MICRO BIOLOGY
UNIT # IV

CLINICAL & SURGICAL ASEPSIS

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Sr. Nursing Lecture PSNC Swat.

SIX STEPS OF CHAIN OF INFECTION

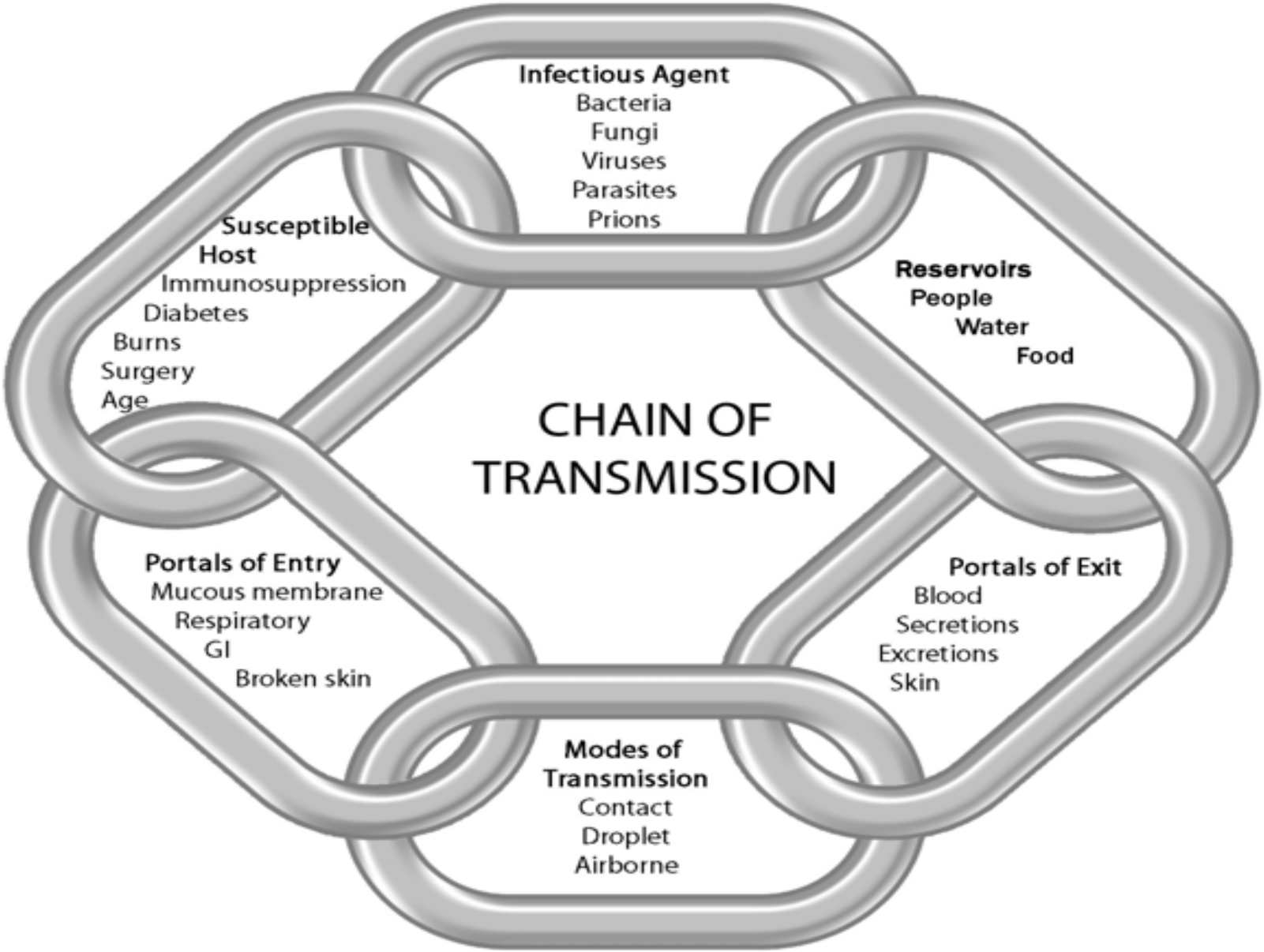
- **Elements in the cycle of infection.**
- 1. ***Infectious Agent***
  - When germs enter the body, they can cause illness.
  - Eg. Bacteria, virus, fungi, protozoa, helminths.
- 2. ***Reservoir***
  - Where germs normally live and multiply in
  - Eg Humans, Contaminated food, water, toys, sports equipment, Insects, animals, soil etc.
- ***3. Portal of Exit***
  - How germs leave the body
  - Eg Respiratory tract, Intestinal tract, Urinary/genitourinary tract, Open wounds, Blood and body fluids.

