

WHAT IS SEPSIS?

Sepsis is the body's overwhelming and life-threatening response to infection that can lead to tissue damage, organ failure, and death. In other words, it's your body's overactive and toxic response to an infection.

Your immune system usually works to fight any germs (bacteria, viruses, fungi, or parasites) to prevent infection. If an infection does occur, your immune system will try to fight it, although you may need help with medication such as antibiotics, antivirals, antifungals, and antiparasitics. However, for reasons researchers don't understand, sometimes the immune system stops fighting the "invaders," and begins to turn on itself. This is the start of sepsis.

Some people are at higher risk of developing sepsis because they are at higher risk of contracting an infection. These include the very young, the very old, those with chronic illnesses, and those with a weakened or impaired immune system.

Patients are diagnosed with sepsis when they develop a set of signs and symptoms related to sepsis. Sepsis is not diagnosed based on an infection itself. If you have more than one of the symptoms of sepsis, especially if there are signs of an infection or you fall into one of the higher risk groups, your doctor will likely suspect sepsis.

Sepsis progresses to severe sepsis when in addition to signs of sepsis, there are signs of organ dysfunction, such as difficulty breathing (problems with the lungs), low or no urine output (kidneys), abnormal liver tests (liver), and changes in mental status (brain). Nearly all patients with severe sepsis require treatment in an intensive care unit (ICU).

Septic shock is the most severe level and is diagnosed when your blood pressure drops to dangerous levels.

Sepsis has been named as the most expensive in-patient cost in American hospitals. One report stated that the costs were \$24 billion in 2014. But at an average of over \$18,000 per hospital stay and with over 1.5 million sepsis hospital stays per year, this actually works out to costs of \$27 billion each year.

Studies investigating survival have reported slightly different numbers, but it appears that on average, approximately 30% of patients diagnosed with severe sepsis do not survive. Up to 50% of survivors suffer from post-sepsis syndrome. Until a cure for sepsis is found, early detection and treatment is essential for survival and limiting disability for survivors.

RISK FACTORS

What are the risk factors for sepsis? The obvious risk factor is an infection. Any infection, from the tiniest source (a bug bite, a hangnail, etc.) to the more severe (pneumonia, meningitis, and more), can trigger sepsis, which can lead to severe sepsis and septic shock. The infection can be bacterial, viral, fungal, or parasitic. But some people do have a higher risk of developing infections and sepsis than others.



Those at the highest risk of developing sepsis include the very young and the very old (infants and seniors), as well as people with chronic or serious illnesses, such as diabetes and cancer, and those who have an impaired immune system.

Sepsis cannot always be prevented, but by knowing the risks, you help reduce your chances of developing sepsis. You can also say the words “I’m concerned about sepsis because I have....” to healthcare professionals. Saying these words can make the difference between quick identification and waiting.

PREVENTION

Sepsis can be caused by any type of infection: bacterial, viral, fungal, or even parasitic. Sepsis prevention is only possible by preventing infections with good and consistent hygiene and avoiding people with infections. Other infections can be prevented through the use of vaccinations.

Vaccinations for infection prevention

Viral infections, such as influenza (the flu) and chicken pox, are caused by viruses. Viruses are



microscopic organisms that must live inside a living host, such as humans. Although each virus is different, viruses generally don’t survive for long outside the host. such as humans.

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Usually when you have a viral illness, your body produces antibodies that keep you from getting the illness again – they make you immune.

Vaccines have been developed for many prevention of many viruses, such as chicken pox (varicella), tetanus, and polio. These vaccines, sometimes called immunizations, trick your body into thinking that it has been infected with the virus – and then makes you immune to actually getting the illness.

Caring for wounds

Every cut, scrape, or break in the skin – including surgical incisions – can allow bacteria to enter your body that could cause an infection. For this reason, it's infection prevention begins with ensuring that all wounds be cleaned as quickly as possible and be kept clean as they heal. They should also be monitored for signs of an infection.

Cleaning open wounds:

- Always wash your hands before touching an open wound. If possible, wear clean disposable gloves.
- If the wound is deep, gaping, or has jagged edges and can't be closed easily, it may need stitches. See your healthcare provider as soon as possible



- If the wound does not appear to need stitches, rinse it and the surrounding area with clean (not soapy) water. Gently running water over the wound can help remove any dirt or debris that may be inside. If you believe that there is still debris in the wound, this should be checked by a healthcare provider.
- If desired, apply an antibiotic cream or ointment.
- Cover the wound to protect it from dirt and from rubbing against clothing.
- Watch for signs of infection: redness around the wound, skin around the wound warm to touch, increased pain, and/or discharge from the wound. Consult your physician or nurse practitioner if you suspect you may have an infection.

