Acute Respiratory Failure

Educational Reinforcement Material

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Pre- Test Questions

1. Which one of the following is not a class of respiratory failure?
    a. Refractory hypoxemia
    b. Increased work of breathing
    c. Airway protection
    d. Mountain sickness
2. Which type of tachypnea is more worrisome?
    a. Rapid and shallow
    b. Rapid and deep
3. Why is rapid and shallow breathing worse?
    a. Low CO2
    b. Easily tired
    c. Low tidal volumes
    d. Will not tolerate BiPAP
4. Which is not a class of increased work of breathing causing respiratory distress?
    a. Opiate overdose
    b. Bronchospasms
    c. Increased metabolic demands
    d. Worsening compliance
5. In severe metabolic acidosis, why are the patients breathing rapidly?
    a. To stay awake
    b. Increased metabolic supply
    c. To overcome shunt physiology
    d. To get rid of CO_2
6. Can someone fake being diaphoretic?
    a. Yes
    b. No
7. Why is tachycardia and diaphoresis dangerous in the setting of increased work of breathing?
    a. Likely to have a metabolic acidosis
    b. Not really concerning
    c. High concern for drug withdrawal
    d. High catecholamine surge
8. What is meant by shunt physiology?
    a. Inadequate ventilation with adequate perfusion
    b. Inadequate ventilation with inadequate perfusion
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    b. Something in the alveoli that prevents them from expanding
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10. Why does positive pressure ventilation help with shunt physiology?
    a. Greater oxygen delivery
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    c. Increase surface area for gas exchange
    d. Helps with patient fatigue
11. What does it mean when there is an increase in FiO2 without an increase in PaO2?
    a. Inadequate amount of oxygen
    b. Mostly mouth breathing
    c. Need to change from NC to non-rebreather
    d. No gas exchange due to shunt physiology
12. What percentage of alveoli are involved in shunt physiology to have refractory hypoxia?
    a. >30%
    b. >40%

c. >50%
d. >55%

13. What is one indication that a patient is unable to protect his airway and would benefit from intubation?
    a. Pooling of secretions in the airway
    b. Frequent lethargy and unable to carry on a conversation
    c. Poor cough
    d. Recent stroke
14. What is the Glasglow coma score that is a general rule of thumb for intubation?
    a. Three
    b. Less than 10
    c. Less than 8
    d. Less than 11
15. What happens to the ratio of carbon dioxide to oxygen when a patient is apneic?
    a. ↑ Carbon dioxide: ↑Oxygen
    b. ↑ Carbon dioxide: ↓ Oxygen
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    a. Recent use of benzodiazepines
    b. Cough
    c. Nothing, just intubate and then evaluate
    d. Blood glucose
17. What is the reversal agent for opiate overdose?
    a. Naloxone
    b. Flumazenil
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18. What is the reversal agent for benzodiazepine overdose?
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19. What should you consider before giving flumazenil for a benzodiazepine overdose?
    a. A higher dose is going to be needed if the patient is chronically on benzodiazepines
    b. Consider a drip due to the short half-life of flumazenil
    c. Add naloxone because of the likely use of opiates also
    d. Avoid if patient is on chronic benzodiazepines as they can go into withdrawal

Manual with Blanks

Causes of Acute Respiratory Failure 0047

1. Increased work of breathing
2. Refractory hypoxemia
3. Airway protection (intubate, No NIPPV)
4. Apnea/ Hypopnea (intubate, no NIPPV)

Increased work of breathing 0212

Tachypnea, Tachycardia, and Diaphoresis

Tachypnea: - types

- × Rapid and shallow chest rise- BAD; they are having lower _____
- × Chest rise and rapid breathing- Good

Tachycardia and Diaphoresis

- × High catecholamine surge
- × Verge of some catastrophe

Categories

A. Neuromuscular weakness
    a. Myasthenia Gravis (crisis), spinal muscle atrophy, Guillain Barre Syndrome, Myopathy, prolonged MV, Myotonic dystrophy, ALS
B. _____
    a. Asthma, COPD, Anaphylaxis
        - Remember patients with COPD and asthma do not have trouble with inspiration. They have trouble with expiration.
C. Worsening Compliance (C= _____/ _____)
    a. Pulmonary (edema, _____, contusion, atelectasis, blood)
    b. Thorax (pneumothorax, effusion, burns)
    c. Abdomen (ascites, acute compartment syndrome)
D. Miscellaneous
    a. Upper airway obstruction
E. Increased metabolic demands
    a. For the most part will have different chest rise
    b. Large tidal volumes & rapid breathing
    c. Severe metabolic acidosis-> trying to get rid of _____
        - This is why intubation of a patient with severe metabolic acidosis is bad. You have to make sure you are giving them the same minute ventilation- since tidal volume is limited to 4-8 ml/ kg of ideal body weight, which means a fast-respiratory rate.
    d. Shock-> trying to increase metabolic supply

