Sepsis Prevention Training
Siupo Becker, M.D.
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Introduce Your Faculty

Siupo Becker, M.D.
Vice President Health Care Strategies
Sr. Medical Director, National Accounts UnitedHealthcare

Objectives
At the end of this educational activity, participants should be able to:

Examine the epidemiology and etiology of sepsis.

Recognize the signs and symptoms of sepsis and characterize individuals most susceptible to sepsis.

List the risk factors for sepsis.

Discuss methods for reducing the risks associated with sepsis.
Sepsis Overview

CDC Sepsis Overview

- Sepsis is the body’s extreme response to an infection. It can be a life-threatening medical emergency.
- Sepsis happens when an ongoing infection (bacterial, viral or fungal) in an individual’s skin, lungs, urinary tract, or elsewhere—triggers a chain reaction throughout the body.
- Without timely treatment, this chain reaction can rapidly lead to tissue damage, organ failure, septic shock and death.¹

While less common, even healthy infants, children, and young adults can develop sepsis from an infection, but the following members are at risk.

- Children younger than one year old
- Adults 65 years and older
- People with weakened immune systems (for example, due to AIDS or cancer)
- People who take drugs that weaken the immune system (like corticosteroids or chemotherapy)
- People with chronic medical conditions, such as diabetes, lung disease, cancer, and kidney disease
- People recently admitted to a hospital, nursing home, or other healthcare facility²

A CDC evaluation found more than 90% of adults and 70% of children who developed sepsis had a health condition that may have put them at risk.³
Significance of Sepsis

Healthcare Cost and Utilization Project (HCUP) 2013 Data Factors

- Sepsis is the most expensive condition treated in U.S.
- Approximately $24 billion dollars annually
- 6.2 percent of all U.S. hospital costs
- Sepsis kills 270,000 people per year in the U.S or 1 person every 2 minutes

Program Sepsis Statistics

<table>
<thead>
<tr>
<th>E&amp;I - FI - 2018 Data</th>
<th>E&amp;I - AO - 2018 Data</th>
<th>M&amp;R - 2018 Data</th>
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Signs and Symptoms of Sepsis

Ensure members are aware of possible signs and symptoms of sepsis:

- Fever*
- Chills
- Shortness of breath
- Rapid breathing
- Increased heart rate
- Diarrhea
- Vomiting
- Rash
- Pain
- Disorientation
- Confusion

* Ensure the member has access to and knowledge of how to use a thermometer

Members should seek immediate medical attention if sepsis is suspected, or if they have an infection that’s not getting better, or is getting worse.

Caregivers – Recommendation is to assess member for recurrent infections and risk management
Chronic Medical Conditions

Chronic Medical Conditions - Cancer
Cancer – Sepsis Alliance (2017)

- "Having cancer and undergoing certain treatments for cancer, such as chemotherapy, can result in a weakened immune system, presenting a higher risk for developing an infection that could lead to sepsis.
- People with cancer are particularly susceptible to developing sepsis. An American study published in 2004 found that patients with cancer were much more likely to be hospitalized with severe sepsis (the stage just before septic shock) than the general population. The study also found that severe sepsis caused 8.5 percent of cancer-related deaths and cost over three billion dollars a year to fight.
- Why are people with cancer at high risk? There are several reasons why people with cancer may be at higher risk of developing sepsis. These include:
  - Frequent hospital stays, which increase the risk of contracting a hospital acquired infection.
  - Surgeries, procedures that puncture the skin, insertion of urinary catheters etc. Each time something is introduced into the body, the risk of infection goes up.
  - Depressed immune system because of treatment to fight the cancer.
  - Weakness due to malnutrition, illness or frailty from age can increase the risk of developing an infection."

Chronic Medical Conditions - Diabetes
Diabetes – Sepsis Alliance (2017)

- "People who have diabetes are also at risk of developing wounds and sores that don’t heal well. While the wounds are present, they are at high risk of developing infection. And, again because of the diabetes, the infections can get severe quickly. When infection overwhelms the body, the body can respond by developing sepsis and going into septic shock.
- Sometimes incorrectly called blood poisoning, sepsis is the body’s often deadly response to infection. Sepsis kills and disables millions and requires early suspicion and rapid treatment for survival.
- Sepsis and septic shock can result from an infection anywhere in the body, such as pneumonia, influenza or urinary tract infections. Worldwide, one-third of people who develop sepsis die. Many who do survive are left with life changing effects, such as post-traumatic stress disorder (PTSD), chronic pain and fatigue, organ dysfunction (organs don’t work properly) and/or amputations."
Chronic Medical Conditions - Kidney Disease

Kidney Disease – Sepsis Alliance (2017)

