Fluid therapy
 - Conservative (less fluid) > liberal fluid administration
 - ✦ 30 mL/Kg bolus up front for hypotension
 - ✦ Crystalloids > Colloids (albumin)
 - ✦ Lactated ringers (other balanced/buffered crystalloids) > 0.9%/normal saline (unbalanced crystalloids)
 - Avoid
 - ✦ Hydroxyethyl starch → risk of acute kidney injury/bleeding
 - ✦ Gelatins → no benefit /increased cost
 - ✦ Dextrans → no benefit/increased cost/increased blood transfusions/bleeding
 - ✦ Albumin → early in the resuscitation/no benefit/increased cost/limited availability

VASOPRESSOR SUPPORT



- **1st Line**
 - Norepinephrine (NE)
 - ✦ Dosage: 2-30 mcg/min (No relative maximum dose)
 - Add Vasopressin with higher doses of NE
 - ✦ Dosage: 0.03-0.04 Units/min (Maximum dose: 0.07 Units/min)
- **2nd Line**
 - Vasopressin
 - OR
 - Epinephrine
 - ✦ Dosage: 0.2-2 mcg/Kg/min or 2-30 mcg/min
- **3rd Line**
 - Dopamine (**DO NOT USE IF NE IS AVAILABLE**)
 - ✦ Dosage: 3-30 mcg/Kg/min

VASOPRESSORS: PERIPHERAL ACCESS



- **Recommendations:**
 - Upper extremity only
 - ✦ No hand or wrist access
 - ✦ At or above AC
 - ✦ Contralateral to BP cuff
 - 20 gauge or larger IV
 - ✦ Must have good blood
 - Max duration of 24hrs
 - ✦ Central access should be established for extended administration or more if > 1 vasopressor
 - **Dopamine**
 - Max conc: 800 mcg/mL
 - Max rate: 10 mcg/Kg/min
 - **Epinephrine**
 - Max conc: 32 mcg/mL
 - Max rate: 20 mcg/min
 - **Norepinephrine**
 - Max conc: 32 mcg/mL
 - Max rate: 30 mcg/Kg/min
 - **Phenylephrine**
 - Max conc: 160 mcg/mL
 - Max rate: 200 mcg/min
 - **Vasopressin**
 - Max conc: 20 Units/mL
 - Max rate: 0.03-0.04 Units/min
- **Monitor for extravasation Q2 hours**

VASOPRESSORS: EXTRAVASATION



- **Extravasation Management**
 - Stop vasopressor administration immediately
 - Aspirate residual medication and remove catheter
 - Outline extent of extravasation for monitoring the site
 - Notify physician immediately
 - Consider a Wound Care consult is necessary
 - **Phentolamine**
 - Inject 0.5-1 ml in multiple injections around the leading edge of extravasation
 - ✦ Separate needles for each injection.
 - **Nitroglycerin paste**
 - Apply to the affected area
- **Submit adverse drug event report.**

HEMODYNAMIC SUPPORT



- Goal Mean Arterial Pressure (MAP)
 - 60-65mmHg
- Cardiac dysfunction/heart failure and persistent hypotension
 - ✦ Some evidence for cardiovascular collapse/acute systolic CHF by 2 weeks
 - Dobutamine
 - ✦ Dosage: 2-20 mcg/Kg/min
 - May cause worsened hypotension
- Refractory shock
 - Low dose corticosteroid therapy vs. No corticosteroid therapy
 - ✦ Hydrocortisone
 - Dosage: 50 mg IV Q6 hours
 - Steroids may cause persistent viral shedding +/- increased mortality

