



SNS COLLEGE OF ALLIED HEALTH SCIENCES

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DEPARTMENT OF CARDIO PULMONARY PERFUSION CARE
TECHNOLOGY

COURSE NAME : CLINICAL MICROBIOLOGY

TOPIC : BLOOD STREAM INFECTIONS



BLOOD STREAM INFECTIONS



- Also known as a bacterimia, blood poisoning or septicaemia, is an infection caused by bacteria entering the bloodstream.
- It occurs when a bacterial infection somewhere in the body, such as in the lungs, intestines, urine or skin, enters the bloodstream.
- There are different types of microbial infections that are carried in the blood causing blood infections.



- Blood stream infections (BSI) refers to the presence of organisms in blood which are threat to every organ in the body.
- Causes shock, multiple organ failure and DIC (Disseminated Intravascular Coagulation).
- The presence of bacteria in blood is called Bacteremia.
- The bacteria circulate and actively multiply in the blood stream is called Septicemia.
- The presence of virus in blood is called Viremia.
- The presence of parasite in blood is called Parasitemia,
- The presence of fungi in blood is called Fungemia.



- The most common type of blood infection is known as sepsis, “a serious complication of septicemia.
- Sepsis is when inflammation throughout the body occurs, the body's reaction to the infection, which can cause organ damage and even death.
- This inflammation can cause blood clots and block oxygen from reaching vital organs, resulting in organ failure.
- Septicemia is an infection that occurs when bacteria enter the bloodstream and spread.
- Blood infections due to microorganisms could lead to a condition called sepsis and are life-threatening.
- Sepsis is a dangerous condition that could result from infection in any body part that spreads through blood and affects the whole body.



TYPES OF BLOOD STREAM INFECTIONS



1. Intravascular:

- Those that originate within the cardiovascular system. Infection of a part of blood stream
- A- Endocarditis.
- B- Mycotic aneurysm
- C- Suppurative thrombophlebitis.
- D- Intravenous catheter-associated bacteremia.



2. Extravascular

- Those that result from bacteria entering the blood circulation through the lymphatic system from another site of infection.
- Infection of the complete blood stream – Sepsis
- The common portals of entry for bacteremia are:
 - 1- The genitourinary tract (25%).
 - 2- Respiratory tract (20%).
 - 3- Abscesses (10%).
 - 4. Surgical wound infections (5%).
 - 5. Ovary tract (5%).
 - 6- Miscellaneous sites (10%), & uncertain sites (25%).



TYPES OF BLOOD INFECTIONS



- There are three types of blood infections caused by microorganisms namely bacteria, viruses, and fungi.
- **1. Bacteremia**
- Bacteremia is a term indicating the presence of bacteria in the bloodstream.
- It may enter through minor cuts and wounds, during hospitalization, or during any medical procedure or surgery.



- **Some of the bacterial species that cause bacteremia are:**
- Staphylococcus aureus, including MRSA
- Escherichia coli (E. coli)
- Pneumococcal bacteria
- Group A Streptococcus
- Salmonella species
- Pseudomonas aeruginosa



Common causes of bacteremia

- Bleeding gums
- Injury and burns
- Surgery
- Using catheter and breathing tubes
- Weak immune system during chronic illness



Signs and symptoms

- Bacterial blood infection
- High fever
- High pulse and respiratory rate
- Leaking wound
- Painful or swollen skin
- Low blood pressure
- Confusion
- Nausea, vomiting, diarrhea



2. Viremia

- While blood infections and sepsis are more common among bacterial infections, viral infections such as COVID-19 and influenza also affect blood and other organs.
- Viremia is the term used for indicating the presence of a virus in the bloodstream.

Viremia is most likely to affect people belonging to the following categories:

- Unprotected sexual contact with the infected person
- Sharing needles with an infected person
- Insect bite
- Wounds and cuts
- Infected mother to baby through breastfeeding



Common viral infections that lead to viremia

- HIV
- Dengue
- Rubella
- Measles
- Cytomegalovirus
- Hepatitis B
- Polio
- Chickenpox
- Yellow fever

Signs and symptoms

- Fever
- Headache
- Body pain
- Chills
- Rashes
- Diarrhea
- Tiredness



3. Fungemia



- Fungemia refers to the presence of fungus in the blood.
- When a fungus enters the bloodstream and affects the organs, it is referred to as an invasive fungal disease.
- It could be life-threatening, if not treated immediately.
- They enter our body through breathing.