Refractory Hypoxemia: SHUNT 0426

- × Adequate _____ with Inadequate _____ (i.e. good blood supply but poor gas exchange)
- × Intrapulmonary shunt

Alveolar Junk: water, pus (pneumonia), blood (pulmonary contusion), collapsed (atelectasis)

Shunt Physiology

- Oxygen crosses the alveolar gradient and is picked up by oxygen as it leaves the right side of the heart to enter the left side of the heart
- Something is in the alveoli and impeding gas _____ (example- fluid from pulmonary edema), now oxygen is not moving across the alveoli into the capillaries.
- These patients need _____.
    - Positive pressure ventilation (CPAP, BiPAP or intubation) will increase the surface area for gas exchange.

Evaluation of shunt physiology

As more alveoli are involved in shunt physiology, upwards of about _____, then as more FiO_2 is added, we can see that there is no increase in _____ meaning no gas exchange. This patient has _____ hypoxia and > 40-50% of their lung is involved in shunt physiology.

First place them on 15L of 100% non-rebreather which is about _____ FiO_2=> no response then greater of equal to 40% shunt (blood, water, pus, collapsed) => need positive pressure ventilation.

Inability to Protect Airway 0802

1. The pooling of _____ in the airway
2. Ability of patient to lift _____
    - this also shows they are neurologically able to follow commands
3. Gag and cough reflexes do not accurately predict ability to protect the airway
4. GCS _____
    - Rule says: GCS <8 then intubate (rhymes)
    - Problem is that some patients are chronically neurologically devastated

Typically require _____, but there are exceptions

Respiratory Arrest or Hypoventilation 0934

Apnea/ Alveolar Hypoventilation (↑ Alveolar _____→ Displaces _____)

- Cardiac arrest, CNS injury, TBI, Hypoglycemia, Drug Overdose, Shock (decreased cerebral perfusion)

Any reversible causes? D50, Narcan, Flumazenil

- _____:
    - Check FSBS and give glucose (or can just give glucose)
- _____ overdose:
    - Narcan- o.4 mg/ml
    - Dilute 9 ml: 1 ml with Narcan=> 1 ml= 40 mcg per 1 cc
- _____ Overdose
    - Flumazenil 0.2 mg Q60 seconds, max 3 mg / 1 hour
    - DO NOT reverse benzodiazepines unless you know the patient's history and exactly what medications/drugs they have taken

Reinforcement Game

Instructors:

1. Pass out the cards with a name/subject to everyone in the class
2. Ask the student with that card to tell you something about it or ask them a specific question about it, but before the video goes into detail

Tachypnea	Tachycardia and Diaphoresis
Neuromuscular weakness	Bronchospasms
Compliance	Upper airway obstruction
Metabolic Demands	Shock
Oxygenation	Ventilation
Shunt Physiology	Positive pressure ventilation
FiO2	Protect the airway
Neurological injury	Glasglow coma scale
Apnea	Not immediate reverse
Hypoglycemia	Opiate Overdose
Benzazepine overdose	Flumazenil

Post Test Questions

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    b. Increased work of breathing
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2. Why is rapid and shallow breathing worse?
    a. Low CO_2
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    c. Low tidal volumes
    d. Will not tolerate BiPAP
3. What is the reversal agent for benzodiazepine overdose?
    a. Naloxone
    b. Flumazenil
    c. Naltrexone
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4. Can someone fake being diaphoretic?
    a. Yes
    b. No
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   b. Cough
   c. Nothing, just intubate and then evaluate
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   c. To overcome shunt physiology
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   a. A higher dose is going to be needed if the patient is chronically on benzodiazepines
   b. Consider a drip due to the short half-life of flumazenil
   c. Add naloxone because of the likely use of opiates also
   d. Avoid if patient is on chronic benzodiazepines as they can go into withdrawal

Pre- Test Questions and Answers

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    b. Rapid and deep
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    c. Low tidal volumes
    d. Will not tolerate BiPAP
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    a. Opiate Overdose
    b. Bronchospasms
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5. In severe metabolic acidosis, why are the patients breathing rapidly? 0333
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9. What is the underlying problem with shunt physiology? 0454, 0518
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