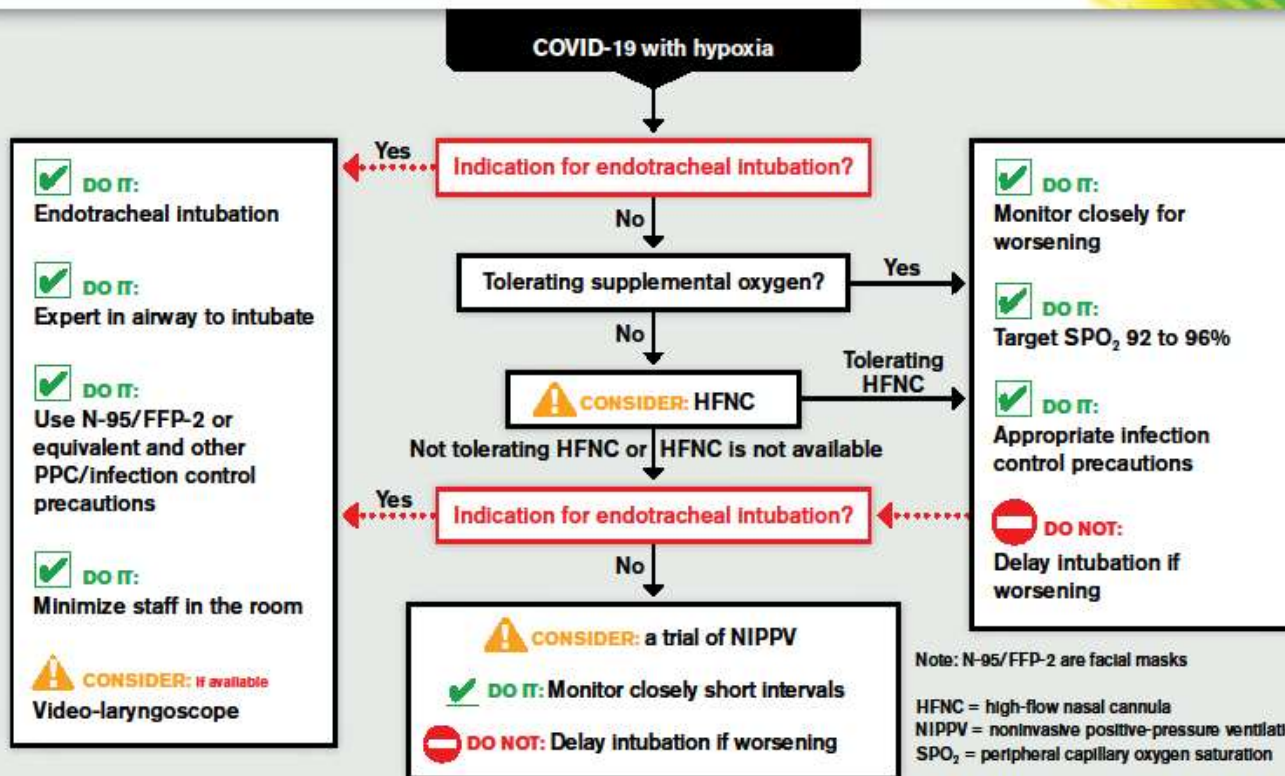
VENTILATORY SUPPORT



- Goal SpO₂ (or SaO₂)
 - 90-96%
 - ✦ Pregnant patient: 92-95%
- Nasal cannula > Heated-high flow nasal cannula
- Heated-high flow nasal cannula > NIPPV
- NIVPPV can be considered for a short trial if tolerated
 - CPAP may be tried and less of an aerosol generating procedure than BiPAP
 - Consider early intubation if intolerant or continued worsening

VENTILATORY SUPPORT

COVID-19 Resources



INVASIVE MECHANICAL VENTILATION



- **Recommend**
 - Low tidal volume ventilation
 - ✦ 4-8mL/kg of ideal body weight over high volumes
 - Plateau pressure goal
 - ✦ <30cm H₂O
 - PEEP
 - ✦ Moderate ARDS or worse (PaO₂/FiO₂ ratio <200)
 - ✦ Higher PEEP strategy over lower PEEP strategy
 - Monitor for barotrauma
- **Follow the ARDSnet Ventilation Protocol**

ARDSnet VENTILATION



NIH NHLBI ARDS Clinical Network
Mechanical Ventilation Protocol Summary

INCLUSION CRITERIA: Acute onset of

1. $\text{PaO}_2/\text{FiO}_2 \leq 300$ (corrected for altitude)
2. Bilateral (patchy, diffuse, or homogeneous) infiltrates consistent with pulmonary edema
3. No clinical evidence of left atrial hypertension

PART I: VENTILATOR SETUP AND ADJUSTMENT

1. Calculate predicted body weight (PBW)
Males = $50 + 2.3 [\text{height (inches)} - 60]$
Females = $45.5 + 2.3 [\text{height (inches)} - 60]$
2. Select any ventilator mode
3. Set ventilator settings to achieve initial $V_T = 8 \text{ ml/kg PBW}$
4. Reduce V_T by 1 ml/kg at intervals ≤ 2 hours until $V_T = 6 \text{ ml/kg PBW}$.
5. Set initial rate to approximate baseline minute ventilation (not $> 35 \text{ bpm}$).
6. Adjust V_T and RR to achieve pH and plateau pressure goals below.

