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# Rapid Clinical Updates: COVID-19, Critical Care Management

Moderated by Jagriti Chadha, MD, FHM
Sarina Sahetya, MD, M.H.S. | Eric Siegal, MD, FHM, SFHM
November 5, 2 PM Eastern

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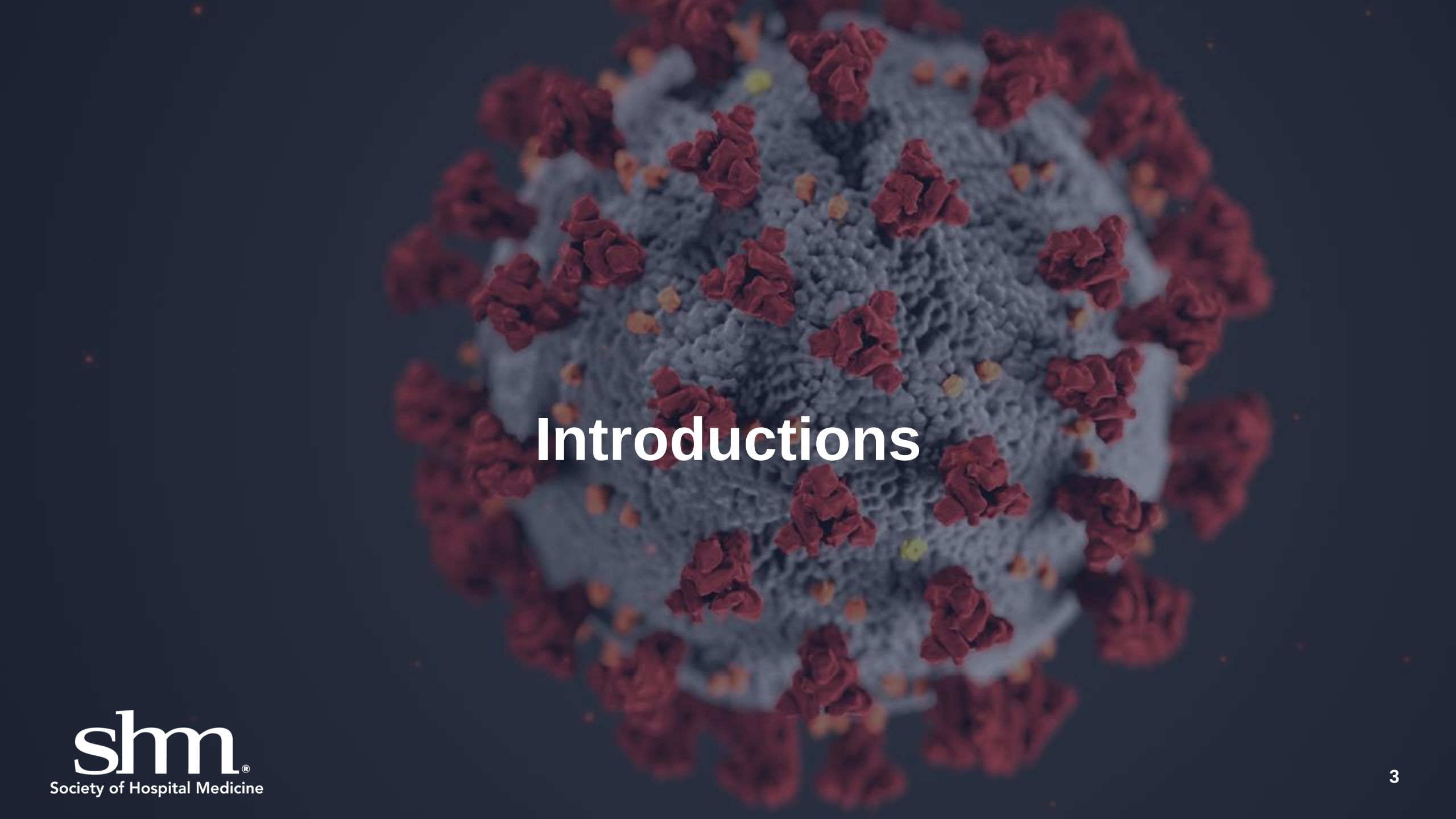
# Opening Survey Questions

- **Do you deal with ICU/Critical Care COVID patients and/or Step Down Unit COVID patients?**
- **Do you have an ICU protocol for COVID?**
- **Has your practice regarding intubating COVID 19 patients in respiratory distress changed in the past few months?**
  A. Yes
  B. No



# Introductions

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# Jagriti Chadha, MD, FHM

- Associate Professor at University of Kentucky, Division of Hospital Medicine
- Medical Director, Physician Development Hospital Medicine
- SHM Education Committee member
- SHM SPARK 3 section editor for gastroenterology/hepatology and hematology/oncology
- Interests in education, faculty development and perioperative medicine

# COVID-19 Rapid Clinical Updates Task Force

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# Agenda

1. Introduction and Overview
2. Case Reviews
3. Key Takeaways in Critical Care Management of COVID-19
4. Audience Questions and Discussion

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# Presentation Time Frame

- First speaker: Sarina Sahetya, 15 minutes
- Questions: 5 minutes
- Second speaker: Eric Siegal, 15 minutes
- Questions: 5 minutes
- Questions & Discussion: 15 minutes


# Learning Objectives:

- Analyze the best practices regarding NMB use in critically ill COVID-19 patients.
- Determine best practices in ventilator management of critically ill COVID-19 patients.
- Differentiate between management of ARDS and CARDS in critically ill COVID patients.
- Recognize appropriate strategy and timing for intubating critically ill COVID patients.

# Eric M. Siegal, MD,  SFHM, FCCM

- Intensivist, Advocate/Aurora Health, Milwaukee, WI
- Adjunct Clinical Professor of Medicine, University of Wisconsin School of Medicine and Public Health
- SHM Board of Directors 2010-2013
- Course director: SHM “Critical Care for the Hospitalist” series
- SCCM: “Critical Care Essentials for the Non-Intensivist” Task Force
- No relevant disclosures

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# Case Presentation

**A 57 yo man presents with fever, cough, myalgias and diarrhea for 8 days, and increasing dyspnea for 2 days. He tested positive for SARS-CoV2 four days ago.**

- **PMHx: HTN, DM II, dyslipidemia, morbid obesity (BMI 38)**

- **HR 110, BP 138/94, RR 24, SpO2 70% on room air, 92% with NRB mask**
- **Patient states that he feels better with the O2 and is not particularly short of breath**
- **Awake, alert, breathing comfortably. Able to speak in full sentences.**
- **ABG on 15 L NRB mask: pH 7.45 / PaCO2 32 / PaO2 75**
- **CXR: patchy opacification in both lungs**

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# True or False?

**This patient meets criteria for severe ARDS**

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# Which Statement is True?

A. Early intubation and ARDSNet mechanical ventilation will improve this patient's likelihood of survival.

B. Conservative management with non-invasive ventilation will improve this patient's likelihood of survival.

C. Beats me. I'm calling my intensivist and letting him/her figure it out.

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# COVID-19 ARDS (CARDS)

# ARDS vs. CARDS

**ARDS**

- **Final pathway of many insults**
- **Impaired gas exchange**
- **Stiff**
- **Dec**
- **PEE**
- **Patients look terrible**

**CARDS**

- **Severe hypoxemia**
- **Seemingly normal respiratory mechanics**
- **(initially)**
- **ike ARDS**
- **Patients look amazingly comfortable**

Are these the same diseases?

Gattinoni. AJRCCM, March 30.
Marini. JAMA, April 24.

