

Sepsis As A Global Life-Threatening Healthcare Problem

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Abstract—Sepsis is a life-threatening condition that arises when the body's response to infection causes injury to its own tissues and organs. Common signs and symptoms include fever, increased heart rate, increased breathing rate, and confusion. There also may be symptoms related to a specific infection, such as a cough with pneumonia, or painful urination with a kidney infection. In the very young, old, and people with a weakened immune system, there may be no symptoms of a specific infection and the body temperature may be low or normal, rather than high. Severe sepsis is sepsis causing poor organ function or insufficient blood flow. Insufficient blood flow may be evident by low blood pressure, high blood lactate, or low urine output. Septic shock is associated with low blood pressure due to sepsis that does not improve after reasonable amounts of intravenous fluids are given. Nowadays sepsis is a global concern which creates worldwide health problems.

This review article focuses on the causes of sepsis, its clinical aspects, complications and management.

Keywords—Sepsis, Causes, Symptoms, Complications, Treatment.

Introduction:

Colloquially known as “blood poisoning”, sepsis is a life-threatening medical condition that arises when the body's attempt to fight an infection results in the immune system damaging tissues and organs. This chaotic response, designed to protect us, causes widespread inflammation, leaky blood vessels, and abnormal blood clotting resulting in organ damage. It is more common than heart attack, and claims more lives than any cancer, yet even in the most developed countries fewer than half of the adult population have heard of it.

In the least developed countries, sepsis remains a leading cause of death.

In severe cases, blood pressure drops, multiple organ failures ensue, and the patient can die rapidly from septic shock. Patients vary in their response; the severity of their sepsis and the speed with which it progresses is affected by their genetic characteristics and the presence of coexisting illnesses, as well as the numbers and virulence of the infecting micro-organism [1]. Some patients seem not to deteriorate until late in their illness, in others sepsis progresses rapidly and can be fatal within a few hours.

What can be done about Sepsis?

Cost-effective basic interventions save lives. The best centers, mainly in industrialized

countries, have doubled patients' chances of survival, simply by recognizing the condition

and responding rapidly [2, 3]. However, only 10-30% of patients with sepsis receive excellent care [4, 5]. Saving lives depends not just on treatments specific to a particular infection, but rather a focus on early recognition and awareness of sepsis, rapid antimicrobial therapy and resuscitation, and vital organ support. In short, sepsis is a medical emergency and each hour matters. A better understanding of sepsis as the final common pathway of illness due to infection is essential to drive improvement. This applies to the medical profession, governments and the general public. Furthermore, some infections that could lead to sepsis can be prevented through vaccination for diseases like influenza, pneumococcus and meningitis and also strategies to prevent healthcare-associated infections are effective to reduce the burden of sepsis.

What causes Sepsis?

Sepsis is always triggered by an infection. Sepsis occurs as a result of infections acquired both in the community and in hospitals and other health care facilities. The majority of cases are caused by infections we all know about: pneumonia, urinary tract infections, skin infections like cellulitis and infections in the abdomen (such as appendicitis). Invasive medical procedures like the insertion of a catheter into a blood vessel can also introduce bacteria into the blood and trigger sepsis.

Normally, when we suffer a minor cut, the area around the injury swells and becomes hot and red. This is the immune system in action. To fight any infection and to form a blood clot to stop bleeding, the body must get white blood cells and platelets into the tissues surrounding the cut. The body does this through inflammation, which is managed by the immune system. The blood vessels swell to allow more blood to flow, become leaky so that the infection-fighting cells and clotting factors can get out of the blood vessels and into the tissues where they are needed, and we see the typical hot, red swelling. Sepsis is best thought of as this process in overdrive: inflammation is no longer localized to the "cut", but is now widespread affecting all of the body's organs and tissues. The body's defense and immune system go into overdrive, leading to widespread inflammation, poor perfusion, organ failure and septic shock.

Most types of microbes can cause sepsis, including bacteria, fungi, viruses and parasites such as those causing malaria. Bacteria are by far the most common culprit, but it is important to understand that viral infections with seasonal influenza viruses, the Dengue and Ebola viruses may also progress to acute organ dysfunction and result in death from multiple organ failure and septic shock [6-8]. Sepsis is the final common pathway in the vast majority of deaths from infection worldwide.

Who gets Sepsis?

Sepsis does not discriminate. It affects all age groups and is not respectful of lifestyle choices. Vulnerable groups such as new born babies, small children and the elderly are most at risk, as are those with chronic disease and weakened immune systems. It is not a disease confined to healthcare settings, though most patients with established sepsis will be cared for in hospital.

Age, sex, and race or ethnic group can all influence the incidence of severe sepsis, which is higher in infants and elderly persons than in other age groups, higher in males than in females, and higher in blacks than in whites [9]. People with chronic illnesses, such as diabetes, cancer, AIDS, kidney or liver disease, are also at increased risk, as are pregnant women and those who have experienced a severe burn or physical injury.

How many people get Sepsis?

Sepsis is a global health problem that carries a high risk of death. A recent global assessment of the mortality rate of patients with sepsis treated in an intensive care unit found that over one third of these patients died without leaving hospital [10].