High risk of getting blood infections due to fungus



- Chemotherapy
- Weak immune system
- Medications and steroids which suppress our immune system
- Long term Hospitalisation
- Surgery
- Very low birth weight in infants
- Central venous catheterisation



Some of the common fungal species that cause severe illnesses are:

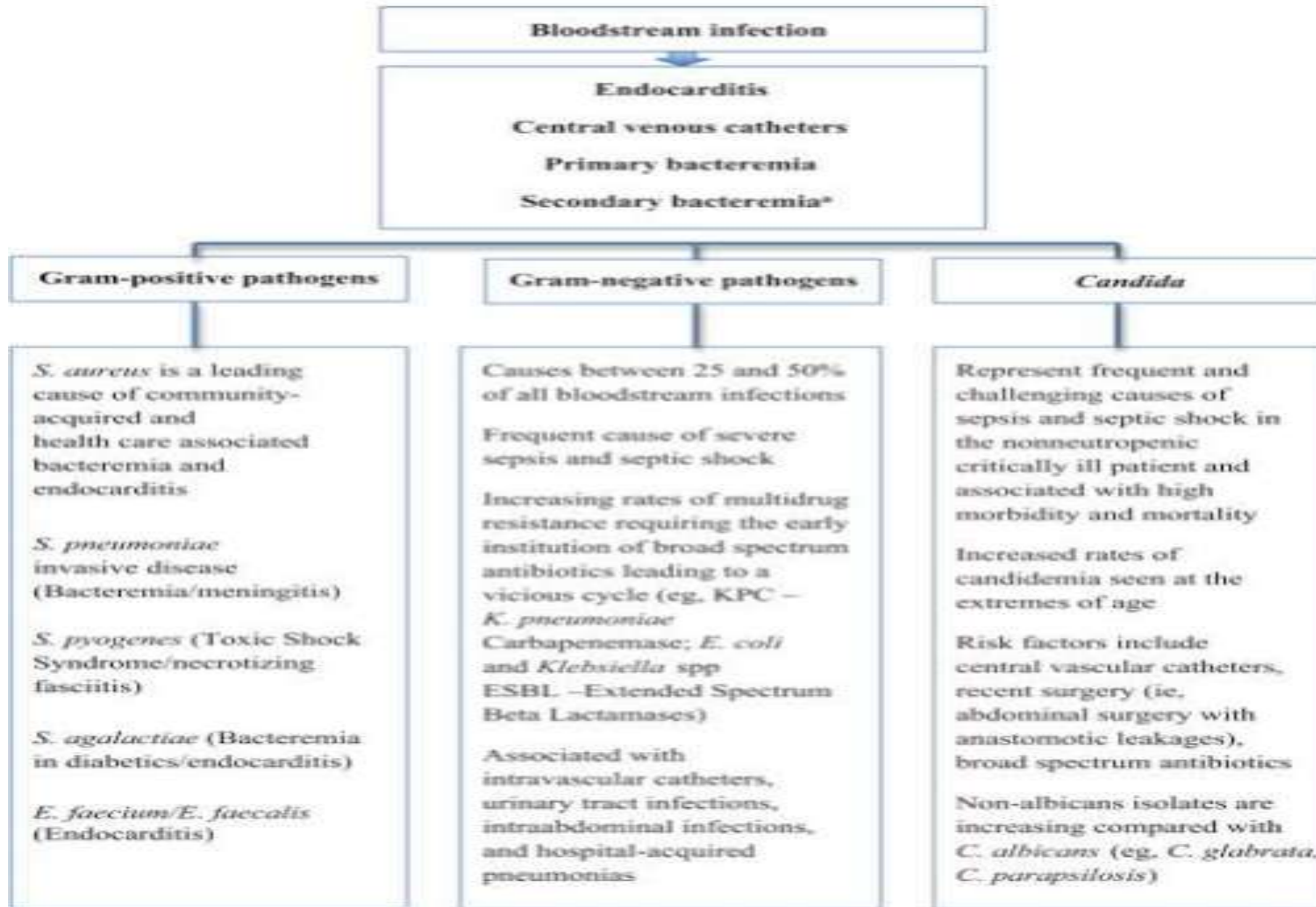
- Candida species
- Histoplasma
- Aspergillus
- Candida is a fungus responsible for a majority of fungal infections.
- The presence of candida in the bloodstream is known as [candidemia](#).
- When the candida infection spreads from your blood to other parts of your body like eyes, kidneys, liver and brain, it is known as Invasive Candidemia.