# Conventional ARDS Management

- **Intubate early**
- **Control ventilation to minimize lung injury**
  - Vt 6-8 ml/kg IBW
  - Static pressure (Pplateau) < 30 cm H2O
  - Driving pressure < 15 cm H2O
- **Sedate heavily and paralyze if necessary**
- **Prone ventilation**
- **Restrictive fluid resuscitation**

| Severity | PaO2/FiO2 | Mortality |
|---|---|---|
| Mild | 200-300 | 27% |
| Moderate | 100-200 | 32% |
| Severe | <100 | 45% |

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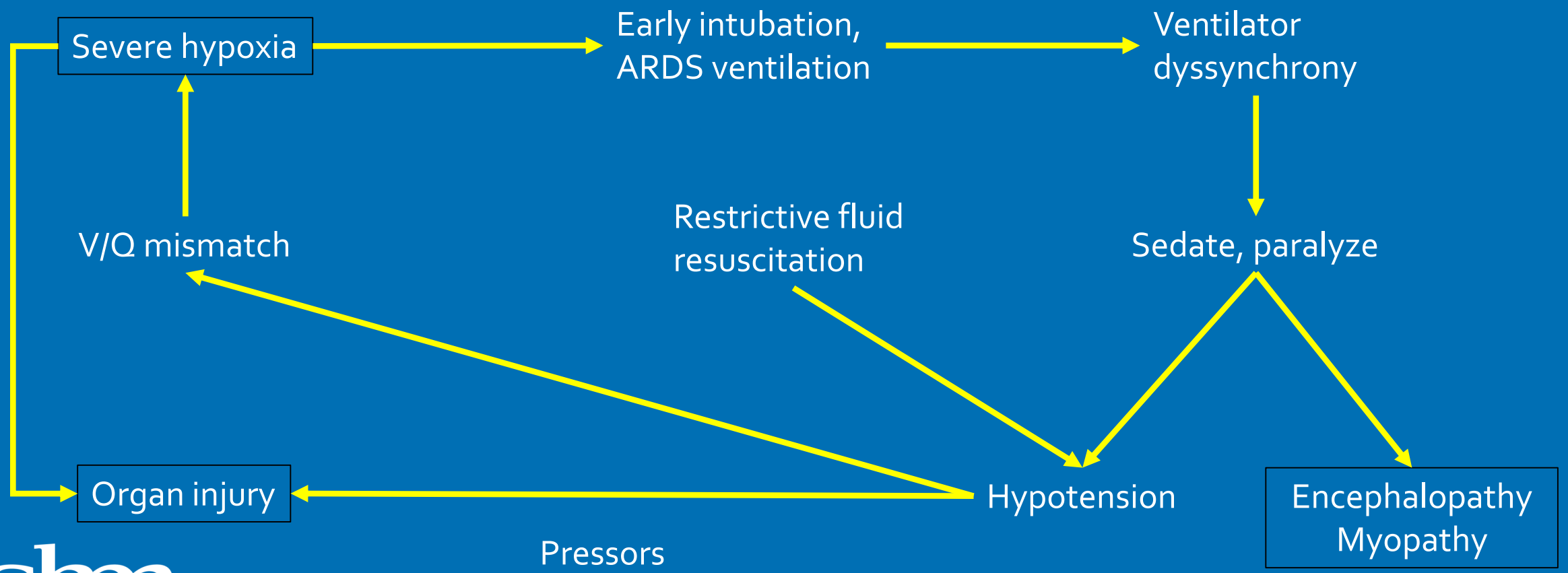
http://www.ardsnet.org/files/ventilator_protocol_2008-07.pdf

JAMA, 2012; 307 (23)

# The COVID-19 Ventilator Cycle of Doom

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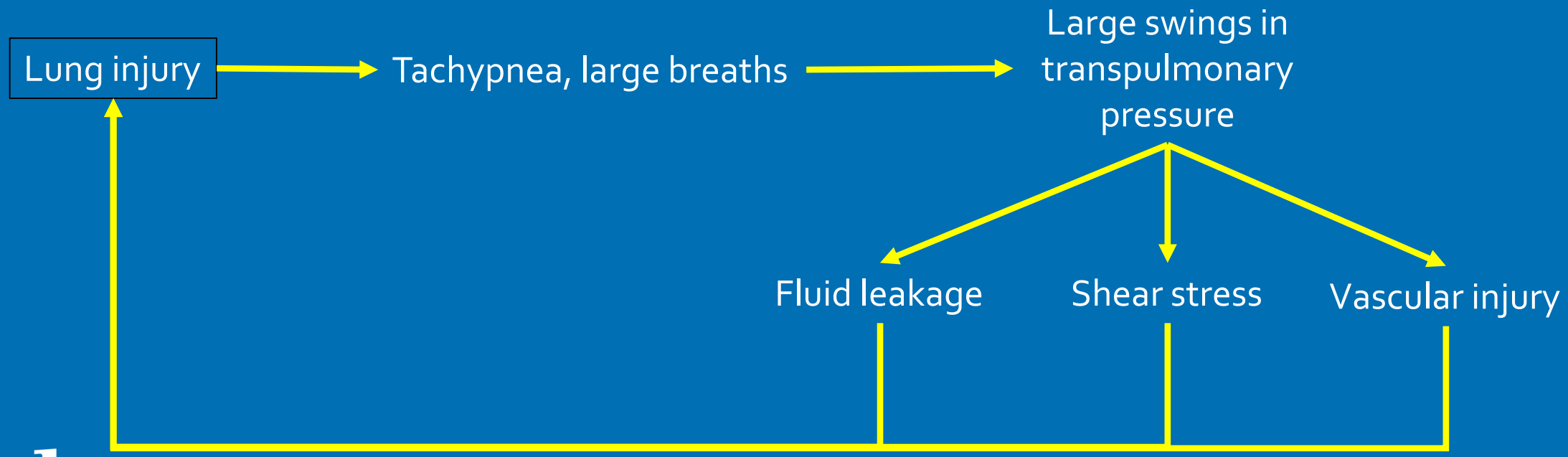
# But if We Delay Intubation…

## Self Induced Lung Injury (SILI)

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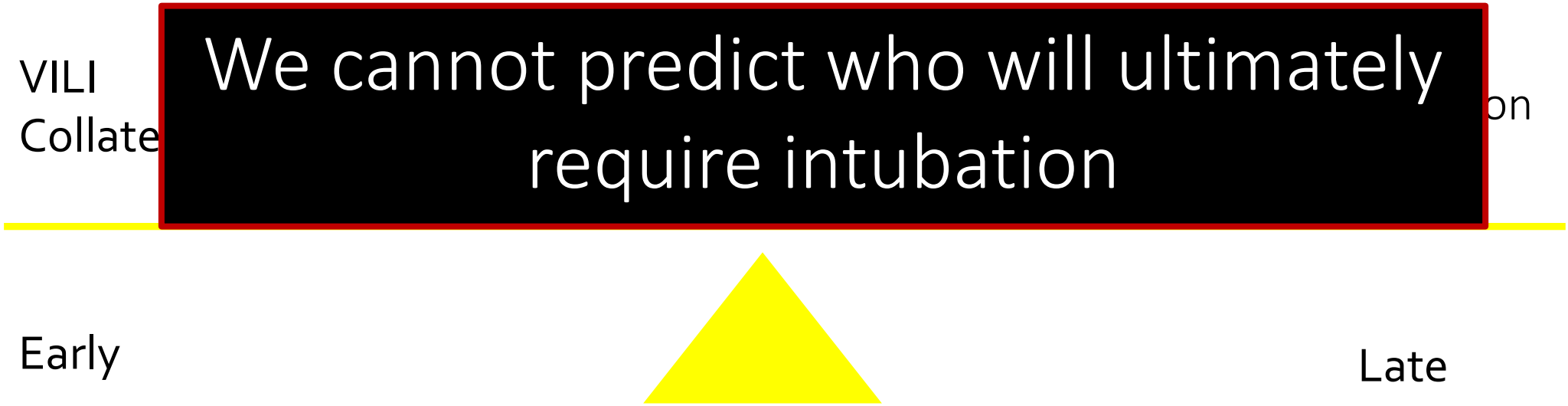
# Damned If We Do, Damned If We Don't?