OXYGENATION GOAL: PaO_2 55-80 mmHg or SpO_2 88-95%

Use a minimum PEEP of 5 cm H_2O . Consider use of incremental FiO_2 /PEEP combinations such as shown below (not required) to achieve goal.

Lower PEEP/higher FiO_2

FiO_2	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7
PEEP	5	5	8	8	10	10	10	12

FiO_2	0.7	0.8	0.9	0.9	0.9	1.0
PEEP	14	14	14	16	18	18-24

Higher PEEP/lower FiO_2

FiO_2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5
PEEP	5	8	10	12	14	14	16	16

FiO_2	0.5	0.5-0.8	0.8	0.9	1.0	1.0
PEEP	18	20	22	22	22	24

PLATEAU PRESSURE GOAL: $\leq 30 \text{ cm H}_2\text{O}$

Check P_{plat} (0.5 second inspiratory pause), at least q 4h and after each change in PEEP or V_T .

If $P_{\text{plat}} > 30 \text{ cm H}_2\text{O}$: decrease V_T by 1 ml/kg steps (minimum = 4 ml/kg).

If $P_{\text{plat}} < 25 \text{ cm H}_2\text{O}$ and $V_T < 6 \text{ ml/kg}$, increase V_T by 1 ml/kg until $P_{\text{plat}} > 25 \text{ cm H}_2\text{O}$ or $V_T = 6 \text{ ml/kg}$.

If $P_{\text{plat}} < 30$ and breath stacking or dys-synchrony occurs: may increase V_T in 1 ml/kg increments to 7 or 8 ml/kg if P_{plat} remains $\leq 30 \text{ cm H}_2\text{O}$.

ARDSnet VENTILATION



pH GOAL: 7.30-7.45

Acidosis Management: (pH < 7.30)

If pH 7.15-7.30: Increase RR until pH > 7.30 or PaCO₂ < 25 (Maximum set RR = 35).

If pH < 7.15: Increase RR to 35.

If pH remains < 7.15, V_T may be increased in 1 ml/kg steps until pH > 7.15 (Pplat target of 30 may be exceeded).

May give NaHCO₃

Alkalosis Management: (pH > 7.45) Decrease vent rate if possible.

I: E RATIO GOAL: Recommend that duration of inspiration be \leq duration of expiration.

PART II: WEANING

A. Conduct a SPONTANEOUS BREATHING TRIAL daily when:

1. FiO₂ \leq 0.40 and PEEP \leq 8 OR FiO₂ \leq 0.50 and PEEP \leq 5.
2. PEEP and FiO₂ \leq values of previous day.
3. Patient has acceptable spontaneous breathing efforts. (May decrease vent rate by 50% for 5 minutes to detect effort.)
4. Systolic BP \geq 90 mmHg without vasopressor support.
5. No neuromuscular blocking agents or blockade.

B. SPONTANEOUS BREATHING TRIAL (SBT):

If all above criteria are met and subject has been in the study for at least 12 hours, initiate a trial of UP TO 120 minutes of spontaneous breathing with FiO₂ \leq 0.5 and PEEP \leq 5:

1. Place on T-piece, trach collar, or CPAP \leq 5 cm H₂O with PS \leq 5
2. Assess for tolerance as below for up to two hours.
 - a. SpO₂ \geq 90: and/or PaO₂ \geq 60 mmHg
 - b. Spontaneous V_T \geq 4 ml/kg PBW
 - c. RR \leq 35/min
 - d. pH \geq 7.3
 - e. No respiratory distress (distress= 2 or more)
 - HR > 120% of baseline
 - Marked accessory muscle use
 - Abdominal paradox
 - Diaphoresis
 - Marked dyspnea
3. If tolerated for at least 30 minutes, consider extubation.
4. If not tolerated resume pre-weaning settings.

