

**SEPSIS: PATHOGENESIS, CLINICAL FEATURES, AND PREVENTION STRATEGIES (A40–A41)****Mashrabova Bibi Fotima Muhammad qizi**Kokand University, Andijan Branch, Faculty of Medicine,
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Department of “Pediatrics”E-mail: skkobiljonova@gmail.com<https://doi.org/10.5281/zenodo.17163430>**Abstract**

Sepsis is a severe systemic inflammatory syndrome that develops in response to microorganisms or their toxins entering the body, and it is often life-threatening. According to the International Classification of Diseases (ICD-10), sepsis is classified under codes A40–A41. The etiological factors of the disease include streptococci, staphylococci, enterobacteria, and other Gram-positive and Gram-negative microorganisms. Clinically, sepsis manifests with sudden changes in body temperature, chills, tachycardia, decreased blood pressure, intoxication, and multiple organ dysfunction. Sepsis is considered a serious pathology that requires early diagnosis and comprehensive treatment.

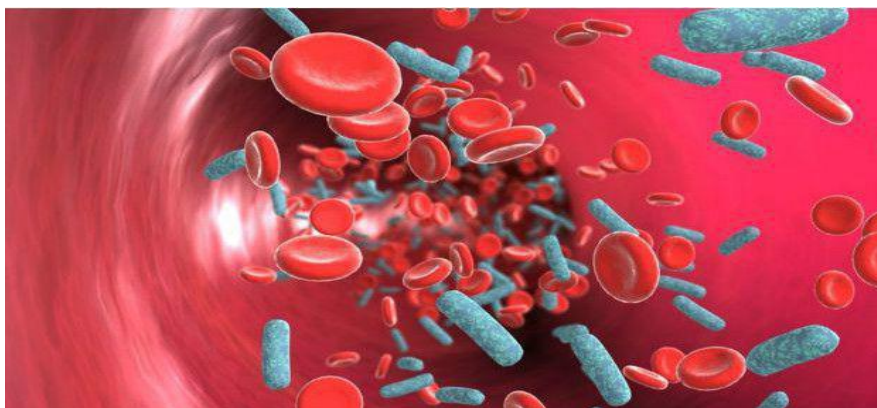
Keywords:

Sepsis, infection, A40–A41, streptococcal sepsis, staphylococcal sepsis, Gram-positive bacteria, Gram-negative bacteria, intoxication, multiple organ failure, clinical signs, diagnosis, treatment.

Introduction

Sepsis (from the Greek: *sepsis* — decay, putrefaction) is a generalized infectious disease that occurs when pyogenic microorganisms spread from a local site of infection into the bloodstream and lymphatic system, subsequently disseminating throughout the patient's tissues and organs. Infectious wounds and various purulent diseases (such as carbuncles, abscesses, and phlegmon) may serve as sources of sepsis. Omphalitis (infection of the umbilical stump) can cause sepsis in newborns, while postpartum sepsis may arise from purulent infections of the uterine cavity. Typically, the main causative agents are *Staphylococcus*, *Streptococcus*, and less frequently, *Pneumococcus*, *Gonococcus*, *Escherichia coli*, and other microorganisms.

The development of sepsis is primarily associated with two factors: first, the high virulence (pathogenicity) of the pyogenic microorganisms, and second, the weakening of the patient's immune defenses due to conditions such as malnutrition, vitamin deficiencies, or concomitant illnesses.



In the most severe forms of sepsis, microorganisms multiply directly in the bloodstream, releasing toxic byproducts that damage red blood cells (erythrocytes) and poison the body. In such cases, body temperature may rise to 39–40 °C, accompanied by chills and profuse sweating. At times, the skin acquires a yellowish tint, and rashes may appear. In relatively milder forms, microorganisms do not multiply in the bloodstream but instead disseminate through circulation to various organs and tissues, forming multiple purulent foci. These cases often follow a prolonged course, worsening when abscesses are forming, and temporarily improving after spontaneous rupture or surgical intervention.

Sepsis can only be treated in a hospital setting. Prevention of sepsis requires timely medical consultation for any purulent process, such as wound infections, abscesses, or phlegmon. In daily life, it is important to prevent injuries and to treat even minor wounds—especially open lesions—without delay. For newborns, strict adherence to aseptic principles by the caregiver is essential.



Causes

Sepsis most commonly develops when cocci (e.g., streptococci, staphylococci, pneumococci) or *Escherichia coli* enter the body. The main risk factors that predispose to sepsis include:

- Presence of chronic diseases (e.g., hematologic disorders, oncological diseases, HIV infection, congenital immunodeficiencies);
- Use of immunosuppressive drugs or cytostatics;
- History of radiotherapy;
- Complications arising from trauma or burns.

Complications of Sepsis

Septicemia and sepsis are progressive conditions that can be effectively treated with antibiotics and intravenous fluid therapy. However, untreated sepsis may lead to various complications, such as:

- **Circulatory disorders:** Reduced blood flow affecting the function of vital organs.
- **Organ dysfunction:** Increased vascular permeability and impaired perfusion during sepsis raise the risk of clot formation, which can lead to multi-organ failure.
- **Septic shock:** Uncontrolled sepsis may result in septic shock, characterized by dangerously low blood pressure. Reduced blood flow and hypotension cause severe tissue and organ damage.
- **Systemic inflammation:** An excessively aggressive immune response to bacteria can trigger widespread inflammation, causing organ injury. This is especially pronounced in patients with chronic diseases, whose immunity is already weakened.
- **Acute respiratory distress syndrome (ARDS):** A severe manifestation of bloodstream infection, in which oxygen delivery to the lungs and brain is compromised, potentially leading to neurological symptoms.
- **Thrombosis:** Sepsis can cause blood clots in different parts of the body, obstructing blood supply to tissues. Prolonged ischemia can result in irreversible damage, organ necrosis, or limb amputation.