# Is There a “Sweet Spot”?

- **We manage conservatively if:**
  - Hypoxemia can be managed noninvasively
  - Treatment reduces work of breathing
  - There are no other indications for intubation
- **Treatment options:**
  - Supplemental O2
  - NPPV (CPAP, BiPAP)
  - High flow nasal cannula (Optiflow™, Vapotherm™)

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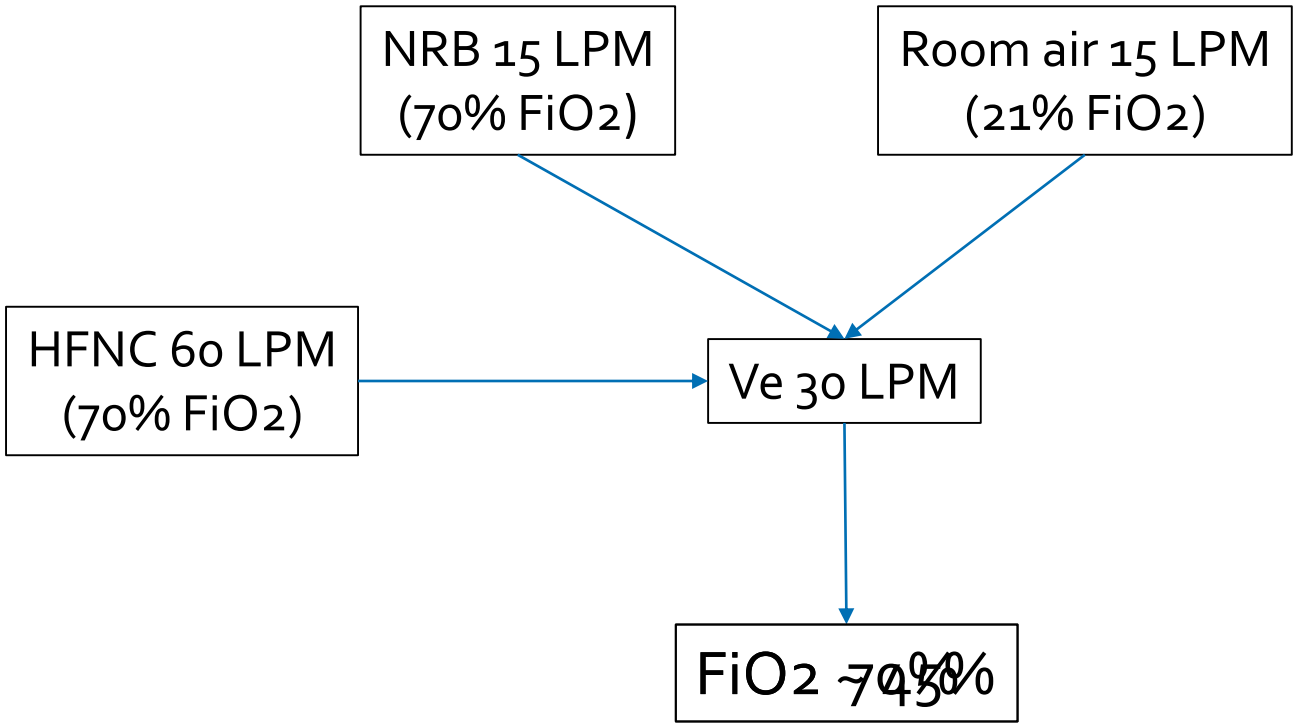
# What's So Great About HFNC?

- Minimizes dilution with room air
- Heated and humidified
- Washes out dead space
- Provides limited PEEP
- Comfortable
- Limited data suggest no added aerosol risk

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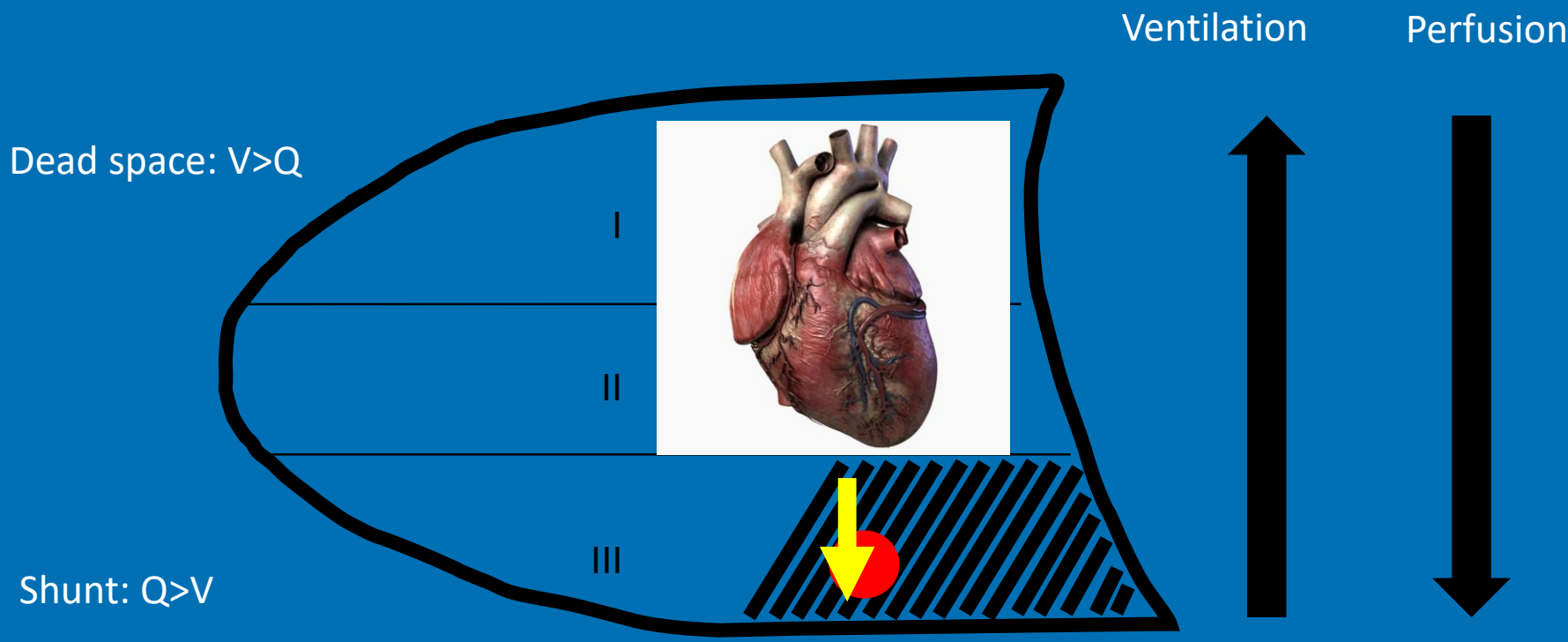
# Prone Ventilation

