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Acute Respiratory Distress Syndrome

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Normal lung function requires that inflated alveoli are in contact with well-perfused blood vessels, so that oxygen and carbon dioxide diffusion can occur across the alveolar-capillary membrane (ACM) (Siegel, 2018b). The ACM is semi-permeable, so fluid can cross depending on hydrostatic and osmotic pressures, but proteins remain in the vasculature (Siegel, 2018b).

### ARDS Pathophysiology

The tissue injury and inflammatory process that takes place during ARDS is extremely detrimental to the patient and especially their respiratory function.

**Impaired gas exchange is a major consequence of this pathophysiology.** It results due to a ventilation-perfusion mismatch which occurs, because the patient is perfusing, but cannot and does not diffuse oxygen across the alveoli (Siegel, 2018b). Carbon dioxide (CO2) elimination is also impaired due to decreased diffusion (Siegel, 2018b). This explanation is the reason why a major sign of ARDS is refractory hypoxemia — the patient’s arterial oxygen levels do not improve despite increasing oxygen requirements (Siegel, 2018a).

ARDS also results in a decrease in lung compliance (Kedissi, Youssef, Jones, & Kinowski, 2019). The loss of compliance is due to both the decrease in pulmonary surfactant, as well as the stiffness of the lungs due to their lack of flexibility (Siegel, 2018b). The lungs can no longer expand as usual or account for the increased pressure from inhalation. Special consideration must be taken for patients on the ventilator, because high tidal volumes can cause further damage to the alveoli and lung tissue (Haffl, Stahl, & Zabahchi, 2019).

**Pulmonary hypertension is another common element in patients with ARDS (Kaldet).** It occurs in about 25% of patients with ARDS who are mechanically ventilated and results from hypoxic vasoconstriction, vascular compression from positive pressure ventilation, tissue destruction, and increased CO2 levels (Siegel, 2018b). An echocardiogram will most likely show right heart strain as the heart tries to overcome the resistance of the lungs (Hines & Marschall, 2018).

**Conclusion**

ARDS is a condition with a high mortality rate that requires exceptional interprofessional teamwork and knowledge (Siegel, 2018b). It is essential that clinicians have an understanding of the entire pathophysiological process, because early detection could save a patient's life. Because nurses work at the bedside with 24hr patients, they must be the eyes and ears for physicians in order to notice small changes in the patient’s condition.

Research must continue in order to develop the most efficient standard of care to improve mortality rates among this particular patient population. Staff education is crucial to ensure prompt diagnosis and treatment.