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The Thistle QA CEU No is: MTS 18/062

Each attendee should claim ONE CEU point for completing this Quality Control Journal Club exercise, and retain a copy of the relevant Thistle QA Participation Certificate as proof of registration on a Thistle QA EQA.

CHEMISTRY LEGEND

May 2018

Hypoxemia

Hypoxemia is an abnormally low level of oxygen in the blood. More specifically, it is oxygen deficiency in arterial blood. Hypoxemia has many causes, often respiratory disorders, and can cause tissue hypoxia as the blood is not supplying enough oxygen to the body.

Signs and symptoms

In an acute context, hypoxemia can cause symptoms such as those in respiratory distress. These include breathlessness, an increased rate of breathing, use of the chest and abdominal muscles to breathe, and lip pursing.

Although they can vary from person to person, the most common hypoxia symptoms are:

- Changes in the color of your skin, ranging from blue to cherry red
- Confusion
- Cough
- Fast heart rate
- Rapid breathing
- Shortness of breath
- Sweating
- Wheezing

Other symptoms of hypoxemia may include cyanosis, digital clubbing, and symptoms that may relate to the cause of the hypoxemia, including cough and hemoptysis

Causes

Hypoxemia refers to insufficient oxygen in the blood. Thus any cause that influences the rate or volume of air entering the lungs (**ventilation**) or any cause that influences the transfer of air from the lungs to

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the blood may cause hypoxemia. As well as these respiratory causes, cardiovascular causes such as shunts may also result in hypoxaemia.

There are five basic processes that result in hypoxemia:

1. **Ventilation-perfusion (V/Q) mismatch:** air isn't getting to the parts of the lung that the blood is passing through. Causes includes pneumonia, asthma, COPD, ARDS, pulmonary embolism, heart failure, and interstitial lung diseases. V/Q mismatches usually respond well to supplemental oxygen.

2. **Right-to-left shunt:** blood bypasses the lung altogether. This can happen due to an anatomic shunt in the heart itself as in an ASD, VSD, or PFO or in the lung vasculature through an AVM, or as a physiologic shunt due to severe pneumonia, ARDS, heart failure, or atelectasis. Because blood isn't getting to the alveoli, supplemental oxygen doesn't help–all it does it bring O2 to places without blood flow.

3. **Hypoventilation:** the patient just isn't moving enough air. It's associated with an increase in CO2, and causes include CNS causes (sedation, stroke, tumours), neuromuscular disorders, airway obstruction (COPD, asthma, laryngospasm), and dead space ventilation.

4. **Diffusion defect:** oxygen isn't getting from the air to the blood. Causes include emphysema, atypical pneumonias, and pulmonary fibrosis.

5. **Low inspired oxygen content:** high altitude! And not much else.

Diagnosis

In general, hypoxia and/or hypoxemia is diagnosed by physical examination and by using oxygen monitors (pulse oximeters), determining, oxygen level in a blood gas sample and may include pulmonary function tests.

Treatment

The best treatments for COPD-related hypoxia and hypoxemia are those that keep the airways open and reduce inflammation. Preventing infections that can worsen lung function can also help. Treatment for low blood sodium varies depending on the cause.

Example of management for COPD hypoxia and hypoxemia include:

- **Bronchodilator therapy**: These are typically inhaled medications that reduce the spasm and tightening of the smooth muscle in the airways to improve oxygen flow.
- **Immunizations**: Getting a regular flu shot and scheduled pneumonia and pertussis (whooping cough) vaccines can help a person prevent infections that could make lung hypoxia and COPD worse.

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- **Oral or inhaled corticosteroids**: These medications reduce inflammation in the airways and in the body during a COPD flare. Examples include beclomethasone and prednisone.
- **Quitting smoking**: If a person with COPD smokes, quitting smoking can have significant benefits in treating the condition and reducing its symptoms. Quitting also boosts the immune system.
- **Pulmonary rehabilitation therapy**: This treatment involves breathing "retraining" to teach a person the best ways to breathe when their lungs are impaired. It also slows the decline of lung function and increases a person's ability to exercise.

Along with nutritional counseling, pulmonary rehabilitation therapy can help a person with COPD breathe better. If a person has severe hypoxemia due to COPD, a doctor will commonly recommend oxygen therapy. This involves breathing in extra oxygen through a small, flexible tube that fits in the nostrils known as a nasal cannula.

References

1. *https://en.wikipedia.org/wiki/Hypoxemia*
2. https://medbits.richaidan.com/2016/02/02/the-five-causes-of-hypoxemia
3. *https://www.medicalnewstoday.com/articles/316136.php*

Questions

1. Define the term Hypoxemia.
2. Discuss the causes of Hypoxemia.
3. How can Hypoxemia be treated?