## Supine Patient

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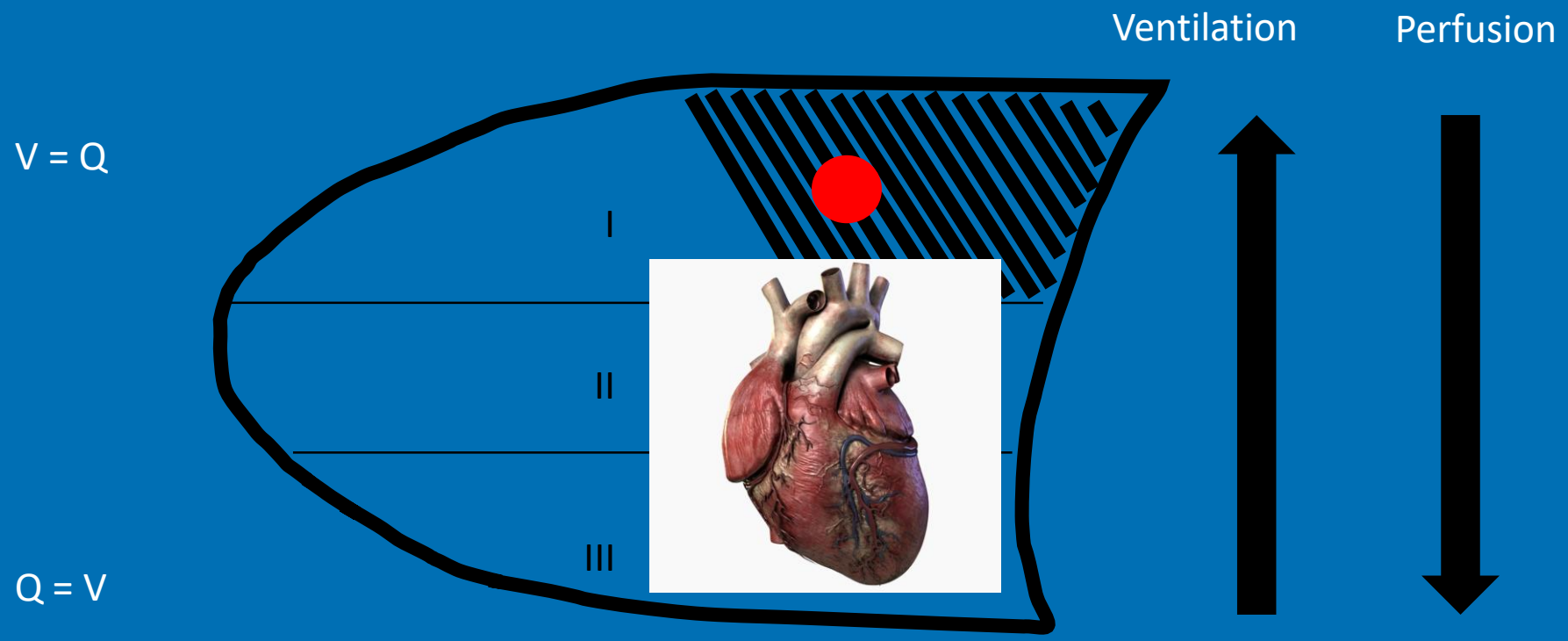
# Prone Ventilation

## Prone Patient

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# Prone Ventilation

- **Proven mortality reduction in intubated patients with severe ARDS**
- **Awake proning in CARDS**
  - Often improves oxygenation and decreases WOB
  - Unclear if it reduces disease progression or intubations
  - Harder to assess patients with a “quick look”
  - Might delay inevitable intubation… when patient is even worse

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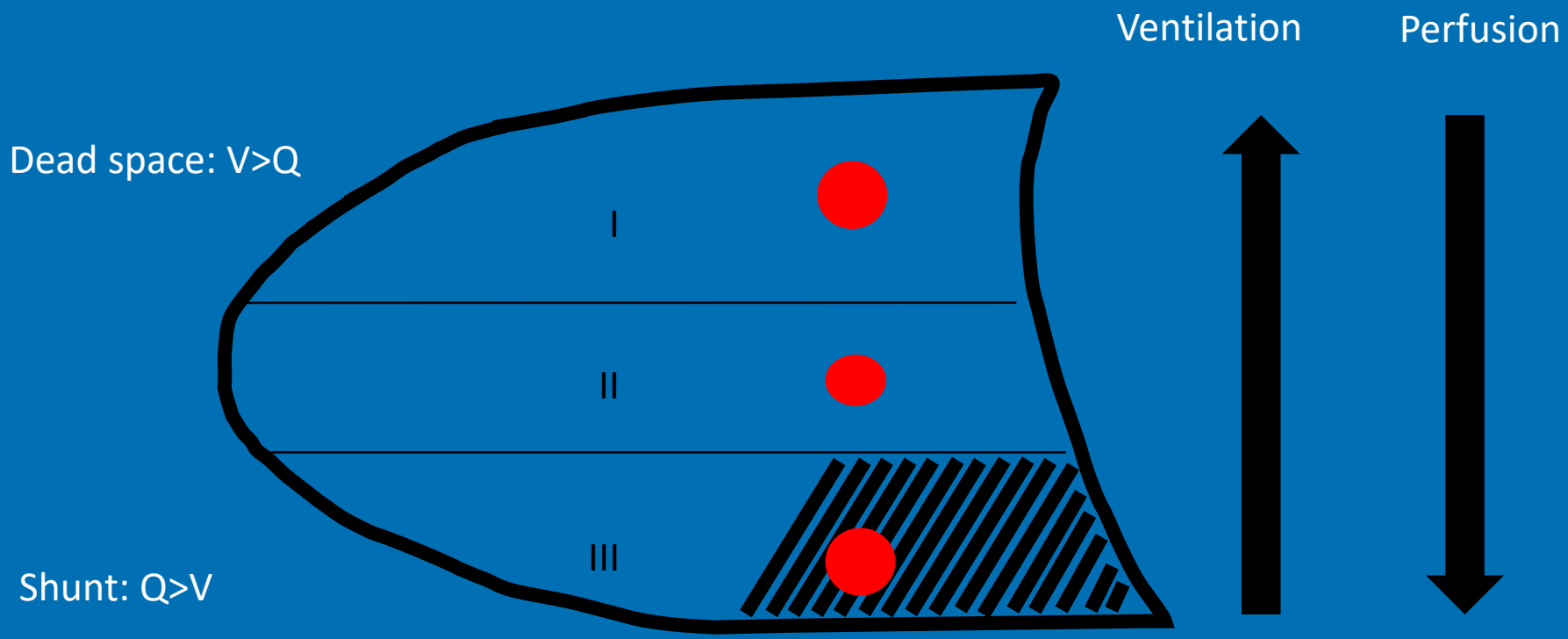
NEJM 2013; 368(23)
JAMA. 2020;323(22):2336-2338.
JAMA. 2020;323(22):2338-2340.

# Inhaled Vasodilators

## *Nitric Oxide, Prostacyclins*

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# CARDS: Lessons Learned… So Far

- **Early:  Is it ARDS?**
- **Late: It's probably ARDS**
- **NIV likely "saves" some patients, but… we cannot prospectively identify them**
- **We now mostly intubate "NIV failures"… and many don't do well**
  - Prolonged ventilation/ trach
  - High mortality
  - Functional outcome for survivors unclear

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# True or False?

**This patient meets criteria for severe ARDS**

*True.  PaO2 75 / 0.75 FiO2 = PaO2:FiO2 ~100.*

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# Which Statement is True?