Blisters: If you have a blister, do not pop it or break it. The blister is a protective barrier and breaking it introduces an opening in your skin. If the blister does break, treat it like an open wound, and keep the area clean and monitor for signs of infection.

Treating infections

Bacterial infections

Bacteria can cause infections in many parts of the body, such as a cut or bug bite on your arm, your kidneys or bladder, even your lungs (pneumonia). If you have been diagnosed with a bacterial infection, you will likely be prescribed antibiotics for treatment. Antibiotics are medications that kill bacteria or stop them from reproducing.

Some antibiotics work against several types of bacteria, while others are for specific bacteria only. Partly because of overuse and misuse of these medications, some bacteria are becoming resistant to certain antibiotics. This is making it harder to treat infections. For this reason, it is essential that people take antibiotics only when necessary and exactly as prescribed.

What to do when you are prescribed antibiotics

- Follow the instructions regarding how the medication should be taken – with or without food, before or after meals.
- Take it on time (example: once a day, every six hours)
- Finish the full course (7 days, 10 days, etc.), even if you feel better earlier. The symptoms will disappear before the bacteria have been completely eliminated.
- Store the antibiotics as directed to preserve its strength.

What not to do with antibiotics

- Do not ask your physician or nurse practitioner for a prescription for an infection not caused by bacteria. Antibiotics do not work on viruses, such as colds or the flu, or other illnesses not caused by bacteria.
- Do not take someone else's antibiotics, even if you do have a bacterial infection. It may not be the correct type or dosage, or it may have expired. It can be dangerous to take expired antibiotics.
- Antibiotics are not usually taken for infection prevention, but there are situations where this may be necessary. If your doctor prescribes antibiotics for prevention, follow the instructions carefully.

Viral infections

Most viral infections run their course without treatment, but some viral infections may be treated with anti-viral medications. If you are ill and don't seem to be getting better, are getting worse, or are developing new symptoms, are having difficulty breathing, or you are concerned, please consult your healthcare professional. Sometimes medications may be prescribed for the symptoms caused by the virus.

Fungal and parasitic infections

Infections caused by fungi or parasites must be treated with specific medications that will eliminate the cause.

Important Infection Prevention Tool: Hand washing

Washing our hands is a simple task that we all do every day, several times a day. However for hand washing to be effective, it needs to be done properly and possibly more frequently than

many people do already. Generally, to wash your hands well, you simply need to use running water (to help wash the debris from your hands), lather your hands well (making sure to rub between each finger and under your nails), and dry your hands thoroughly with a clean towel. It is best if you remove your rings before washing your hands.

If you are using a hand sanitizer (waterless cleanser), use the same motions of rubbing your hands together, in between your fingers and remembering the tops of your hands and your thumbs. Your hands should be dry before touching anything.



If you're wondering whether to use a waterless cleanser or soap and water, the general belief is that soap and water are best for hands that are visibly dirty or after activities, such as toileting. Hand sanitizers are good for when hands are not visibly dirty, but you know they need to be cleaned.

Teaching children to wash their hands.

Children have many things they want to do and washing their hands may not be something they see as important. However, they do need to learn how to wash their hands properly and when they should be washed.



Obviously, children should wash their hands when they are dirty, but here is a list of other times when washing their hands is a must:

- Before eating or handling food
- After using the bathroom
- After blowing their nose or coughing
- After touching pets or other animals
- After being outside the home, such as playing outside, going to school, or shopping

For people caring for or living with someone who is immunocompromised.

Someone who is immunocompromised has a weakened immune system, which makes it easier for them to develop infections and they have a harder time fighting them. When caring for or coming in contact with someone who is immunocompromised, it's important to reduce the infection risk as much as possible, so the routine for washing your hands is stricter. While it may take a little longer to go through the steps, they are important in limiting the chances of transferring an infection to someone who may have a hard time fighting it.