Definition of UNASSISTED BREATHING
(Different from the spontaneous breathing criteria as PS is not allowed)

1. Extubated with face mask, nasal prong oxygen, or room air, OR
2. T-tube breathing, OR
3. Tracheostomy mask breathing, OR
4. CPAP less than or equal to 5 cm H₂O **without pressure support or IMV assistance.**

VENTILATOR BUNDLE



- Head of Bed elevation: 30-45°
- Closed suctioning system
- Drain moisture from tubing
- Change HME or filters per recommendations
- H-2 blocker or PPI for GI prophylaxis
- Heparin or Lovenox for DVT prophylaxis
- Turn Q2 hours (if able) to prevent pressure ulcers
- Early mobilization if clinically stable
- Daily sedation holidays and spontaneous breathing trials if stable

MINIMALLY INVASIVE VENTILATION/ARDS



- **Conservative > Liberal fluid strategy**
 - Less fluid better than more fluid
 - CVP <4 vs. CVP 10-14

- **Prone positioning**
 - Moderate ARDS or worse
 - ✦ $\text{PaO}_2/\text{FiO}_2 < 200$
 - Suggest prone ventilation for 12-16hrs/day
 - ✦ Consider availability of nursing staff and comfort level with proning

INVASIVE VENTILATION/ARDS



- **Sedation**
 - Use the ICU Intubation order set
 - ✦ Fentanyl
 - ✦ Propofol
 - ✦ Precedex
 - Avoid benzodiazepines if possible
 - Daily sedation holiday recommended if stable

INVASIVE VENTILATION/ARDS



- Intermittent neuromuscular blockade (NMB)
 - Moderate ARDS or worse
 - ✦ $\text{PaO}_2/\text{FiO}_2 < 200$
 - May help facilitate protective lung ventilation
- Deep sedation +/- continuous NMB
 - Up to 48 hours
 - Nimbex (cisatracurium preferred)
 - Indications
 - ✦ Persistent ventilator dyssynchrony
 - ✦ Prone ventilation
 - ✦ Persistently high plateau pressures, suggested to use continuous NMBA infusion for up to 48hrs (Nimbex preferred)

INVASIVE VENTILATION/ARDS



- **NOT ROUTINELY RECOMMENDED**
 - Pulmonary vasodilators
 - ✦ Use: refractory hypoxemia
 - ✦ Inhaled nitric oxide
 - ✦ Could be consider as rescue therapy if other treatments optimized
 - Pulmonary recruitment maneuvers
 - ✦ Using ultra high levels of PEEP for short bursts
 - ✦ Increased risk of barotrauma
 - ✦ Some harm
 - ✦ No proven benefit

OTHER TREATMENTS: Corticosteroids



- Systemic steroids
 - Potential harm
 - ✦ Increased viral shedding
 - ✦ Increased mortality
 - Potential benefit
 - ✦ Shock
 - ✦ Severe ARDS
 - Mechanically ventilated adults **WITHOUT** ARDS
 - ✦ Recommend **AGAINST** the routine use of systemic steroids
 - Mechanically ventilated adults **WITH** ARDS
 - ✦ Recommend the **USE** of systemic steroids
 - Dosage: Methylprednisolone 1-2 mg/Kg/day (divided doses) for 5-7 days

OTHER TREATMENTS: ECMO




- **Veno-Venous Extracorporeal Membrane Oxygenation (V-V ECMO)**
 - Indication: refractory hypoxemia despite previous interventions
 - Rescue therapy in carefully selected patients
 - Only available at specialty centers (Mayo, Univ. of MN or Univ. of NE)