A. Early intubation and ARDSNet mechanical ventilation will improve this patient's likelihood of survival.

B. Conservative management with non-invasive ventilation will improve this patient's likelihood of survival.

C. ***Beats me. I'm calling my intensivist and letting him/her figure it out.***

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**Stay safe!**

**eric.siegal@aah.org**

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# Neuromuscular Blockade in COVID-19 ARDS

Sarina Sahetya, MD MHS
Assistant Professor
Pulmonary & Critical Care Medicine
Johns Hopkins Hospital

# Sarina Sahetya, MD, M.H.S.

- Assistant Professor of Medicine, Johns Hopkins
- Expertise in ARDS, pneumonia, obstructive lung disease
- Graduated from University of Louisville School of Medicine (2011)
- Residency- Johns Hopkins University School of Medicine / Internal Medicine (2014)
- Fellowships- Johns Hopkins University School of Medicine / Pulmonary and Critical Care Medicine (2018)
- Board Certifications
- American Board of Internal Medicine, Internal Medicine & Pulmonary & Critical Care Medicine Certified

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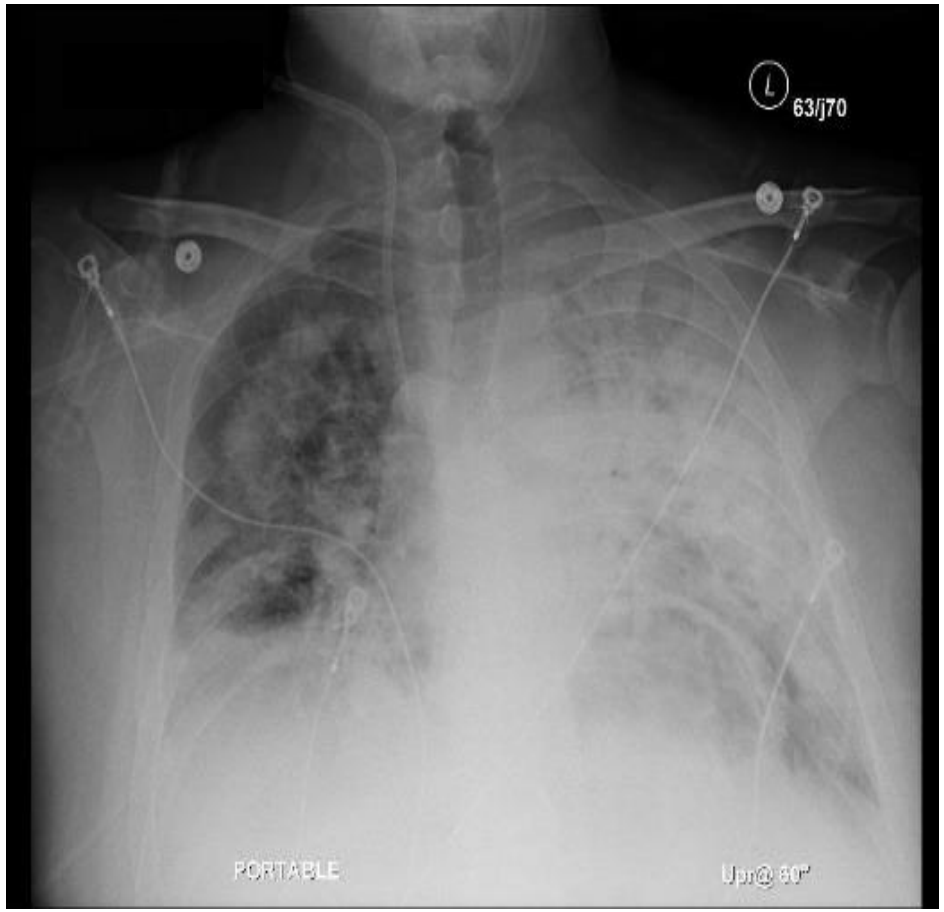
# Disclosures

**None**

# Patient RE Case

- 56 yo Male
- COVID-19 positive
- Over 48 hrs:
  - 2L NC -> NRB
- SpO2: 85% on NRB
- CXR:

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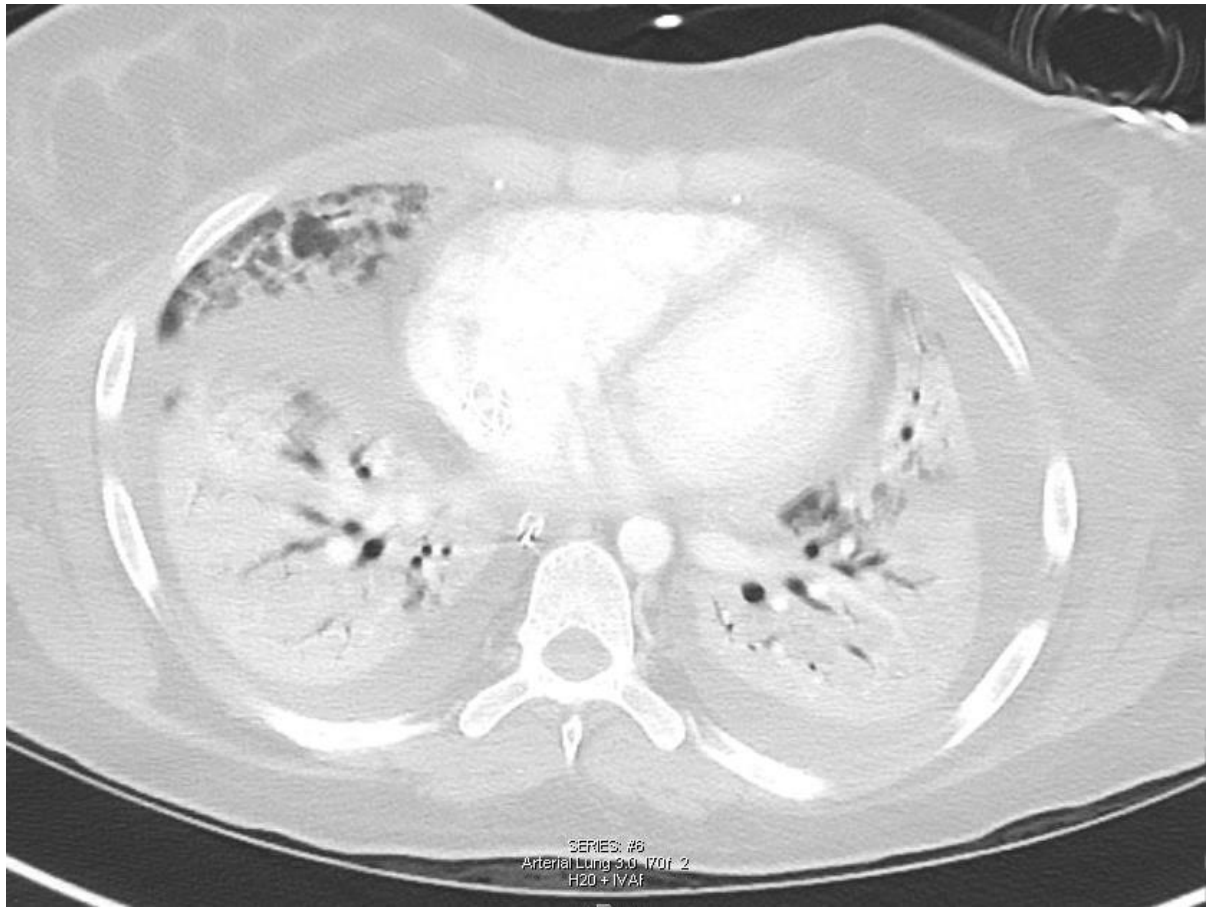
# Patient RE Case

