

# The Critical COVID -19 Patient: Updates

Michelle Harkins, MD

Pulmonary, Critical Care and Sleep Medicine

University of New Mexico

April 16, 2020

# Disclosures

- None

# Objectives

- Review the expanding clinical presentations of COVID-19 disease
- Outline the techniques to manage patients with hypoxemia
- Review UNM ICU protocols and stats

# COVID-19 Clinical Pearls

## **Incubation Period:**

Median: 5 days (range 2-14 d)

## **Most Common Symptoms\***

1. Fever
2. Cough
3. Dyspnea

## **Common Laboratory Findings\*\***

1. Lymphopenia ( $1.5 \times 10^9/L$ )
2. Elevated LDH
3. Elevated D-dimer
4. Elevated CRP
5. Normal Procalcitonin

## **Radiographic Findings**

1. Chest CT (abnormal in  $\frac{3}{4}$  of patients):
  - Ground Glass Opacities
  - Local or bilateral patchy infiltrates

## **Patterns of Disease**

1. Mild Respiratory Infection (80% of cases)
2. Non-Life-threatening Pneumonia
3. Severe Pneumonia and ARDS

## **Risk Factors for Severe Disease\*\*\***

1. Age (>60 years)
2. Co-morbidities:
  - Cardiovascular Disease
  - Diabetes
  - Hypertension
  - Chronic Obstructive Pulmonary Disease



De Chang, MD, PhD  
Mingui Lin, MD

JAMA. Published online February 7, 2020

\*Other symptoms: Fatigue, Expectoration, Headache, Myalgia, Diarrhea

\*\* Other laboratory findings: leukopenia, thrombocytopenia, increased transaminases, leukocytosis

\*\*\*Few children have developed severe disease \*\*\*\*

# Phases of Disease

Described by Dr. Caridi-Scheible at Emory University

- Phase 1: Prodrome, nonspecific, poor PO intake, N/V
- Phase 2: Mild hypoxia, tachypneic, abnormal CXR, needs some volume resuscitation, can last for days
- Phase 3: Increasing oxygen requirement, subjective SOB, worsening CXR, lasts hours to days
- Phase 4: Respiratory collapse, transaminitis, rising CRP, thick secretions, pulmonary edema, not in shock
- Phase 5: Hyperinflammatory or cytokine storm with fulminant myocarditis and arrhythmias, multi-organ failure, death likely due to cardiac arrest

# Clinical presentation updates

- Variety of presentations
  - Heart failure/ACS
  - Prothrombotic events, endothelial injury (very elevated Ddimer?)
  - CNS manifestations
  - Worsening hypoxia 3 weeks after original testing
- Younger patients being admitted to ICU
  - Risk factors obesity and DM
- Pneumonia phenotypes
  - More compliance vs typical severe ARDS
- Thick secretions in a few
  - Guaifenesin, incentive spirometry, CPT, suctioning
- New pressor requirement may suggest new sepsis or myocarditis/cytokine storm before decline and PEA arrest

# ARDS Basic Management Principles

- Lung Protective Vent Strategy

\*\*\*

- PaO<sub>2</sub> goal: 55 – 80 mmHg
- Low tidal volume ventilation
- Use of PEEP
- Limited plateau pressures
- Permissive hypercapnia

- Adjunctive Therapies

- Conservative fluid management
- Paralytics \*\*\*
- Inhaled pulmonary vasodilators
- Prone positioning \*\*\*
- Open lung ventilation (HFOV or APRV)
- ECMO



# COVID-19 Resources

## COVID-19 with mild ARDS

**DO:**  
Vt 4-8 ml/kg and  $P_{\text{plat}} < 30 \text{ cm H}_2\text{O}$

**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  $P_{\text{pt}}$ , 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  $P_{\text{pt}}$ , 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  
 $P_{\text{plat}}$  = plateau pressure  
SPO2 = peripheral capillary oxygen saturation  
PEEP = positive end-expiratory pressure  
NMBA = neuromuscular blocking agents  
ECMO = extracorporeal membrane oxygenation



# What's new in the ICU



- Be prepared to run out of medications.
- Be prepared to alter staffing ratios.
- Think of ways to limit PPE use.
- Prone the non-intubated patient early.
- May not need to avoid HFNC.
- Develop procedure teams.
- Have a plan for CPR.

# UNM ICU experience

- Overall 37 patients with ARDS in ICU
- Duration of mechanical ventilation: 3-15 days
- Volume control with PEEP from 10 to 16
  - 3 patients needed epoprostanol, APRV and proning
  - 6 required paralysis
- 1 failed extubation twice due to mucus plugging
- 1 patient on VV ECMO
- 3 with cytokine storm
- 2 with ICH, 2 with cardiac presentations
- Mortality ~20%

# References

- <https://litfl.com/coronavirus-disease-2019-covid-19/>
- International Pulmonologist's Consensus on COVID-19
  - <https://www.unah.edu.hk/dmsdocument/9674-consenso-internacional-de-neumologos-sobre-covid-19-version-ingles>
- <https://covid-19.elsevier.health>
- <https://www.sccm.org/disaster>
- the NEMJ video –proning  
[https://www.youtube.com/watch?v=E\\_6jT9R7WJs&t=19s](https://www.youtube.com/watch?v=E_6jT9R7WJs&t=19s)