- "Organ failure is a hallmark of sepsis. As the body is overwhelmed, its organs begin to shut down, causing even more problems. The kidneys are often among the first to be affected.
- According to the National Kidney Foundation, one of the major causes of acute kidney injury (also called AKI) is sepsis and some studies have found that between 32% and 48% of acute kidney injury cases were caused by sepsis.
- There are two ways the kidneys could be affected by sepsis. The first is if the infection that caused the sepsis begins in the kidney, through a kidney infection or a bladder infection that has spread to the kidney. The second is if the cascade of events from sepsis causes the kidney damage.
- In sepsis and septic shock, blood pressure drops dangerously low, affecting how the blood flows through the body. Because the blood can't flow as quickly as it should, it can't deliver the nutrients needed by the body's tissues and organs. At the same time, the blood begins to clot within the blood vessels (called disseminated intravascular coagulation, or DIC), slowing down blood flow even more."

Chronic Medical Conditions - Autoimmune Diseases

Autoimmune Diseases – Sepsis Alliance (2017)

- "Autoimmune diseases do not cause sepsis, but people with certain types of autoimmune diseases are at higher risk of developing infections, which can trigger sepsis."
- Medications that may be used to treat some autoimmune disorders can weaken the immune system, making it easier for you to develop an infection. This includes treatments with corticosteroids (like prednisone), chemotherapy, and immunotherapy.
- These are a few of the autoimmune diseases that increase the risk of infection:
  - Diabetes (skin is fragile and slow to heal)
  - Inflammatory bowel disease such as Crohn’s disease and ulcerative colitis (perforated bowel)
  - Myasthenia gravis (may cause paralysis, choking, etc.)
  - Psoriasis (cracked skin may become infected)
  - Rheumatoid arthritis (as a result of certain types of treatment)
  - Lupus – systemic lupus erythematosus
  - Sarcoidosis"

Chronic Medical Conditions - Tobacco Use

Tobacco Use – NCBI (2008)

- "Active smokers and those exposed to secondhand smoke are at increased risk of bacterial infection. Tobacco smoke exposure increases susceptibility to respiratory tract infections, including tuberculosis and pneumonia.
- Tobacco smoke compromises the anti-bacterial function of leukocytes, including neutrophils, monocytes, T cells and B cells, providing a mechanistic explanation for increased infection risk
- Smokers are more susceptible than non-smokers to a plethora of chronic diseases and conditions that include stroke, vascular diseases, chronic obstructive pulmonary disease, multiple cancers, periodontal diseases, hypertension, impotence and osteoporosis. However, smokers are also significantly more susceptible to multiple bacterial infections than are non-smokers."
Special Populations

Special Populations - Joint Replacement Recipients

Sepsis and Joint Replacement – Sepsis Alliance (2018)

- Joint replacements (arthroplasties) for the knee, hip, shoulder, and other joints are now common surgeries and their successful outcomes can change lives.
- Most people who undergo joint replacements heal well, without any complications. However, any type of surgery does increase your risk of developing an infection, which can in turn cause sepsis.
- Joint replacements are major surgeries however, with the risks that come with surgery. One of those risks is infection in the surgical wound or the joint itself. According to the American Academy of Orthopaedic Surgeons, about one patient out of every 100 who undergo a hip or knee replacement develops an infection. Regardless of where the infection is, it could lead to sepsis.
- Surgery is performed under sterile conditions. All objects introduced or implanted in the body are sterilized to minimize the risk of infection. However, there is always a small chance that bacteria can still appear on the implant or hardware and cause a bacterial infection. And since the bacteria are inside the implant instead of exposed directly to body tissue, it can be more difficult for your immune system to detect and fight the bacteria.

Special Populations - Aging

Sepsis and Aging – Sepsis Alliance (2016)

- "Sepsis can and does affect people of all ages. The very young and those who already have a chronic health problem or a compromised immune system are at higher risk of developing sepsis. But people over 65 years old, particularly those who have health issues, are even more susceptible to sepsis than any other group.
- According to a study published in 2016, while people aged 65 years and older make up about 12% of the American population, they make up 65% of sepsis cases in the hospitals."
Special Populations - Aging (continued)

How does sepsis occur in older people?

- Researchers believe that as we age, our immune system becomes less effective at fighting infections. This results in older people contracting more infections and they are more severe. Every infection we get means we have a risk of developing sepsis.
- Any type of infection can cause sepsis, from the flu to an infected bug bite, but the most common infections that trigger sepsis among older people are respiratory, such as pneumonia, or genitourinary, such as a urinary tract infection (UTI). Infections can also happen through infected teeth or skin sores, either from a simple skin tear because the skin may be dry or fragile, or a pressure sore from sitting in a wheelchair or lying in bed. There are many ways an infection can take hold.
- It’s not always easy to spot infections among older people. For example, symptoms of a UTI usually include the need to urinate frequently, a sense of urgency (you need to urinate immediately), not feeling as if you’ve emptied your bladder completely, burning or pain while urinating, and cloudy and foul-smelling urine. For many seniors though, the first sign of a UTI is a change in their mental status – they become confused or disoriented. So the infection could be present for quite a while before it is noticed. The same could happen with other infections, like pneumonia.