1. Remove rings and watches so you can clean the areas where they rest against your skin.
2. Wet your hands with warm running water.
3. Using soap, preferably liquid, rub your hands together to make a lather. Make sure that your fingertips rub into the areas between the fingers (webs) of the opposite hand.
4. With each hand, wash the top of your other hand, not just the inside (palms). Don't forget the thumbs, which are often neglected. Clean under your nails and let the water run under them as well.
5. Go up to your wrists when washing.
6. Hand washing should take at least 10 to 15 seconds. This is about how long it takes to sing "Happy Birthday," twice quickly or once slowly.
7. Rinse your hands well and then dry with a clean towel. Pat them gently rather than rubbing vigorously, to protect your skin from becoming irritated.
8. Use this towel to turn off the tap, to prevent re-contaminating your hands.

Not all infections can be prevented and as a result, not all cases of sepsis can be prevented. However, by following these basic rules, you can decrease your risk of becoming ill.

SYMPTOMS OF SEPSIS

When it comes to sepsis, remember **IT'S ABOUT TIME™**. Watch for:

T	I	M	E ™
TEMPERATURE higher or lower than normal	INFECTION may have signs and symptoms of an infection	MENTAL DECLINE confused, sleepy, difficult to rouse	EXTREMELY ILL "I feel like I might die," severe pain or discomfort

Watch for a combination of these symptoms. If you suspect sepsis, see a doctor urgently, CALL 911 or go to a hospital and say, "I AM CONCERNED ABOUT SEPSIS."

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It's important to look for a combination of the warning signs of sepsis. Spotting these symptoms early could prevent the body from entering septic shock, and could save a life.

T – Temperature higher or lower.

Your body's temperature should stay fairly constant, around 98.6 degrees Fahrenheit (37 degrees Celsius), moving up or down a bit depending on your activity, the environment, and time of day. A temperature of 100 degrees Fahrenheit (37.7 degrees Celsius) is considered to be hyperthermia, a fever. When you have an infection, your body's temperature usually rises as it tries to fight off the bug causing the infection. Interestingly, some people see their body temperature go down (hypothermia) instead of up. This is why any change, high or low, can be a sign of sepsis.

I – Infection – may have signs and symptoms of an infection.

If you have a local infection, like a urinary tract infection, pneumonia, or an infected cut, the signs and symptoms are localized according to the area affected (needing to urinate or burning on urination for a UTI, coughing and chest pain for pneumonia, redness and pus for an infected cut, for example). If the infection has spread or you have a generalized infection, you may develop other signs and symptoms, such as fever, fatigue, pain, etc.

Sometimes however, you may have an infection and not know it, and not have any symptoms. Keep this in mind especially if you have recently had surgery or an invasive medical procedure, a break in your skin, or you have been exposed to someone who is ill.

M – Mental decline – confused, sleepy, difficult to rouse.

Sepsis can affect your mental status. Some people, especially the elderly, may not show typical signs of infection. Instead, they may show a sudden change in mental status, becoming confused, or a worsening of dementia and confusion. Sleepiness, often severe, is also a common complaint.

E – Extremely ill – “I feel like I might die,” severe pain or discomfort.

Many sepsis survivors have said that when they were ill, it was the worst they ever felt. It was the worst sore throat, worst abdominal pain, or they felt that they were going to die.

Children developing sepsis may exhibit different symptoms, as seen below.

Any Child Who:


1. Feels abnormally cold to touch
2. Looks mottled, bluish, or has very pale skin
3. Has a rash that does not fade when you press it
4. Is breathing very fast
5. Has a convulsion
6. Is very lethargic or difficult to wake up


A Child Under 5 Who:

1. Is not eating
2. Is vomiting repeatedly
3. Has not urinated in 12 hours

IF YOU SEE ONE OR MORE OF THESE SYMPTOMS, YOUR CHILD MAY BE CRITICALLY ILL.

SEE A DOCTOR URGENTLY OR CALL 9-1-1 AND SAY "I'M CONCERNED ABOUT SEPSIS"

 **TIME IS VERY CRITICAL**

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Healthcare professionals look for the following signs and symptoms, as well as those listed above, to determine a diagnosis. They include:

Inflammatory

- High white blood cell count
- Immature white blood cells in the circulation
- Elevated plasma C-reactive protein
- Elevated procalcitonin (PCT)

Hemodynamic

- Low blood pressure
- Low central venous or mixed venous oxygen saturation
- High cardiac index

Organ Dysfunction

- Low oxygen level
- Low urine output
- High creatinine in the blood
- Coagulation (clotting) abnormalities
- Absent bowel sounds
- Low platelets in the blood
- High bilirubin levels

Tissue Perfusion

- High lactate in the blood
- Decreased capillary filling or mottling