Acute Respiratory Distress Syndrome

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**Acute Respiratory Distress Syndrome**

The Acute Respiratory Distress Syndrome (ARDS) is a syndrome characterized by noncardiogenic pulmonary edema, respiratory insufficiency, and diffuse bilateral pulmonary infiltrates. It is a severe and life-threatening condition that can rapidly progress to multiple organ failure and death. ARDS affects an estimated 150,000 to 200,000 people annually in the United States and a comparable number of patients in Europe. It is a complex syndrome with a mortality rate of 30-50% even with current standard treatment.

**Symptoms and Signs**

- Presentation of symptoms of ARDS usually occur within 24-48 hours after the initial insult.
- In the presence of sepsis, the onset of symptoms can be even more rapid, within 24 hours.
- Patients generally present with dyspnea, tachypnea, and hypoxemia.
- Acute dyspnea or hypoxemia, a life-threatening event, may also be accompanied by adventitious breath sounds including crackles, wheezes, and rhonchi.
- Diagnosis is made through exclusion of other causes of respiratory failure. Common causes of ARDS include sepsis, trauma, and surgical procedures. A high-risk population includes patients with a history of chronic obstructive pulmonary disease, coronary artery disease, or a recent episode of sepsis.

**Pathophysiology**

- **Underlying Pathophysiology**
  - Beginning with either a direct lung injury or an indirect lung injury, such as widespread infection, the pathophysiological processes of ARDS are complex and involve inflammation, edema, and increased vascular permeability.
  - The inflammatory process results in the production of pro-inflammatory cytokines and chemokines, leading to the recruitment of leukocytes and the release of reactive oxygen species.
  - In the lung, these processes lead to the recruitment of neutrophils, which are activated and release enzymes and cytokines that cause tissue damage and further recruit more leukocytes.
  - This leads to the development of interstitial edema and alveolar flooding, which further increases lung compliance and worsens gas exchange.

- **Implications for Respiratory Care**
  - Respiratory therapists play a critical role in managing the respiratory distress in ARDS patients. They assess oxygenation status, monitor ventilator settings, and titrate positive end-expiratory pressure (PEEP) to optimize gas exchange and minimize patient-ventilator asynchrony.
  - They also work closely with the medical team to adjust pharmacological interventions and monitor for signs of improvement or deterioration.

**References**


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**Table 1. Berlin Criteria for Diagnosis of ARDS**


**Significance of Pathophysiology**

- The pathophysiology is what has driven treatment modalities for ARDS.
- Understanding that ARDS stems from an inflammatory process from lung injury has led to improvements in patient oxygenation and causation further the development of extracorporeal membrane oxygenation, which enables the inflammatory process and worsens ALI (acute lung injury).
- The pathophysiologic understanding of pathophysiology; nursing and healthcare staff can be more competent and efficient in the care of all patients.

**Oxygenation**

- **Oxygenation**
  - **Mild**
    - PaO2/FiO2: 200-399
    - PEEP or CPAP
  - **Moderate**
    - PaO2/FiO2: 100-199
    - PEEP or CPAP
  - **Severe**
    - PaO2/FiO2: 100-99
    - PEEP or CPAP

**Timing**

- Within one week of illness onset or close of respiratory symptoms

**Signs and Symptoms**

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- Acute dyspnea or hypoxemia, a life-threatening event, may also be accompanied by adventitious breath sounds including crackles, wheezes, and rhonchi.
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