Reducing the Risk of Sepsis

What you can do?

Sepsis Prevention – Value Pillars

<table>
<thead>
<tr>
<th>Right Provider</th>
<th>Right Treatment</th>
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<tbody>
<tr>
<td>• Timely provider consultation with infectious MD</td>
<td>• Seek immediate care with S&amp;S</td>
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<tr>
<td>• Order lab or imaging testing to pinpoint underlying infection</td>
<td>• Appropriate pharmacotherapy</td>
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<tr>
<td>• For patients with diabetes: control A1C</td>
<td>• Treat wounds immediately</td>
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<td></td>
<td>• Monitor post-surgical S&amp;S</td>
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<table>
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<tr>
<th>Right Care</th>
<th>Right Lifestyle</th>
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</thead>
<tbody>
<tr>
<td>• Ensure right diagnosis</td>
<td>• Ensure proper hand washing</td>
</tr>
<tr>
<td>• Make sure immunizations are up-to-date</td>
<td>• Manage chronic conditions</td>
</tr>
<tr>
<td>• Order lab or imaging testing to pinpoint underlying infection</td>
<td>• Avoid tobacco products</td>
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Legal approved
Reducing the Risk of Sepsis

Primary Care
- Members should discuss vaccinations with their Physician.
  - Influenza vaccine every year
  - Pneumonia vaccination(s)
  - Tetanus Vaccine
    - CDC recommends that all preteens and teens get a Tdap vaccine, preferably at 11 or 12 years old. Adults need to get a Td booster shot every 10 years to stay protected.
  - Diphtheria/Tetanus/Pertussis Vaccine
    - Td is usually given as a booster dose every 10 years but it can also be given earlier after a severe and dirty wound or burn.
  - Varicella Zoster Vaccine
    - The varicella vaccine (for chickenpox prevention) is given in two doses. A child should have the first shot at ages 12-18 months. The second shot should be given at ages 4-6 years. Older children and adults should have two shots, with four to eight weeks between the first and second shot.
- If Pediatric member, recommend working with Primary Care Physician to ensure all appropriate vaccinations based on age and risk factors.

CDC: www.cdc.gov/vaccines/index.html

Reducing the Risk of Sepsis (continued)

Wound Care
- Treat wounds immediately.
  - Gently cleaning out any dirt or debris, washing the wound with soap and water.
  - Seek medical evaluation if the wound may need closure.
- Watch for signs and symptoms of infection such as redness, warmth, pain, or drainage.

Ensure Routine Provider Follow Up
- For management of chronic conditions
  - For assessment and treatment of any infection that does not appear to be resolving or is getting worse
  - Immediately after hospitalization for infection and/or sepsis

Properly Wash Hands
- Wash hands thoroughly and frequently.
  - Wash with soap and hot water for about 20 seconds.
  - Make sure to dry hands thoroughly.

Condition Specific
- Manage chronic conditions such as lung disease, kidney disease, liver disease, or diabetes according to your physician’s guidance.
- For patients with diabetes:
  - Ensure appropriate glucose control.
  - Getting to your target HbA1c.
  - Practice good skin care, especially for your feet, to prevent wounds. Always follow up per your physician’s guidance for foot exams.

CDC: www.cdc.gov/sepsis/prevention/index.html

Case Study
Sepsis Case Study

George is a 72-year-old man with diabetes. During his checkup, George is noted to have elevated blood sugar consistently over 200 for the past month. His HgbA1C is elevated at 9.2 and his blood pressure is within normal range. George’s only complaint is that his feet have been numb for the past several months.

One month later, George has a cut on his foot that might be infected. He calls his healthcare provider, who tells him how to take care of the cut and the signs of infection. Two days later, his foot is worse and he develops a fever, has redness around the cut and his foot is swollen. The next day the redness and swelling spread up his leg and George is lethargic. He seeks medical attention immediately by going to the ED.

At the hospital, a healthcare provider recognizes the signs and symptoms of sepsis. The provider immediately orders tests to determine the source of infection and starts appropriate treatment, including antibiotics.

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Q #1. What are the signs and symptoms that indicate George may have sepsis?
    Answer: lethargy, spreading of erythema, fever, edema

Q #2. What could predispose George to the development of sepsis?
    Answer: Diabetes, peripheral neuropathy

Q #3. Was the ED the appropriate site of care at the time his family brought him in for evaluation?
    Answer Yes
Program Sepsis Statistics

<table>
<thead>
<tr>
<th>E&amp;I - FI - 2018 Data</th>
<th>% of Members with Depth of Care</th>
<th>E&amp;I - ASO - 2018 Data</th>
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