ARDS MANAGEMENT

COVID-19 Resources

COVID-19 with mild ARDS

 **DO:**
Vt 4-8 ml/kg and P_{plat} <30 cm H₂O

 **DO:**
Investigate for bacterial infection

 **DO:**
Target SPO₂ 92% - 96%

 **CONSIDER:**
Conservative fluid strategy

 **CONSIDER:**
Empiric antibiotics

 **UNCERTAIN:**
Systematic corticosteroids

COVID-19 with Mod to Severe ARDS

 **CONSIDER:**
Higher PEEP

 **CONSIDER:**
NMBA boluses to facilitate ventilation targets


 **CONSIDER:** *if PEEP responsive*
Traditional Recruitment maneuvers

 **CONSIDER:**
Prone ventilation 12 -16 h

 **CONSIDER:** *if proning, high P_{plat}, asynchrony*
NMBA infusion for 24 h

 **DON'T DO:**
Staircase Recruitment maneuvers


 **CONSIDER:**
Short course of systematic corticosteroids

 **UNCERTAIN:**
Antivirals, chloroquine, anti-IL6

Rescue/Adjunctive therapy

 **UNCERTAIN:**
Antivirals, chloroquine, anti-IL6

 **CONSIDER:** *if proning, high P_{plat}, asynchrony*
NMBA infusion for 24 h

 **CONSIDER:**
Prone ventilation 12 -16 h

 **CONSIDER:** *STOP if no quick response*
A trial of inhaled Nitric Oxide

 **CONSIDER:** *follow local criteria for ECMO*
V-V ECMO or referral to ECMO center

Mod = moderate
ARDS = adult respiratory distress syndrome
P_{plat} = plateau pressure
SPO₂ = peripheral capillary oxygen saturation
PEEP = positive end-expiratory pressure
NMBA = neuromuscular blocking agents
ECMO = extracorporeal membrane oxygenation

OTHER TREATMENTS: EMPIRIC



- **Empiric antibiotics/antimicrobials**
 - Recommended over No antibiotics
 - Appropriate antivirals if influenza is suspected
 - Duration and spectrum of coverage based on local microbiology
 - Obtain appropriate cultures
 - Give within 1 hour
 - Evaluate for de-escalation daily
- **Fever**
 - Acetaminophen or Paracetamol
 - Avoid NSAIDs → variable reports of potential complications

OTHER TREATMENTS: Nutrition



- Place an orogastric tube over a nasogastric tube for suctioning and feeding
- If hemodynamic stable, consider early enteral nutrition within the first 24-48 hours
 - Trophic feedings for the first 5-7 days and advance as tolerated is acceptable
- Do not check residuals
- Avoid parenteral nutrition unless unable to feed enterally for ≥ 7 days

OTHER TREATMENTS: AVOID



- **Immunoglobulins**
 - Do not routinely give IVIG
- **Convalescent plasma**
 - Do not routinely give
- **Kaletra**
 - Lopinavir/Ritonavir
 - Recent study (NEJM 3/18/20) – NO BENEFIT
- **Other antivirals**
 - Remdesivir: currently being studied – INSUFFICIENT EVIDENCE

OTHER TREATMENTS: AVOID



- **Recombinant Interferon**
 - rINFN's – INSUFFICIENT EVIDENCE
- **Chloroquine and Hydroxychloroquine**
 - Antimalarial and autoimmune disease treatment
 - Currently being studied - INSUFFICIENT EVIDENCE
- **Azithromycin**
 - INSUFFICIENT EVIDENCE
- **Toclizumab**
 - Blocks IL-6
 - Currently being studied - INSUFFICIENT EVIDENCE

IMMOSUPPRESSION/TRANSPLANT



- **Kidney, Liver and Pancreas Transplant**
 - Consult the Transplant Team for ultimate direction:
 - Prednisone at baseline or 5 mg/day - **CONTINUE**
 - ✦ Reserve high dose for severe cytokine release syndromes, septic shock and/or ARDS per recommendations
 - Calcineurin inhibitors - **CONTINUE**
 - ✦ Tacrolimus and Cyclosporine
 - Reports suggest these may decrease viral replication
 - Tacrolimus goal level: 5 – 8 ng/mL
 - Antimetabolites - **STOP**
 - ✦ Mycophenolate and Azathioprine
- **Heart and Lung**
 - Contact the patients transplant center

*Suggestion based on discussions from Am. Soc. of Transplant, U of Wash, MGH, etc...

COVID and Pregnancy



- Pregnant or recently pregnant women carry the same risk of COVID-19 infection as the general
- No current evidence of increased the risk of illness severity or fetal compromise
- No evidence of vertical transmission
- Infection control practice need to be discussed with a newly delivered mother with COVID-19 to prevent spread to the infant
 - Standard and respiratory precautions are recommended
 - Pumping and feeding if unable to breast feeding is recommended

HELPFUL ORDER SETS



- **ICU Intubation**
 - Includes ventilator bundle, RT ventilator setting and weaning orders, RASS (Richmond Agitation and Sedation Scale, CAM-ICU for delirium, analgesia and sedation recommendations
- **Adult Sepsis Diagnostic/Treatment**
 - ICU or Med/Surg admit orders, labs/diagnostics, volume resuscitation, empiric antibiotic recommendations
- **COVID-19 Diagnostic/Treatment**