

Otterbein University

Digital Commons @ Otterbein

Nursing Student Class Projects (Formerly MSN)

Student Research & Creative Work

Summer 2016

Acute Respiratory Distress Syndrome

Jessica A. Bernhard

Otterbein University, jessica.bernhard@otterbein.edu

Follow this and additional works at: https://digitalcommons.otterbein.edu/stu_msn



Part of the [Nursing Commons](#)

Recommended Citation

Bernhard, Jessica A., "Acute Respiratory Distress Syndrome" (2016). *Nursing Student Class Projects (Formerly MSN)*. 190.

https://digitalcommons.otterbein.edu/stu_msn/190

This Project is brought to you for free and open access by the Student Research & Creative Work at Digital Commons @ Otterbein. It has been accepted for inclusion in Nursing Student Class Projects (Formerly MSN) by an authorized administrator of Digital Commons @ Otterbein. For more information, please contact digitalcommons07@otterbein.edu.

Acute Respiratory Distress Syndrome (ARDS)

Jessica Bernhard BSN, RN

Otterbein University, Westerville, Ohio

Pathophysiological Processes

Introduction

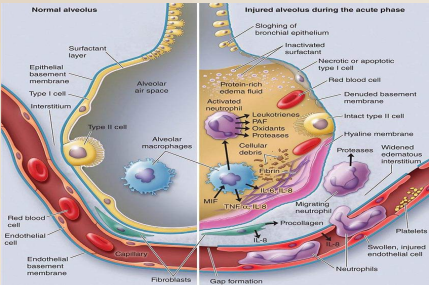
Acute respiratory distress syndrome (ARDS) is a severe respiratory ailment that is a chief cause of mortality for patients in the Intensive Care Unit (ICU) (Gibbons, 2015). ARDS involves the rapid development of respiratory failure resulting from various diseases or injuries to the lungs. Because it includes both short and long term complications, early detection of ARDS is beneficial to prevent its devastating course.

Significance of ARDS

According to Modrykamien and Gupta (2015), there are approximately 190,000 cases of ARDS in the United States each year. As a nurse in the ICU, typically ARDS develops in one to two patients every one to two months. With a mortality rate of 40-46% (Yadam, Bibler, & Balaan, 2016), ARDS is a significant issue for any patient in the ICU. I choose ARDS to study because myself as well as my colleagues in the ICU would find any resources demonstrating the best evidence based practice in caring for patients with this disease valuable.

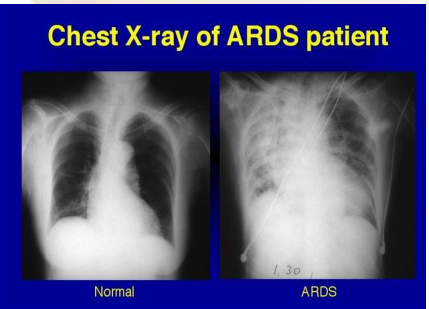
Signs and Symptoms

- Non-cardiogenic pulmonary edema, dyspnea, hypoxemia (Chiumello, Coppola, Froio & Gotti, 2016)
- Accessory muscle use, tachypnea, pallor, diaphoresis, decreased breath sounds (Carlucci, Graf, Simmons, & Corbridge, 2014)
- Respiratory alkalosis initially on arterial blood gas (Carlucci, Graf, Simmons, & Corbridge, 2014)
- As breathing increases, respiratory acidosis will ensue (Carlucci, Graf, Simmons, & Corbridge, 2014)



(Hall & Kress, 2015)

Figure 1. Comparison of a normal alveoli and an alveoli in ARDS



(Alva, 2016)

Figure 2. Normal chest X-ray and chest X-ray of a patient with ARDS

Underlying Pathophysiology

- Three phases of ARDS
- Acute exudative phase: Injury to the endothelium, composed to type I and type II cells, occurs (Carlucci et al., 2014).
- The injury results in spaces between endothelial cells which results in increased permeability and warrants alveolar flooding with protein rich fluid (Carlucci et al., 2014).
- According to (Carlucci et al., 2014), injury to the endothelium also causes damage to the pulmonary vascular bed, which leads to a reduction in perfusion to the lungs and overall results in impaired gas exchange.
- Injury to type II cells lessens surfactant production and impairs fluid transport, which causes alveoli to collapse, and impairs gas exchange (Carlucci et al., 2014).
- Neutrophils in the lungs release injurious substances, which increase the inflammatory response (Carlucci et al., 2014).
- Coagulation pathways are disrupted and micro thrombi form in the lungs (Carlucci et al., 2014).
- Fibroproliferative phase: Neutrophil-mediated inflammation and pulmonary edema lessen. A fibroproliferative process follows which causes a deposition of extracellular matrix, proliferating cells, and new blood vessels into the alveolar compartment (Carlucci et al., 2014).
- Resolution phase: The epithelium is repaired by type II cells, which proliferate and differentiate into type I cells (Carlucci et al., 2014).
- Neutrophil-mediated inflammation resolution is unclear, but apoptosis is thought to occur (Carlucci et al., 2014).
- Pulmonary edema moves from the alveoli into the interstitium and protein is removed through a variety of pathways (Carlucci et al., 2014).

