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Prevalence of Sepsis in Pediatric Populations
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Introduction
Sepsis and more specifically septic shock in the pediatric population is a diagnosis that is full of complications. There are instances where a neutrophilic myeloid patient observes a better outcome than a pro-inflammatory healthy patient who is suffering from the same pathogens related sepsis. Sepsis is the 10th leading cause of death according to the Center for Disease Control and Prevention, and each year between 20,000 and 42,000 children is diagnosed with sepsis (Riley & Wheeler, 2012). Even with significant advances in medical treatment, sepsis is still associated with high mortality and mortality rates. A retrospective study of patient outcomes across 26 countries found that pediatric sepsis mortality was 25%, was seemingly unaffected by age, and had only mild variations across developed countries. Of the survivors, 20% suffer from a form of moderate functional disability (Wiley et al., 2015). Despite the amount of clinical trials and research associated with pediatric sepsis its incidence continues to increase by close to 1.5% annually (Riley & Wheeler, 2012).

Signs and Symptoms
Those within the pediatric population who possess the greatest risk of developing sepsis include patients with underlying vascular and urinary catheters, after recent surgery, and those with immunocompromise, no matter the cause. Patients with sepsis generally exhibit characteristic signs and symptoms. The hallmark signs of sepsis is either hyperthermia or hypothermia and is seen to be the onset of a viral infection. The disease process is also associated with the symptoms of tachycardia, hypoglycemia without the incidence of diabetes, lethargy, warm skin, increased cardiac output, chills, and muscle weakness. Severe sepsis or septic shock is differentiated from sepsis by the presence of hypotension, decreased cardiac output, and other complications including fever failures, acute respiratory distress syndrome, encephalopathy, renal failure, disseminated intravascular coagulopathy, and multiple organ dysfunctions syndrome (Duran-Bedolla, 2014).

Underlying Pathophysiology
Sepsis and its associated symptoms are caused by a microorganism, and the body’s dysregulation of compensatory mechanisms. There are 3 phases associated with sepsis after the microorganism has infiltrated the host body:

1. The inflammatory mediators
   • The lack of an appropriate anti-inflammatory response
   • The inflammatory macrophage due to the presence of inflammatory mediators present

2. Th17 cell dysfunction due to the presence of inflammatory mediators present

3. The compensatory mechanism due to the presence of inflammatory mediators present

This image demonstrates endothelial damage neutrophil activation, and mRNAs that activate the complement cascade which leads to the associated symptoms of sepsis and multiple organ failure.

Significance of Pathophysiology
The morbidity and mortality of sepsis is not from the disease process alone but is associated with the sequela of organ dysfunction that sepsis may cause. During septic shock there is an inadequate oxygen perfusion to cells. This hypoxia causes an increase in reactive oxygen species and reactive nitrogen species. Reactive oxygen species can break polypeptide chains and change the shape of proteins which is associated with the establishment of a hypercoagulable state. Reactive nitrogen species yield nitric oxide causing microvascular damage and vascular vasodilation which produce hypotension. Excessive amounts of nitric oxide can also cause cell apoptotic cell processes which can propagate organ dysfunction. After prolonged organ dysfunction, death may occur depending on the pressure and inflammatory response. Sepsis has the capacity to cause fever, tachycardia, and mild hypotension in some patients while other patients suffer the sequelae of irreversible organ damage or death (Duran-Bedolla, 2014).

Implications for Nursing Care
Though there has been a vast amount of advances with the medical field, sepsis is still a difficult disease to treat. It has been proven that early identification and disease specific intervention can reduce the morbidity and mortality of sepsis and even possibly prevent severe sepsis from becoming septic shock, or sepsis associated with hypotension. At the Methodist Medical Center of Illinois a sepsis initiative called “Think Sepsis” was created including sepsis specific training of those personnel present most often the first to encounter patients suffering from sepsis. This medical center also utilized a sepsis trigger tool that allowed for early recognition and its management of sepsis. At this hospital prior to the completion of the sepsis initiative, in 2009 their mortality rate for patients was 19%. In 2011, two years after the initiative was started, their mortality rate had decreased to 11% (Bustamante, 2011). The initiative of creating the awareness and symptoms of early sepsis can alert the medical team of their findings and potentially stop the progression of severe sepsis to septic shock.

Conclusion
Sepsis is a complex disease originating from a microorganism into a host’s body and the resulting improper inflammatory response and dysregulation of compensatory mechanisms. The ramifications of the body’s inappropriate response to the microorganism cellular death thus leading to organ dysfunction and even death in severe. Despite many medical advances sepsis still remains a major threat to complicated disease course and is remaining high in the pediatric population.

Additional Sources
Bustamante, D., E98.

References Cited