Fungal blood infection signs and symptoms



- Fever, chills
- Skin rash
- Weakness and tiredness
- Low blood pressure
- Muscle pain
- Changes in vision and eye infections
- Headaches
- Nerve problems
- Abdominal pain



*Primary bacteremia (primary source none identified). Secondary bacteremia implies spillage of viable bacteria into the bloodstream from a focal infection such as a urinary tract infection, pneumonia, or abscess.



LABORATORY DIAGNOSIS



Specimen collection:

- The blood should be collected before antimicrobial therapy.
- The skin is wiped with 70% isopropyl alcohol.
- Using sterile disposable syringe the blood is collected aseptically by venipuncture.
- The blood volume is around 10-20 ml for adults and 1- 5 ml for infants.
- The collected blood transported to the laboratory in anticoagulant containing tube.
- Heparin, EDTA are not used, because it inhibits the growth of organisms.
- Hence, Sodium polyanethol sulphonate (SPS) acts as coagulant for blood culture.
- Then it should be grown in Trypticase Soy broth and Brain Heart Infusion broth.



Diagnosis



- Bacteria in your [blood](#) or other body fluids
- Signs of infection on an X-ray, [CT scan](#), or [ultrasound](#)
- A high or low [white blood cell count](#)
- A low number of platelets in your blood
- [Low blood pressure](#)
- Too much acid in your blood (acidosis)
- A lack of oxygen in your blood
- Problems with how your blood clots
- Uneven levels of electrolytes
- [Kidney](#) or [liver problems](#)



TREATMENT



- [Antibiotics](#) are the standard treatment for bacterial infections and the duration of the treatment will be a minimum of two weeks.
- The antibiotics will be given as an infusion through veins which enter the bloodstream directly to balance the electrolytes and to stabilise the condition.
- Broad-spectrum antibiotics may fight infections caused by bacteria.
- Prescribe vasopressors (which make your blood vessels narrow) to improve blood pressure.
- Corticosteroids to fight inflammation or insulin to keep control of your blood sugar.



- In most infections, the first step to treat the symptoms is by using pain relievers and fever-reducing medications, removing nasal congestion and taking sufficient rest until the symptoms subside.
- For viruses such as influenza and chickenpox, the antiviral medications speed up the healing process if given on time.
- Treatment for candidemia can be challenging especially if it has been spread to other organs.
- First step is to identify the source of the infection followed by treatment with antifungal medication.
- Some of the commonly preferred [antifungal drugs](#) include fluconazole, caspofungin, micafungin, amphotericin B and voriconazole.



PREVENTION



- Maintain proper hygiene by washing hands regularly.
- Keep your blood sugar levels under control.
- Keep away from infected patients
- Get vaccinated if possible.
- Cover your broken or injured skin with a bandage until it heals completely.
- Do not share your personal items like shaving razors, toothbrushes and towels with others.
- Take hot showers and clean your body with soap after any physical activity.
- Wear loose-fitting, breathable clothes.



Assessment



1. What is BSI and explain its types?
2. List out the bacterial species that causing bacteremia?
3. Common viral infections that causing viremia?
4. Risk factors of getting BSI due to fungus?
5. Name any drugs for the treatment of BSI?



THANK YOU