Significance of Pathophysiology

ARDS presents acutely and progresses extremely fast (Drahnak & Custer, 2015). Recognition and treatment of the underlying cause is essential to avoid the damaging effects of ARDS (Drahnak & Custer, 2015). Despite numerous studies, no targeted therapies have been proven effective or ineffective as ARDS is characterized as a heterogeneous syndrome rather than a molecularly confirmed disease (Baron & Levy, 2016). ARDS continues to be hard to treat and has significant morbidity and mortality (Baron & Levy, 2016).

Implications for Nursing Care

- Continuing research for treatments is warranted due to the high mortality of ARDS (Marini, Josephs, Mechlin, & Hurford, 2016).
- Low tidal volume mechanical ventilation has shown promising results in the treatment of ARDS (Marini, Josephs, Mechlin, & Hurford, 2016).
- Patients with severe ARDS in the early phase may benefit from prone positioning (Kress, 2015).
- In collaboration with physicians nurses can administer a neuromuscular blockade with initial mechanical ventilation and place patients in the prone position (Gibbons, 2015). Not all ARDS patients benefit from prone positioning (Marini, Josephs, Mechlin, & Hurford, 2016).
- Biomarkers are useful as they reduce the heterogeneity of ARDS, thus enabling a better understanding of the pathophysiology in patients (Ware & Calfee, 2015).
- Advances in critical care have reduced ARDS mortality rates (Gibbons, 2015).
- Continual patient assessment is critical to evaluate the patient's condition and response to therapy.

Conclusion

Many ICU nurses are challenged by patients suffering from ARDS. Often, these patients have various diseases and injuries which make it difficult to determine the appropriate therapy. Most therapies aim to enhance oxygenation. Some of the interventions include low tidal volume mechanical ventilation and placing the patient in a prone position. Keen assessment skills are crucial in detecting ARDS in its earliest stage to prevent its progression. Continual assessment of the patient's condition is vital to ensure the appropriate nursing interventions are being utilized.

References

Alva, N. (2016). Acute respiratory distress syndrome. [Online image]. Retrieved June 28, 2016 from <http://rt102-pathologies.wikispaces.com/acute+respiratory+distress+syndrome>

Baron, Rebecca M., & Levy, Bruce D. (2016). Recent advances in understanding and treating ARDS. *F1000 Research*. Doi: 10.12688/f1000research.7646.1

Carlucci, M., Graf, N., Simmons, J. Q., & Corbridge, S. J. (2014). Effective management of ARDS. *Nurse Practitioner*, 39(12), 35-40 6p. doi:10.1097/01.NPR.0000454981.96541.e6

References (continued)

Chiumello, D., Coppola, S., Froio, S., & Gotti, M. (2016). What's next after ARDS: Long-term outcomes. *respiratory care*, 61(5), 689-699. doi:10.4187/respcare.04644

Drahnak, D. M. (2015). Prone Positioning of Patients With Acute Respiratory Distress Syndrome. *Critical Care Nurse*, 35(6), 29-37. doi:10.4037/ccn2015753

Gibbons, C. (2015). Acute respiratory distress syndrome. *Radiologic Technology*, 86(4), 419-439.

Kallet, R. H. (2015). A comprehensive review of prone position in ARDS. *Respiratory Care*, 60(11), 1660-1687 28p. doi:10.4187/respcare.04271

Kress, J., & Hall, J. (2015). Acute respiratory Distress Syndrome. [Online image]. Retrieved June 28, 2016 from <http://clinicalgate.com/acute-respiratory-distress-syndrome-2/>

Marini, J. J., Josephs, S. A., Mechlin, M., & Hurford, W. E. (2016). Should positioning be a standard of care in ARDS with refractory hypoxemia?. *Respiratory Care*, 61(6), 818-829 12p. doi:10.4187/respcare.04562

Modrykamien, A. M., & Gupta, P. (2015). The acute respiratory distress syndrome. *Baylor University Medical Center Proceedings*, 28(2), 163-171.

Ware, L., Calfee, C., Ware, L. B., & Calfee, C. S. (2016). Biomarkers of ARDS: what's new?. *Intensive Care Medicine*, 42(5), 797-799 3p. doi:10.1007/s00134-015-3973-0

Yadam, S., Bihler, E., & Balaan, M. (2016). Acute Respiratory Distress Syndrome. *Critical Care Nursing Quarterly*, 39(2), 190-195 6p. doi:10.1097/CNQ.0000000000000111



OTTERBEIN
UNIVERSITY