Post-Sepsis Syndrome

Even after successful treatment, patients may experience post-sepsis symptoms for months. These may include:

- Cognitive decline,
- Chronic fatigue,
- Insomnia.

Clinical Signs of Sepsis

Typical symptoms of blood infection include:

- Chills, skin rash, hypotension, mottled skin, tachycardia, subconjunctival hemorrhage, fever, excessive sweating, and dyspnea.

Diagnosis

Sepsis is a severe infectious-inflammatory syndrome caused by an excessive systemic response to infection. Early detection is crucial, as delayed diagnosis significantly increases mortality.

1. Clinical criteria:

- General condition: severe, altered consciousness, adynamia, delirium.
- Fever ($>38^{\circ}\text{C}$) or hypothermia ($<36^{\circ}\text{C}$).
- Tachycardia ($>90/\text{min}$).
- Tachypnea ($>20/\text{min}$) or $\text{PaCO}_2 <32 \text{ mmHg}$.
- Hypotension: systolic BP $<90 \text{ mmHg}$ or MAP $<65 \text{ mmHg}$.
- Skin changes: pallor, mottling, cyanosis, peripheral coldness.

2. Laboratory criteria:

- Leukocytosis ($>12 \times 10^9/L$) or leukopenia ($<4 \times 10^9/L$).
- Thrombocytopenia ($<100 \times 10^9/L$).
- Elevated CRP and procalcitonin.
- Lactate >2 mmol/L (sign of hypoperfusion).
- Metabolic acidosis on ABG analysis.
- Blood cultures – essential for pathogen identification.

3. Diagnostic scoring systems:

- **SIRS criteria:** ≥ 2 findings in the context of infection indicate high likelihood of sepsis.

- **SOFA and qSOFA scores:**

qSOFA: respiratory rate $\geq 22/\text{min}$, systolic BP ≤ 100 mmHg, altered mental status (≥ 1 point). ≥ 2 points = high risk of sepsis.

4. Imaging studies:

- Chest X-ray / CT: to identify pneumonia, abscess, peritonitis.
- Ultrasound: to detect abdominal or urinary tract infections.
- Echocardiography: to assess cardiac function and detect endocarditis.

5. Stages following sepsis:

- **Septic shock:** persistent hypotension despite vasopressor therapy (e.g., norepinephrine) and lactate >2 mmol/L.

Treatment of Sepsis

Management of sepsis includes the following essential measures:

- Antibacterial therapy,
- Detoxification therapy (intravenous fluid resuscitation),
- Anti-inflammatory medications,
- Administration of donor plasma and platelet transfusions, when indicated.

Risks of Untreated Sepsis

If left untreated, sepsis can lead to:

- Pulmonary and cerebral abscesses, gangrene, purulent pleuritis, cystitis, purulent meningitis, heart failure, septic shock, and internal bleeding.
- Sepsis is a progressive condition with a high risk of death, and spontaneous recovery is extremely rare.

Preventive Measures

1. Control of infection sources:

- Reduce nosocomial infections by strict adherence to asepsis and antisepsis.
- Minimize unnecessary invasive procedures (catheters, intubation, surgery).
- Ensure sterilization of blood products, urine collection systems, and surgical instruments.

2. Hygiene and asepsis:

- Hand hygiene is the most important preventive measure; medical staff must use antiseptics.
- Use sterile instruments and new gloves for each patient.
- Strengthen hospital infection control programs.

3. Antibiotic prophylaxis and stewardship:

- Administer prophylactic antibiotics before surgery (only when indicated).
- Implement antibiotic stewardship to avoid overuse and reduce resistance.

- Monitor hospital microflora for resistant strains.

4. **Immunoprophylaxis:**

○ Vaccination against pneumococcal, meningococcal, influenza, COVID-19, and other infections.

○ Strengthen immunity through management of chronic diseases, proper nutrition, and vitamin balance.

5. **Surgical prevention:**

○ Preoperative skin antisepsis.

○ Timely removal of necrotic tissues (abscess, gangrene).

○ Effective drainage and control of purulent processes.

6. **Protection of high-risk groups:**

○ Newborns, elderly patients, and immunocompromised individuals (e.g., cancer, transplant, diabetes).

○ Reduce invasive procedures to a minimum in these patients.

7. **Early diagnosis and monitoring:**

○ Frequent monitoring of temperature, pulse, respiration, blood pressure, and laboratory parameters.

○ Use of biomarkers such as procalcitonin and CRP for early detection.

Conclusion

Sepsis, or bloodstream infection, is characterized by an excessive immune response to pathogens, leading to systemic inflammation. It most often develops due to delayed diagnosis and treatment of infections. Diagnosis relies on thorough medical history, physical examination, and laboratory tests, including temperature, respiratory rate, heart rate, and blood cell counts.

Sepsis is a serious, life-threatening disease that should never be underestimated. Mortality ranges from 15–30% in general cases and rises to 40–60% in severe sepsis. Thus, any signs of infection such as wound infections, pneumonia, or meningitis should prompt immediate medical attention. Early treatment of infections can significantly reduce the risk of sepsis, especially in high-risk groups such as children, the elderly, and immunocompromised patients.

Preventive measures—including strict hand hygiene, adherence to aseptic and antiseptic rules, rational use of antibiotics, vaccination, and close monitoring of at-risk populations—are of great importance. Modern diagnostic tools such as qSOFA, SOFA scoring, and lactate measurement have improved the early identification of sepsis.

Overall, sepsis remains a global health challenge, and its prevention, early diagnosis, and intensive treatment are the most critical factors for saving lives.

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