- Upgraded to ICU
- Intubated
- Vent settings:
  - Volume-Control
  - RR: 35
  - VT: 6 cc/kg PBW
  - FiO2 90 / PEEP 16
- PaO2:FiO2 = 112, SpO2 89%



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# Question:

**Apart from low tidal volume ventilation, what adjunct therapy is proven to reduce mortality in moderate-severe ARDS?**

A. Prone Positioning

B. Neuromuscular Blockade

C. Inhaled Pulmonary Vasodilators

D. High-frequency oscillatory ventilation

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# Question:

**Apart from low tidal volume ventilation, what adjunct therapy is proven to reduce mortality in moderate-severe ARDS?**

**A. Prone Positioning**

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# Evidence for NMB in ARDS

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 SEPTEMBER 16, 2010 VOL. 363 NO. 12

## Neuromuscular Blockers in Early Acute Respiratory Distress Syndrome

Laurent Papazian, M.D., Ph.D., Jean-Marie Forel, M.D., Arnaud Gacouin, M.D., Christine Penot-Ragon, Pharm.D., Gilles Perrin, M.D., Anderson Loundou, Ph.D., Samir Jaber, M.D., Ph.D., Jean-Michel Arnal, M.D., Didier Perez, M.D., Jean-Marie Seghboyan, M.D., Jean-Michel Constantin, M.D., Ph.D., Pierre Courant, M.D., Jean-Yves Lefrant, M.D., Ph.D., Claude Guérin, M.D., Ph.D., Gwenaël Prat, M.D., Sophie Morange, M.D., and Antoine Roch, M.D., Ph.D., for the ACURASYS Study Investigators*

# ACURASYS Trial 2010

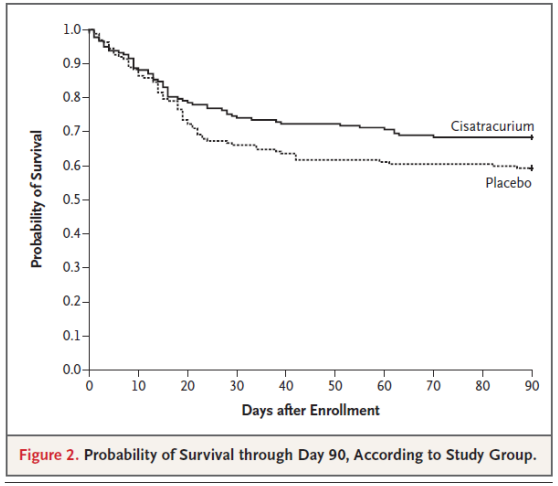


Figure 2. Probability of Survival through Day 90, According to Study Group.

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# Criticisms of ACURASYS

- **Deep sedation in control group**
- **Lag in survival curve separation**
- **Positive study based only on adjusted analysis**
  - Unadjusted 28 day mortality was different but 90 day mortality not significant
  - Underpowered?

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# ROSE Trial 2019

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MAY 23, 2019 VOL. 380 NO. 21

## Early Neuromuscular Blockade in the Acute Respiratory Distress Syndrome

The National Heart, Lung, and Blood Institute PETAL Clinical Trials Network*

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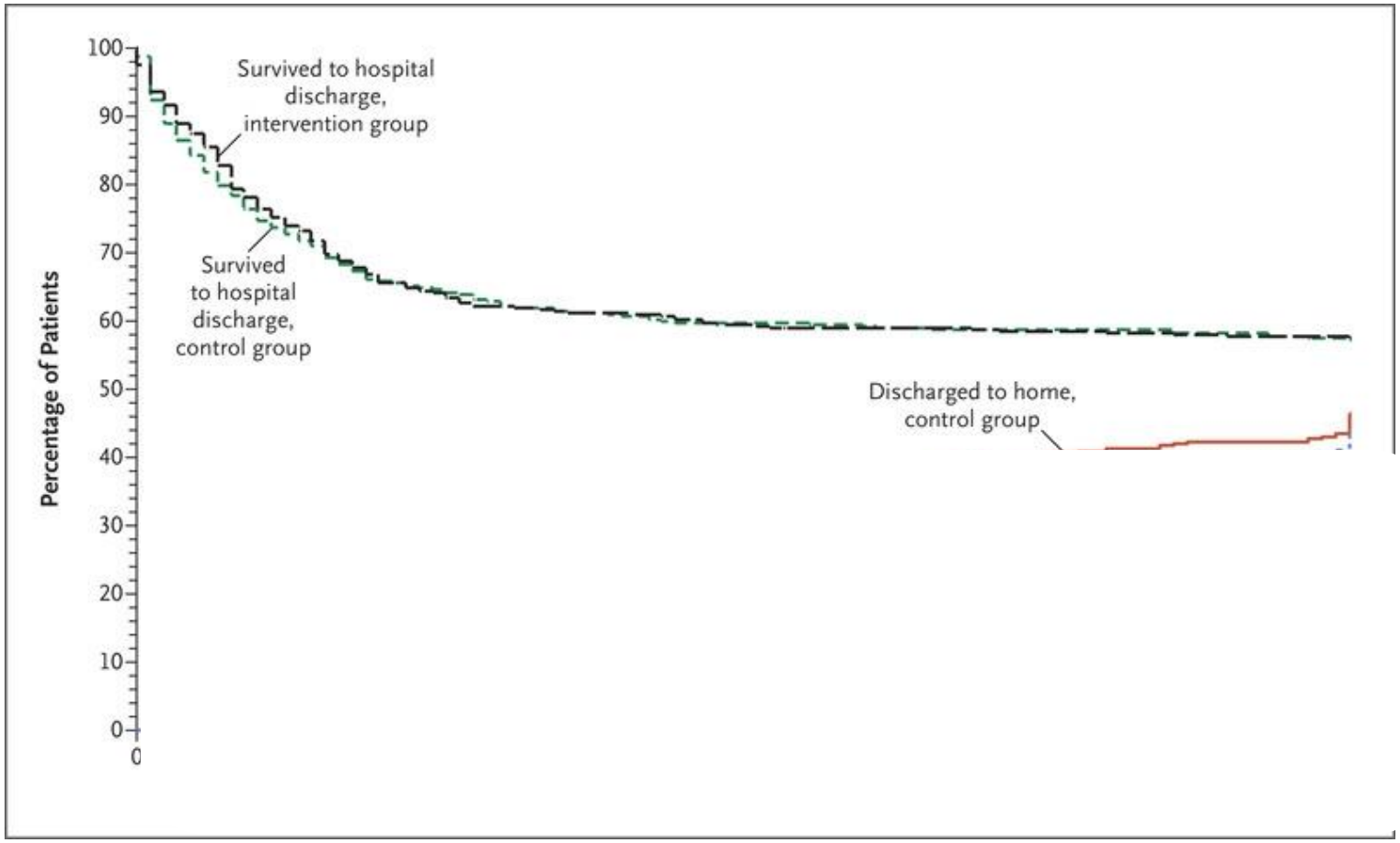
# ROSE Trial

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Moss et al, NEJM 2019

# Why paralyze?

- Improve oxygenation
- Reduce oxygen consumption
- Reduce VILI from dysynchrony and patient effort

