The Pathophysiological Process of Sepsis

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Sepsis is a medical emergency and can be a lifethreatening illness that results as a complication from a severe infection, which occurs when chemicals have been released by the body’s defense system work to fight off an infection (Mayo Clinic, 2016).

• One of the leading causes of death in patients in the hospital setting worldwide, becoming more common that breast and bowel cancer combined (Nursing Times, 2014).

Sepsis can affect anyone; however it is more common in the elderly or in individuals with weaker immune systems.

Health care providers (HCPs) must fully understand this disease as sepsis is a disorder that proper treatment is being implemented. According to Cooper, sepsis has become more common than heart attacks, while claiming more lives than cancer (2016).

• At the national level, mortality rates for sepsis range from 25 to 50 percent, and more than 220,000 people in the United States die from sepsis each year (Butcher, 2016).

• Understanding the pathophysiology of sepsis allows HCPs to provide adequate care and treatment plans to patients.

Significance of Pathophysiology

It is important for APNs to understand the signs and symptoms of sepsis. When a diagnosis is made in a timely manner, complications are decreased and prognosis is improved. In addition, sepsis is one of the leading causes of mortality and morbidity worldwide defined as a systemic inflammatory response initiated by a source of infection.

Pathophysiological Events

• Sepsis is one of the leading causes of mortality and morbidity worldwide defined as a systemic inflammatory response initiated by a source of infection.

• The pathophysiology of sepsis involves, “the stimulation of the innate immune system, activation of pro-inflammatory and anti-inflammatory cells which can lead to the release of a number of mediators or cytokines” (Kleinn, Attiell, & Schaure, 2013, para 4).

• This leads to a variety of physiological changes including vasoconstriction, enhanced expression of adhesion molecules, increased capillary permeability, increased clot formation, and decreased leukocyte adhesion.

• The overactivity of mediators contribute to endothelial cell damage, change in permeability, capillary leak, hypotension, and vasoconstriction; resulting in the progression of severe sepsis, while influencing the absorption and the rate of multiple organ system dysfunction (Kleinpell, Attiell, & Schaure, 2013).

• Systemic inflammatory response syndrome (SIRS) refers to a collection of signs that the body exhibits to show that it is reacting to a range of injuries or illnesses; not specific to infection.

• In response, the body may express signs of infection by raising the heart rate or respiratory rate to increase the amount of oxygen, altering body temperature or increasing white cell production in order to fight infection.

• Patients with sepsis present with hypoxemia and hypoperfusion that usually responds well to fluid replacement. However, patients with sepsis that have been on a high volume of replacement are in septic shock if not timely managed, then results to refractory hypoxemia, tissue ischemia, circulatory collapse and multi-organ failure complications.

• Mortality rates increase along with intravascular losses, which causes hypo perfusion of the blood and cause the vessels to become leaky.

• Tissues begin to swell as fluid and microorganisms escape into the surrounding tissues.

• Tissue edema in the lungs leads to pulmonary hypertension, and presents as shortness of breath.

• Blood can occur if the supply of coagulation proteins becomes overwhelmed.

• Sepsis can cause blood vessels to dilate, which results in hypotension.

Signs and Symptoms

• Sepsis can begin anywhere that a bacteria or virus can enter the body.

• Many symptoms must be identified and explored for diagnosis. Individuals who have been receiving antibiotics are at a higher risk for sepsis.

• Can be identified as a systemic response to infection that displays two of the following symptoms as a result of infection: Temperature > 38°C or <36°C. C. Heart rate > 90 bpm, Respiratory rate > 20 breaths/min or a PaO2 < 80mmHg and white blood cell count >12,000 cells/ml or <4,000 cells/ml or 10% immature (band) forms (Nursing Times, 2014).

• Can display symptoms of infection including: vomiting, diarrhea, sore throat, fever, shivering pain, shortness of breath, tachycardia, and tachypnea (Centers for Disease Control and Prevention, 2016).

• Past medical history is important for diagnosis. Sepsis can mimic symptoms of other infections or disease processes, resulting in a more difficult diagnosis.

• Individuals who have been receiving antibiotics are sometimes more difficult to diagnose with sepsis because a bacterial test may produce a false negative.

• Blood tests are performed to look for abnormalities of white blood cells, elevated lactate levels, or the presence of infectious agents (U.S. National Library of Medicine, 2016).

• Sepsis screening tools are essential to the outcome of patient’s health. Early diagnosis, since there is no single sign or symptom.

Underlying Pathophysiology

The Pathophysiology of sepsis is complex and diagnosis can be difficult. In order to develop quality measures and approaches for the care of patients with sepsis is top priority.

Conclusion

• The pathophysiology of sepsis is complex and diagnosis can be difficult. In order to develop quality measures and approaches for the care of patients with sepsis is top priority.

• Sepsis, severe sepsis, and septic shock represent progression stages of the same illness, which is the systemic response to infection. Inactivation of a cascade derived cytokines (World Journal of Medical and Medical Science, 2013).

• Biomarkers and other lab tests can be beneficial for early detection of sepsis. With immediate diagnosis and treatment, overall prognosis is increased and sepsis at risk patient care is achieved (Weissman, 2016).

• Timely diagnosis, treatment and follow-up care by the APN is critical in the management and outcome of sepsis.

Implications for Nursing Care

• A clear understanding of the pathophysiology of sepsis is important for APNs.

• Managing the disease process appropriately by implementing effective therapies and treatments is part of good practice. By the use of appropriate sepsis protocols and treatment guidelines, the patient prognosis is increased.

• Obtaining a detailed history and physical is important to rule out disease processes.

• Identification of the source of infection is important for APNs to assure patients are treated in a timely manner.

• Implementation of sepsis care bundles has been proven to improve patient outcomes.

• If sepsis is diagnosed, early treatment includes the delivery of all elements of Sepsis within one hour of identification. This includes: full blood counts, blood cultures, strict monitoring of urinary output, oxygen therapy, fluid resuscitation, and administration of broad spectrum antibiotics (Nursing Times, 2014).

• In worst case scenarios, nursing care should also include giving consideration to the patients who are unlikely to respond to treatment and providing them with good end of life-care (Nursing Times, 2014).

References


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