Sepsis remains the primary cause of death from infection despite advances in modern medicine, such as vaccines, antibiotics and acute care. In the developing world sepsis accounts for 60-80% of lost lives per year, affecting more than 6 million newborns and children annually and over 100,000 women

contract sepsis in the course of pregnancy and childbirth [11]. In all countries where data on hospitalizations for sepsis are available the number of cases has increased steadily [12-15]. The US Center for Disease Control's National Center for Health Statistics estimates that, based upon information collected for billing purposes, the number of times people were in the hospital with sepsis increased from 621,000 in the year 2000 to 1,141,000 in 2008 [14]. The number of hospital admissions for sepsis following healthcare-associated as well as community-acquired infections increased up to three-fold over the last decade. In comparison to hospital admissions for stroke and myocardial infarction remained stable over the same period [16].

The number of deaths from sepsis in the U.S. increased from 154,159 in 2000 to 207,427 in 2007 [15] and the numbers of hospitalizations with sepsis have overtaken those for myocardial infarction [17]. In the U.S., sepsis accounts for far more deaths than the number of deaths from prostate cancer, breast cancer and AIDS combined.

The number of hospital-treated sepsis cases in resource rich countries may be up to 7-fold higher because it relies on use of administrative data to identify sepsis patients which likely underestimates the true incidence rate based on clinical assessment or chart review [18-20]. The reason for the rise in sepsis cases is likely due to a combination of factors, including poor socioeconomic conditions, increased awareness and tracking of the condition, an aging population, with more chronic diseases, an upsurge in major surgical interventions and invasive procedures, broader use of immunosuppressive and chemotherapeutic agents as well as the spread of antibiotic-resistant organisms.

What are the symptoms of Sepsis?

The diagnosis and treatment of sepsis often is delayed because early symptoms are not recognized by patients, health care workers and physicians. A common feature of patients with sepsis is that they feel sick as never before. In children, the signs and symptoms may be subtle and deterioration rapid. The most common warning signs of developing sepsis are:

- Fever, chills
- Rapid or difficult breathing
- Elevated heart rate
- New confusion, disorientation or drowsiness
- Severe muscle cramps and joint pains
- A sense of impending doom
- Skin Rash
- Poor feeding (infants and children)

The clinical manifestations of sepsis are variable, depending on the site of infection, the causative micro-organism, and the age and the underlying

health status of the patient. Other early symptoms of sepsis can include severe headache, weakness, dehydration, fatigue, diarrhea, nausea, vomiting, abdominal (stomach) pain, sore throat and unexplained bruising or bleeding. Many of the symptoms of infection and sepsis are subtle and mimic other conditions, making sepsis hard to diagnose in its early stages if physicians and health care workers are not adequately educated about sepsis.

How is Sepsis treated?

Sepsis must be treated as an emergency life threatening status.

Recent studies and quality improvement initiatives demonstrated that prompt recognition of the condition followed by the administration of intravenous fluids and antibiotics are key to survival [21-23].

The primary aims of treatment are:

- a) To treat the infection,
- b) To sustain the vital organs and prevent a drop-in blood pressure, and
- c) Implement appropriate infection control and prevention measures for communicable diseases.

The underlying infection is treated with broad-spectrum antimicrobials, most commonly broad spectrum anti-bacterial, anti-viral and anti-fungal agents. If laboratory tests can identify the infectious agent, doctors can then select medicine that specifically targets that organism. Many patients receive oxygen and intravenous fluids to maintain normal blood oxygen levels and blood pressure.

In some case, other drugs may be used to treat sepsis or to revive those who have gone into septic shock. In the developed world, about 50% of people with sepsis are treated in hospital intensive care units.

Depending on the patient's status, mechanical ventilation or kidney dialysis may be necessary. Sometimes, surgery is required to clear a local site of infection that will not respond to antimicrobials alone. Sepsis specific treatments that focus on the removal of microbial toxins from the blood stream, or are aiming to dampen the exaggerated immune response to sepsis so far have not yet been proven to be effective.

Are there any long-term effects of Sepsis?

Sepsis is a major contributor to lost lives years worldwide [24]. Many people who survive severe sepsis recovers completely and their lives return to normal. However, patients who survive to hospital discharge after sepsis remain at increased risk for death in the following months and years [25].

Those who survive may have impaired physical or neurocognitive functioning, mood disorders, and a low quality of life [26]. We do not know for certain how

many people are affected by such problems, but it is likely to be at least 20% of survivors.

There is also some evidence that an episode of severe sepsis disrupts a person's immune system, making him or her more vulnerable to future infections [27]. In children, an equal number die following discharge from hospital after sepsis, underlining the need for follow up care [28, 29].

What is the economic cost of Sepsis?

Early identification and treatment of sepsis will have tremendous economic benefits, totally apart from saving lives and reducing the negative impacts of sepsis. Treatment for sepsis often involves a prolonged stay in the intensive care unit and complex therapies, which incur high costs.

The Agency for Healthcare Research and Quality lists sepsis as the most expensive condition treated in U.S. hospitals, costing more than \$20 billion in 2011 increasing on average annually by 11.9% [30].

It has been estimated that if the U.S. as a whole achieved earlier sepsis identification and evidenced based treatment, there would be 92,000 fewer deaths annually, 1.25 million fewer hospital days annually, and reductions in hospital expenditures of over \$1.5 billion [31]. The costs related to long-term impacts of sepsis have not been quantified but are likely very substantial, including subsequent medical care: the true fiscal burden, considering delayed return to work, the need for families to adjust lifestyles to support, and rehabilitation cost is likely to be huge.

Conclusion:

Sepsis strikes an estimated 30 million people worldwide every year, many of whom needlessly die or suffer permanent health issues. Medical resources are strained by the burden of caring for patients suffering from sepsis. Education and resources are seriously needed to prevent, diagnose and treat sepsis early.

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