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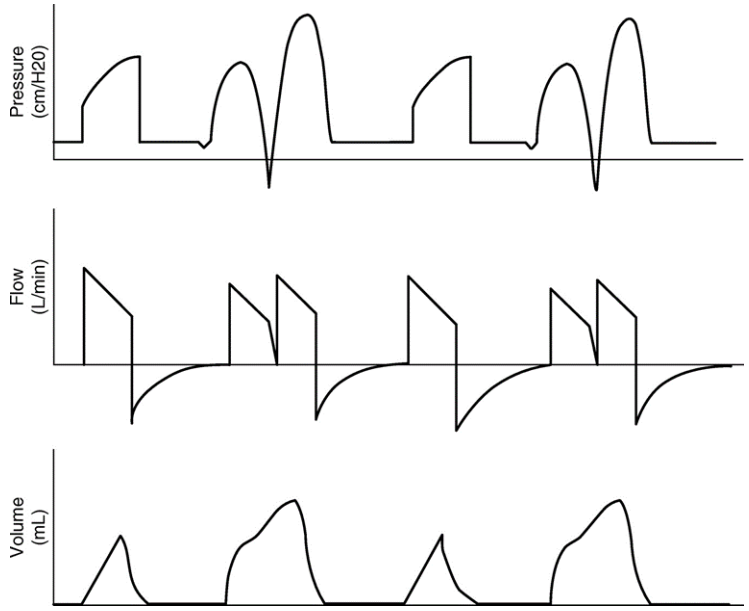
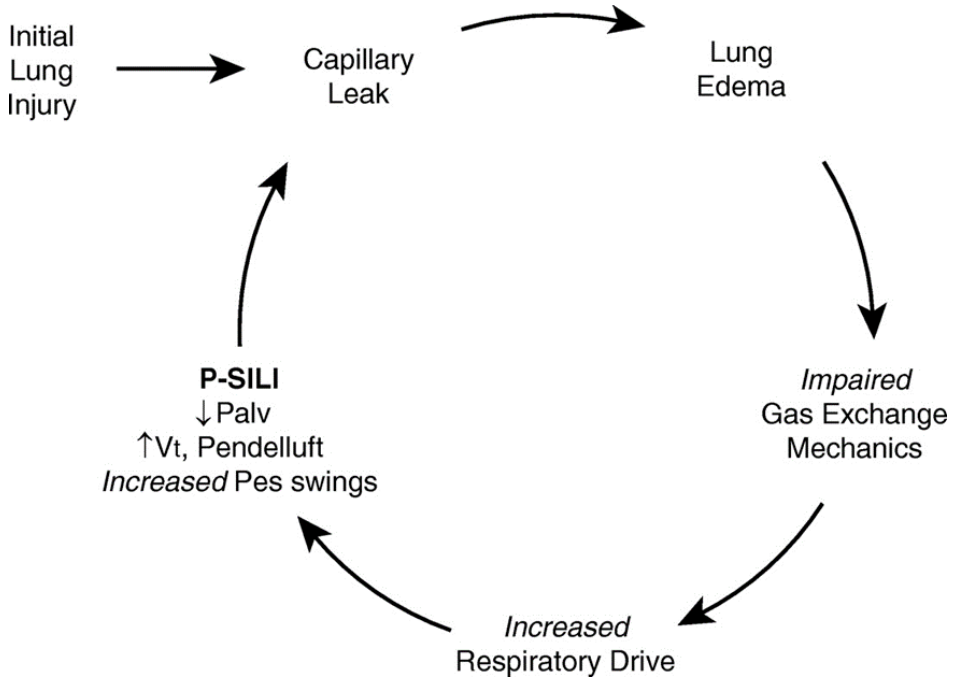
# Reduce VILI




Sahetya, AJRCCM 2017

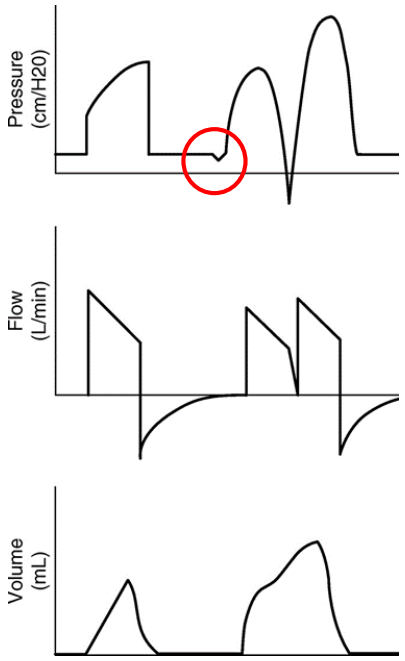
Brochard AJRCCM 2017

# Why NOT to paralyze?

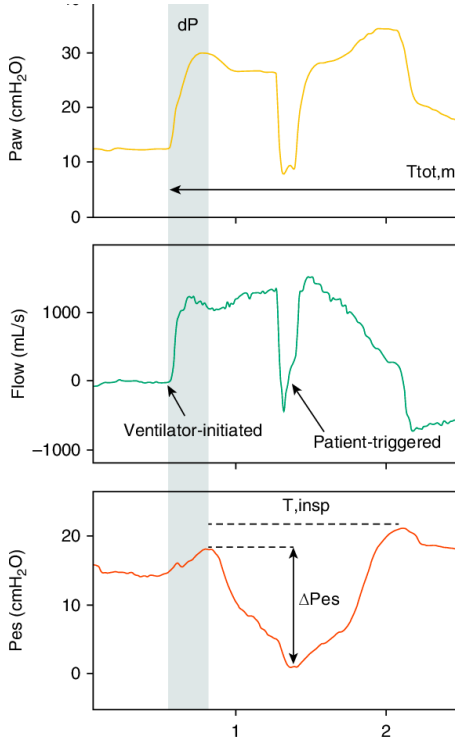
- **Increased deep sedation**
  - Risk for Post-intensive care syndrome
  - Delayed weaning
  - Hypotension
- **Increased ICU-acquired weakness**
- **Not all vent dysynchrony is the same**

# Ventilator Dysynchrony

Double Trigger




Reverse Trigger




SEDATION

LIGHT DEEP

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# Troubleshooting patient-ventilator asynchrony

- **Look at the ventilator**
- **Change ventilator settings**
  - Flow, inspiratory time, RR, mode
- **Change sedation**
  - Reverse triggering resolve with less sedation
  - Propofol/fentanyl >>> benzos
- **Paralysis**
  - Bolus before drip

# TAKE-AWAYS

- No routine use of NMB
- May increase PaO2 and reduce VO2
- Reasonable to reduce ventilator dyssynchrony or patient effort
- If not using NMB, use light sedation strategy

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# Closing Survey Question

- **Which of the following would you use to determine escalation of care in your COVID 19 patients:**
  A. PaO2:FiO2 ratio
  B. Your Gut Feeling

- **Would you routinely encourage proning for non-intubated patients with COVID:**
  A. Yes
  B. No

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# To Claim CME:

**Attendees will receive an email containing a link to claim CME within our Learning Portal within the next 24 hours:**
**https://www.shmlearningportal.org/content/rapid-clinical-updates-covid-19-critical-care-management**

