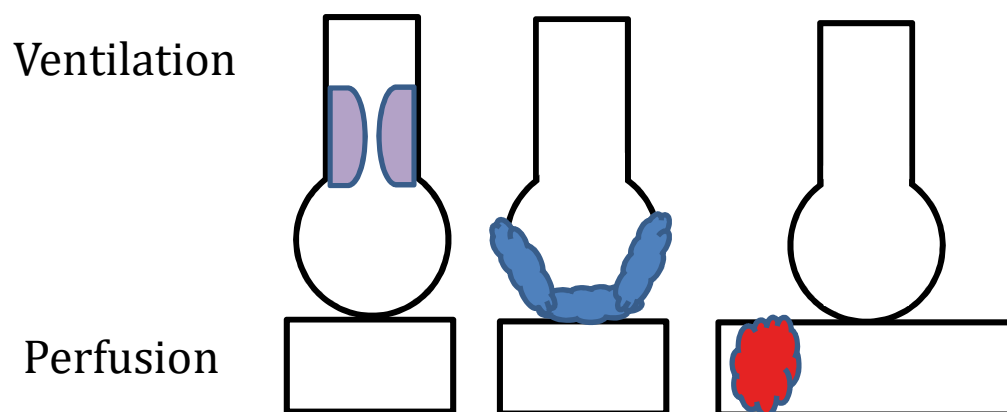


Academic Half Day - Acute Respiratory Failure

Facilitator Guide

Physiology Exercise



| | V | Q | Airway Resistance | Compliance | Mv | SA | PCO2 | PO2 |
|--------|---|---|-------------------|------------|----|----|------|-----|
| Asthma | | | | | | | | |
| CHF | | | | | | | | |
| PE | | | | | | | | |

Discussion Questions

1. What is minute ventilation?
2. What is lung compliance?

3. Why do you not become hypercapnic in CHF exacerbations initially?

4. In which of these pathologies will PEEP help? What is PEEP?

5. In which of these pathologies with inspiratory pressure support help?

Case 1

Mr. Ahtdyshka is a 62 yo male with a history of COPD who presents to the ED with a 2-day history of gradually progressive dyspnea on exertion and increased frequency of his chronic cough which is productive for clear sputum. He denies fevers. He is adherent to prescribed albuterol MDI, salmeterol BID, and tiotropium QD. His albuterol helps his symptoms some. He has a 30-pack year smoking history and currently smokes 0.5 PPD. His apartment complex has been cleaning the AC vents recently.

Vitals: 99.3, 156/87 HR105 RR 26, 91% on 2L (new requirement)

Gen - Uncomfortable, AAOx3

HEENT- PERRL, moist mucous membranes, no oral cavity lesions

CV - Heart sounds distant. Tachycardic, regular, no murmurs, no JVD

Resp - Labored, no wheezing, +accessory muscle use. Able to speak in partial sentences

Abd - soft/nontender/nondistended, +BS

Ext - 2+ radial and DP pulses. No LE edema

Labs:

WBC - 7.3 (normal diff); Hgb- 14.3; Plt- 320

Na - 137, K- 4.1, Cl- 101, HCO₃⁻ 29, BUN- 14, Cr- 1.0

ABG - 7.23/60/62 on 2L (pH/CO₂/O₂)

CXR: ----->



- 1. What is the diagnosis and what are the next steps in management?**
- 2. Would you place this patient on NIPPV (non-Invasive positive pressure ventilation)?**
- 3. You start Mr. Ahtdyshka on bilevel NIPPV. What are you trying to improve in this patient from a respiratory perspective? Return to physiology - where is the defect in the lungs, how do we use NIPPV to overcome this defect?**
- 4. How soon after initiating this therapy should you check an ABG? What parameters are you hoping to see?**
- 5. How long is “too long” in terms of trialing non-invasive ventilation before considering intubation?**

His nurse calls you about 25 minutes later because he is having a hard time arousing he. You ask for an ABG as you make your way to the room. Upon arriving at bedside, you find that Mr. Ahtdyshka requires a sternal rub to open his eyes. When awake, he responds but often drifts off. He withdraws to pain in all extremities. The ABG returns with 7.18/70/63 (pH/CO2/O2).

6. What is your next step?

Decision to Intubate

What are the Indications for Intubation?

- -
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1. Patient is a 76 y/o with a history of cirrhosis, CHF who presented with severe CAP. Initial vitals: 101F, 112, 92/76, RR 32, 82% on NRB.
 - a. **What is going on with this patient? What are next steps?**
 2. Patient is a 23-year-old with a history of severe asthma who presented with an acute exacerbation. On admission patient was AF 130/70 HR 105 RR 29 92% on 2L. VBG 7.36/42. Repeat labs and vitals show VBG 7.32/53 and RR 26.
 - a. **What is going on with this patient? What are next steps?**
 3. Patient is a 56 y/o with a history of cirrhosis who presented with AMS. Lactulose was ordered but he did not receive any as he was not tolerating PO. In the am you get the following exam: somnolent, not following commands, moans with physical stimulus, withdraws to pain.
 - a. **What is going on with this patient? What are next steps?**

4. Patient is a 95-year-old with a history of MDS, HFrEF, HTN, HLD, Dementia who presents with respiratory distress, pulmonary edema on CXR, tachypneic to 26, hypoxic and hypercarbic.
 - a. **What is going on with this patient? What are next steps?**

5. Patient is a 53 y/o with a history of moderate COPD who presented with cough, sputum production, and shortness of breath. Initial VBG showed 7.28/72. Vitals: AF 82 120/70 91% on 4L RR24. Patient's work of breathing is increased.
 - a. **What is going on with this patient? What are next steps?**

6. Patient is a 62 y/o with a history of COPD, CAD, HLD, DMII, and HTN who presented with E.Coli bacteremia, with worsening hypotension with a lactic acidosis (AGMA, bicarb 12), and tachypneic to 33, satting 98% on RA.
 - a. **What are some of the consequences of intubating this patient?**

Case 2

Mr. Tenghianafes with a past medical history of MDS, CHF, COPD and distant provoked DVT/PE who presented to the ED and was admitted this afternoon with mild exertional shortness of breath, slowly progressive over the last two weeks and noted to be anemic to Hgb 6.5 from a baseline of 9-10 (6 months ago), no signs of bleeding. *A Rapid Response was called on the floor for hypoxia.*

Vitals: 100.6, 104, 95/65, 72% on 2L RR 25

He is 5'10" (178cm) and 100kg

CXR:



1. You are the first senior to respond, what do you do?

2. What could be going on with this patient?

Patient is persistently hypoxic on NRB 81%. Mr. Tenghianafes is intubated and started on volume-control continuous mechanical ventilation with a TV of 600 cc, RR 12, FiO₂ of 1.0, and PEEP of 5 cm H₂O. An ABG shortly after intubation: 7.10/16/73 (pH/CO₂/O₂)

3. **Does this patient meet criteria for TRALI/ARDS?**

4. **What changes to the vent settings do you want to make and why?**

5. **What is the pathophysiology of this person's lungs? What are the important aspects of oxygenating this patient?**

6. **After 30 minutes on the above settings with FiO₂ at 1.0, his ABG is 7.28/60/95 (pH/CO₂/O₂). What adjustments should be made at this time?**

Vent Exercise

Objectives:

1. Define the difference between Pressures and Volume Control
2. Go over the different modes of ventilation
3. Define the difference between PEEP vs Inspiratory Pressure
4. Knob-ology

Notes: