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The Importance of Evaluation and Management of Sepsis, Severe Sepsis, and Septic Shock

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The Importance of Evaluation and Management of Sepsis, Severe Sepsis, and Septic Shock

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Introduction

Sepsis is a life-threatening and complicated host response to the presence of infection that is affecting millions of individuals around the world each year (Dellinger et al., 2013, p. 583). According to Gray et al. (2013), sepsis is not only one of the primary causes of hospital admission but it is also a leading cause of morbidity and mortality worldwide (p. 397). Severe sepsis and septic shock are the more advanced and detrimental stages of sepsis, which are starting to increase in incidence and are killing one in four (and sometimes more) individuals infected (Dellinger et al., 2013, p. 583).

Dellinger et al. (2013) believes that "the speed and appropriateness of therapy administered in the initial hours after severe sepsis develops are likely to influence outcomes" (p. 583). Additionally, Cawcutt and Peters (2014) were consistent with Dellinger's findings and explained how early evaluation and appropriate management will significantly reduce the extent of morbidity and mortality related to severe sepsis and septic shock (p. 1572). Thus, it is essential that healthcare professionals, especially those in an intensive care unit (ICU), have extensive knowledge regarding sepsis and how it inevitably can progress to septic shock, and eventually death.

Signs & Symptoms

In 1991, "sepsis" used to be defined as the presence of infection along with two of the systemic inflammatory response syndrome (SIRS) criteria.

According to Dellinger et al. (2013) "severe sepsis" is defined as sepsis in addition to sepsis-induced organ dysfunction or tissue hypoperfusion" (p. 583).

These criteria include:

- > Fever or Hypothermia
- > Tachypnea
- > Tachycardia
- > Leukocytosis

(Cawcutt & Peters, 2014, p. 1572).

Some examples of organ dysfunction include:

- > Impaired liver function
- > Acute Oliguria
- > Decreased capillary refill
- > Skin mottling
- > Increased lactate
- > Coagulation abnormalities
- > Hypoxia
- > Paralytic ileus
- > Arterial Hypoxemia

However, the existing definition defines "sepsis" as the presence (probable or documented) of infection with at least 1 systemic indicator of infection (Cawcutt & Peters, 2014, p. 1572).

If the patient's disease progresses to severe sepsis with persistent signs of sepsis-induced hypotension despite adequate fluid resuscitation they will be considered under a state of "septic shock" (Cawcutt & Peters, 2014, p. 1573).

These indicators include:

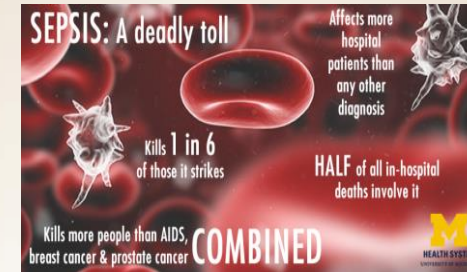
- > Any SIRS criteria
- > Elevation in procalcitonin
- > Elevation in C-reactive protein
- > Hyperglycemia without diagnosed diabetes
- > Altered mental status

Underlying Pathophysiology

The pathophysiology of sepsis is extremely multifaceted, however the syndrome first must be triggered by an infection, which then activates pro-inflammatory and anti-inflammatory processes (Cawcutt & Peters, 2014, p. 1573).

There are three mechanisms associated with systemic inflammatory response:

- 1) The first mechanism is the pro-inflammatory process which releases mediators in response to an infectious agent, such as tumor necrosis factor alpha and interleukin 1, causing inflammation and the resulting SIRS symptoms (Sagy et al., 2013, p. 261-262). The main objective of the pro-inflammatory response is to eradicate the infectious pathogen, whereas in the anti-inflammatory process the host is prompted to stimulate tissue repair and healing (Cawcutt & Peters, 2014, p. 1573). Additionally, the anti-inflammatory response works as a negative feedback mechanism to down-regulate the production of pro-inflammatory mediators and modify their effects, thereby reestablishing homeostasis and preventing SIRS (Sagy et al., 2013, p.262).
- 2) The second mechanism related to the pathogenesis of sepsis is failure of this compensatory anti-inflammatory response (CARS) to act (Sagy et al., 2013, p. 261). This creates an imbalance between pro-inflammatory and anti-inflammatory processes. The pro-inflammatory imbalance causes massive amounts of uncontrolled inflammatory mediators to be released which can result in significant tissue damage. While the anti-inflammatory imbalance causes immunosuppression and consequently increased vulnerability to secondary infections (Cawcutt & Peters, 2014, p. 1573).
- 3) The third and last mechanism is immunoparalysis, which is when the mediators of inflammation overcome the immune system, paralyzing it, resulting in a state of immune deficiency (Sagy et al., 2013, p. 261). This perilous release of mediators causes symptoms consistent with Virchow's triad resulting in changes in coagulability, endothelial cell injury, and abnormal blood flow (Remick, 2007, p. 1436). An individual could have increased coagulation and fibrinolysis resulting in endothelial dysfunction, microvascular thrombi, and impaired tissue perfusion. These findings accompanied with vasodilation and hypotension due to vast amounts of nitric oxide production, may lead to additional tissue damage and in the end contribute to multisystem organ failure resulting in death (Cawcutt & Peters, 2014, p. 1573).



These are some statistics and interesting facts regarding sepsis.

Implications for Nursing Care

As mentioned earlier, understanding the pathophysiology of sepsis can really provide significant insight into early recognition of sepsis for HCP's, including nurses. As a profession, nurses are at the bedside with their patients more often than the physician or the nurse practitioner, so it would not be uncommon for the nurse to be the first individual to recognize a patient who is displaying SIRS or sepsis criteria. Therefore, it is the responsibility of the nurse, especially in the ICU, to have a strong knowledge base about sepsis. This understanding will help nurses recognize symptoms of sepsis as well as signs of a worsening condition of an already diagnosed septic patient. The nurse could then provide this assessment to the unit practitioner, so the patient can be treated quickly and appropriately.

Most septic patients are treated in the ICU and taken care of by ICU nurses. It is extremely necessary for nurses in this profession to be able to multi-task, delegate, and have excellent time management skills so these septic patients are treated quickly and can avoid further progression to a worsening condition. Nurses will be responsible for providing fluid resuscitation, antimicrobial therapy, administration of vasopressors, inotropic agents, and corticosteroids, as well as blood products. In addition, if a patient is ventilated the nurse will be responsible for making sure the patient is comfortable while intubated with sedatives and paralytics. Also, sometimes patients can get fluid overloaded from the overall fluid resuscitation and may require continuous venovenous hemofiltration (CVVH), which is another responsibility of the ICU nurse. These are only a few of the many skills a nurse is required to have in order to ensure the best possible care is delivered to their septic patient.

Conclusion

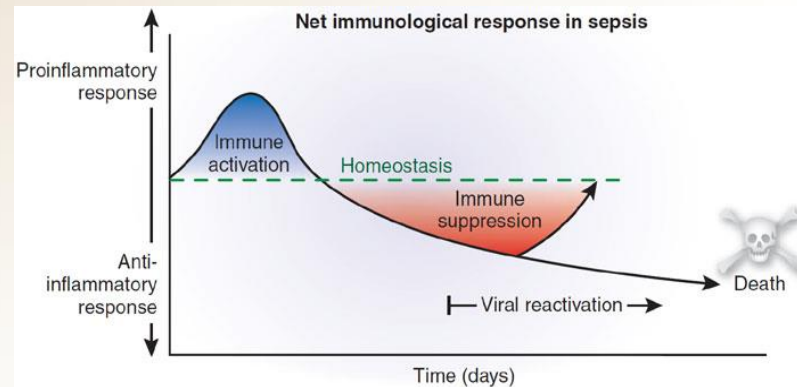
Severe sepsis and septic shock are leading causes of morbidity and mortality and it is the responsibility of HCP's to recognize and treat sepsis in an appropriate and timely manner to improve the outcome of these patients (Cawcutt & Peters, 2014, p. 1577). Although an appropriate inflammatory response to invading pathogens would avoid damage to tissues and organs it is the opposite when dealing with sepsis (Remick, 2007, p. 1436). The imbalance between pro-inflammatory and anti-inflammatory responses to invading microorganisms triggers a vast amount of devastating symptoms which can lead to inevitable multisystem organ failure and eventually death. Given the rising incidence and benefit of early treatment, it is the duty of every HCP to have a general understanding of the prevalence, clinical features, and treatment of sepsis, to provide the best possible outcome for their patient (Cawcutt & Peters, 2014, p. 1577-1578).

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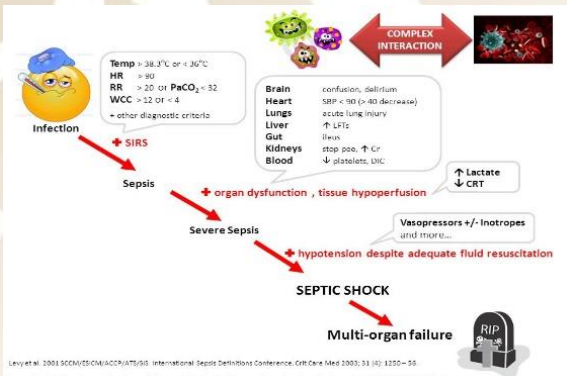
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This diagram shows the differences between proinflammatory response and anti-inflammatory response when dealing with sepsis.

Significance of Pathophysiology

Understanding the pathophysiology of sepsis will help health care professionals (HCP's) become better at detecting patients who are developing sepsis in order to treat them quickly and appropriately. Additionally, knowing the pathogenic progression of SIRS, to sepsis, to severe sepsis, then to inevitable septic shock can help HCP's predict the next stage of possible disease and hopefully prevent it. Lastly, Dellinger et al. (2012) states that early recognition of an individual with sepsis along with initial administration of the appropriate therapy have been proven to prevent and reduce morbidity and mortality (p. 583). So, with the appropriate knowledge base about the cause of infection and pathophysiology of sepsis, a HCP will be able to develop the skills to recognize symptoms earlier, initiate treatment sooner, and improve the longevity of their patients.



These are signs and symptoms related to sepsis as it progresses to septic shock and eventually death.