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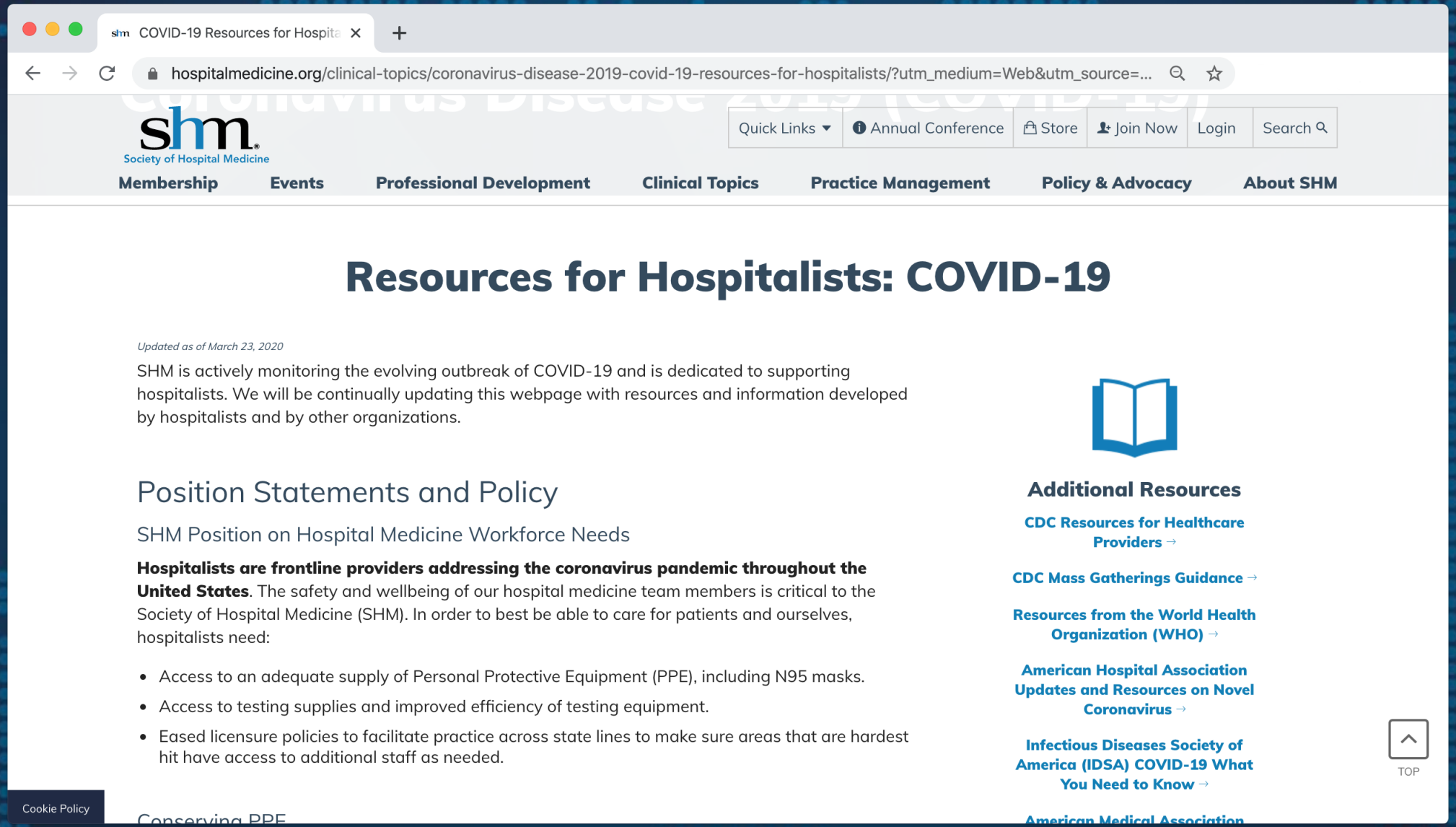
# The Critical Care for the Hospitalist Series

**This series is highly recommended for all clinicians managing COVID, and is fully free to SHM members:**

**https://www.shmlearningportal.org/content/critical-care-hospitalist-series?utm_medium=Web&utm_source=HomeBottom_Boxes&utm_campaign=Boxes&utm_term=CriticalCare&utm_content=CriticalCare#group-tabs-node-course-default1?utm_medium=Web&utm_source=LearningPortal&utm_campaign=edu_app&utm_term=lp-tile&utm_content=critical**

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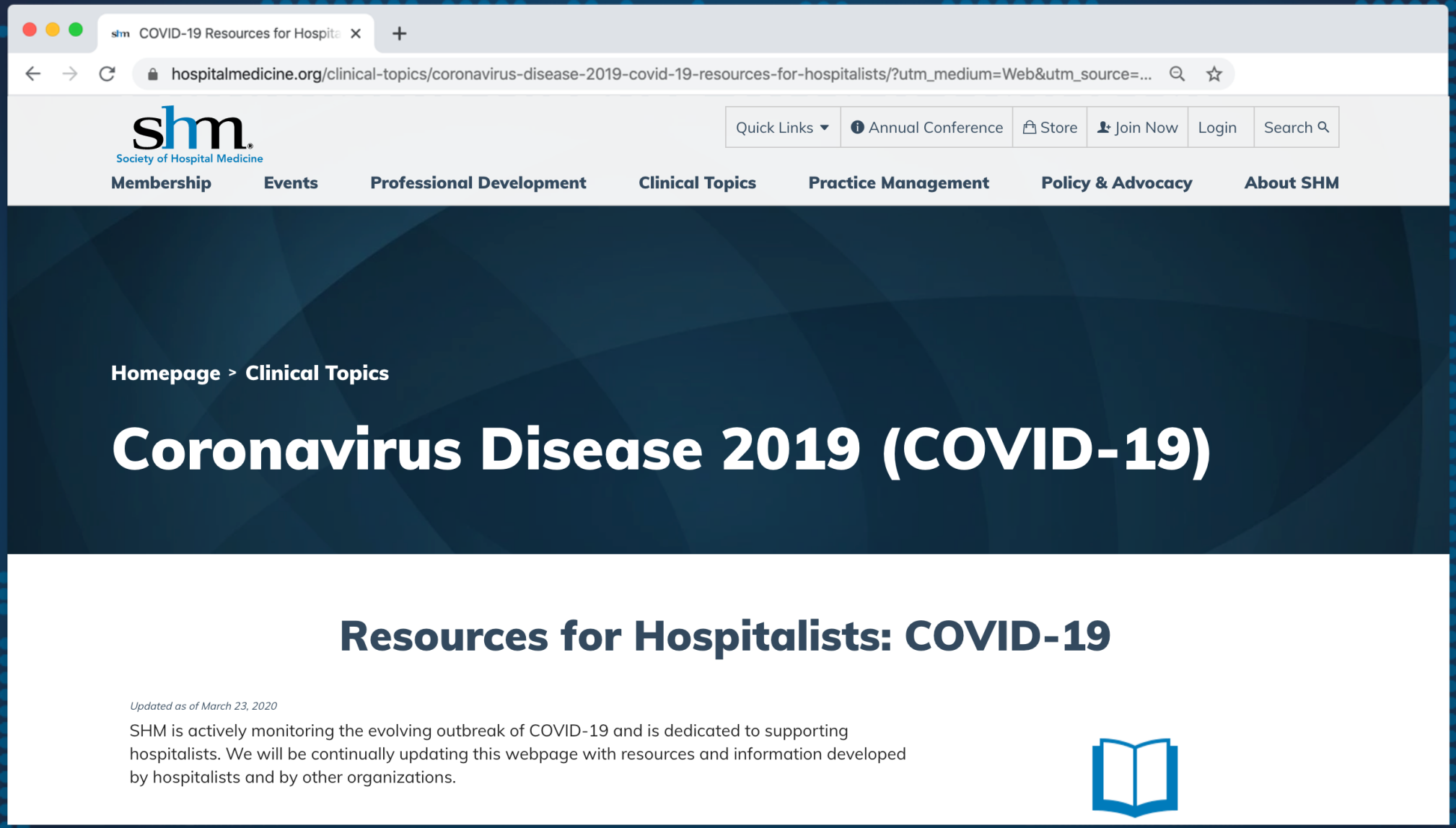


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