

Sepsis: blood and fluid resuscitation

[Science](#), [Epidemiology](#)



Sepsis; pathophysiology, etiology and treatment Abstract To define the disease known as sepsis, briefly discuss its pathophysiology, etiology, signs, symptoms, and treatments. Outline protocols for sepsis screening, early directed goal therapy, and to establish the nurse's role in the process. Sepsis is a complex disease, or response to a disease process that can lead to patient mortality rates up to 60%. Gram negative infectious organisms invade the blood stream, and activate a systemic response.

This systemic response exacerbates the problem, leading to disproportionate blood flow, alterations in tissue perfusion, and eventually multiple organ failure. Sepsis screening begins in the ER, signs and symptoms that are indicative of sepsis, or early indications of infection that can eventually lead to sepsis should be identified quickly. Since the majority of these patients are already compromised, it is imperative to have proper screening and initiate early goal directed therapy. Following standard protocols has proven to reduce mortality rates by as much as 25%. Sepsis; pathophysiology, etiology and treatment

Sepsis has been defined as a suspected or proven infection that has entered the blood stream, and has the clinical manifestations of what has been termed the systemic inflammatory response (e. g. , fever, tachycardia, hypotension, and elevated white blood cell count termed leukocytosis) (Dellacroce, 2009, p. 17). Sepsis can be a result of any infection in the body that has triggered this systemic inflammatory response. Often times especially in the elderly it might be a result of an untreated urinary tract infection, or some other unknown infection that enters into the blood stream.

When the invading organism or antigen enters the bloodstream, it releases endotoxins, a toxic substance usually associated with gram negative bacteria, such as *Escherichia coli*, *Klebsiella pneumoniae*, *Serratia*, *Enterobacter*, and *Pseudomonas*. In the patient who is ill already this invasion into the blood stream stimulates the release of too much immunomodulators, causing an exaggerated response. Vasodilation is the body's way of increasing blood flow to the attested area, thereby transporting more white blood cells, such as macrophages, to control the original infection.

However, vasodilation, without a proportionate increase in blood volume leads to hypotension, increased capillary permeability which allows fluid to leak out of the blood stream and into the surrounding tissue causing edema. Concurrently, fibrinolysis is impaired leading to a decrease in clot breakdown. This is thought to be the body's attempt to confine the antigen. However, the formation of fibrin clots leads to micro thrombi, causing hypoperfusion of tissues, tissue necrosis and eventually organ failure (Dellacroce, 2009, p. 17).

Consequently severe sepsis is evidenced by sepsis-induced organ dysfunction or tissue hypoxia, hypotension, oliguria, metabolic acidosis, thrombocytopenia, hypotension being a late sign of sepsis. Septic shock is defined as severe sepsis with hypotension, despite fluid resuscitation. Sepsis and septic shock are the most common form of vasodilatory shock, associated with the systemic response to severe infection. Sepsis and septic shock are very common in critically ill patients, elderly, and is accompanied by a high mortality rate.

In many cases as high as 30 percent of patients die within the first month of diagnosis, and 50% of patients die within 6 months (Gerber, 2010, p. 141). The growing incidence has been attributed to enhanced awareness of the diagnosis, increased number of resistant organisms, and growing number of immunocompromised patients, and the increase in the elderly population. The early goal is direct therapy interventions and better treatment methods which have resulted in a decreased mortality rate; however the number of deaths has increased, because of the increased prevalence. Porth, 2011, p. 505) The pathogenesis of sepsis involves a complex process in which the immune system releases a number of proinflammatory and anti-inflammatory mediators. In doing so, the body reacts by generating a fever, tachycardia, lactic acidosis, and ventilation-perfusion abnormalities occur. Hypotension is caused by arterial and venous dilatations, plus leakage of plasma into the interstitial spaces, abrupt changes in level of consciousness and cognition, are a result of decreased cerebral blood flow.

Regardless of the underlying cause of sepsis, fever and increased leukocytosis are present. Elevation in lactic acid levels may not always be immediate, but generally a lactic acid level that is above 3.2 would trigger the sepsis screening and cause initiation of early goal directed therapy. Our role as the nurse is to recognize the signs of sepsis, and or infection that could lead to it, and make the Doctor aware of any abnormal values or signs. Sepsis screening should be done on any patient that presents to ER with symptoms that would indicate infection, or early sepsis.

Sepsis should be ruled out by using the screening protocols, and standard blood work, including two sets of blood cultures, (should be from two

separate sites fifteen minutes apart) (Dellacroce, 2009). If the patient has passed the sepsis screening, sepsis protocols for early goal directed therapy should be initiated. The sepsis screening for a patient should take a systematic approach. Does the patient have a suspected infection as evidenced by, white blood cells (WBC) in urine, cerebral spinal fluid, or other normally sterile body fluid, cellulitis or other skin infection, new pulmonary infiltrate on chest x-ray consistent with pneumonia?

Does the patient have systemic inflammatory response syndrome (sirs) as evidenced by, WBC's greater than 12, 000 or less than 4, 000, temperature greater than 38C, heart rate greater than 90 beats per minute, respiratory rate greater than 20 breaths per minute, PaCO₂ less than 32, or on a ventilator? Does this patient have organ system failure as evidence by, respiratory on ventilator, vasopressors, and metabolic serum greater than 3. 2, urine output of less than 0. 5 ml/kg/hr or greater than 0. 5 ml/kg/hr above baseline, or platelets less than 100, 000?

Does this patient have serious condition that indicates septic shock as evidenced by, receiving vasopressors after fluid resuscitation or lactate greater than 3. 9? (EGDT, 2011) Early goal directed therapy or implementation of sepsis bundle, should be priority, after cultures and all blood work has been completed. Antibiotics should be initiated within 3 hours of admission to emergency room, with initial round of antibiotic started within one hour of diagnosis. Central line access should be established for vasopressors.

Arterial line should be established to measure central venous pressure (CVP). Fluid resuscitation to maintain CVP of greater than 8, 12-15 for ventilated
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patients (Soo Hoo, Muehlberg, Ferraro, & Jumaoas, 2009). Rapid fluid resuscitation is required with these patients it is recommended they receive up to 3 liters of fluid. Mean arterial pressure (MAP) should be maintained via vasopressors to achieve MAP above 65. One of the more recent advances in treatment of sepsis is the administration of recombinant human activated protein c (rhAPC). rhAPC is a naturally occurring anticoagulant factor that acts by inactivating coagulation factor Va and VIII. RhAPC has direct anticoagulant properties, including inhibiting the production of cytokines (Porth, 2011, p. 506). Sepsis is a complex disease that takes a multi-disciplinary team to detect and treat. It is vital for the patients that diagnosis and early treatment begun immediately. This disease process is accompanied by a high mortality rate, so vigilance on the part of the healthcare team is a must. Screening and early goal directed therapy protocols are vital tools in the treatment of septic patients.

The implementation of these tools has been shown to reduce mortality as much as 25%. The health care professional must pay attention to the signs that may be subtle, such as a slight increase in temperature; this is especially tricky in elderly patients whose baseline core temperature may be hypothermic. Nurses should watch pulse rates from baseline, urine output, any changes in mental status. References Dellacroce, H. (2009, July). Surviving sepsis: The role of the nurse. RN, 16-21. Gerber, K. (2010). Surviving sepsis: a trust-wide approach.

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