SIX STEPS OF CHAIN OF INFECTION

- ***4. Transmission***
- How germs are spread
  - Direct physical contact
  - Respiratory droplet
  - Stool (fecal-oral route)
  - Contact with blood/body fluids
  - Indirect contact
  - Needle stick injury
  - Ingestion of contaminated food and water
  - Contaminated dust particles
  - Contaminated objects
  - Insects/animals

SIX STEPS OF CHAIN OF INFECTION

- ***5. Portal of Entry.***
- How germs enter the body
  - Respiratory tract
  - Intestinal tract
  - Urinary/genitourinary tract
  - Open wounds
  - Mucus membrane, e.g. eye, mouth
- ***6. Susceptible Host***
  - A person who gets an infection because he/she is unable to successfully fight the infection Infants, elderly and debilitated.
  - Persons who are ill.
  - Children who are not fully immunized or have underdeveloped immune systems.
  - Persons taking certain drugs that lower their defenses against germs.
  - Persons with underlying disease conditions that lower their defense against other germs.


Infectious Agent
Bacteria
Fungi
Viruses
Parasites
Prions
Susceptible Host
Immunosuppression
Diabetes
Burns
Surgery
Age
Reservoirs
People
Water
Food
CHAIN OF TRANSMISSION
Portals of Entry
Mucous membrane
Respiratory
GI
Broken skin
Portals of Exit
Blood
Secretions
Excretions
Skin
Modes of Transmission
Contact
Droplet
Airborne

Ways via which infections spread

- Infectious diseases can spread in a variety of ways:
- through the air,
- from direct or indirect contact with another person,
- soiled objects,
- skin or mucous membrane,
- saliva, urine, blood and body secretions,
- through sexual contact,
- and through contaminated food and water.

Airborne droplets from the nose and throat

- Some infections are spread when an infected person sneezes or coughs out tiny airborne droplets. The droplets in the air may be breathed in directly by another person or indirectly enter another person through contact with surfaces and hands with the droplets on them.
- Examples of airborne diseases:
- Chickenpox
- Common cold
- Diphtheria
- Influenza
- Measles
- Meningitis (bacterial)
- Mumps
- Pneumococcal pneumonia
- Tuberculosis (TB)
- Whooping cough

Urine

- Some infections are spread when urine is transferred from soiled hands or objects to the mouth.
- Example of a disease spread by urine:
- Cytomegalovirus infection (CMV).(any of a group of herpes viruses that enlarge epithelial cells and can cause birth defects).

Faecal-oral

- Some infections are spread when microscopic amounts of faeces from an infected person with symptoms or an infected person without symptoms (a carrier) are taken in by another person by mouth. The faeces may be passed directly from soiled hands to the mouth or indirectly by way of objects, surfaces, food or water soiled with faeces.
- Examples of diseases spread from faeces:
- Giardiasis
- Hepatitis A
- Meningitis (viral)
- Salmonella infection
- Thrush
- Viral gastroenteritis
- Worms

Blood/body fluids

- Some infections are spread when blood or other body fluids from an infected person comes into contact with the mucous membranes or bloodstream of an uninfected person, such as through a needle stick or a break in the skin.
- Examples of diseases spread through blood/body secretions:
- Hepatitis B
- Hepatitis C
- Human immunodeficiency virus (HIV/AIDS)
- Cytomegalovirus (CMV) infection.

Skin or mucous membrane (lining of nose and mouth) contact

- Some infections are spread directly when skin or mucous membrane comes into contact with other skin or mucous membrane. Infections are spread indirectly when skin or mucous membrane comes in contact with contaminated objects or surfaces.
- Examples of diseases spread by skin or mucous membrane contact:
- Chicken pox
- Cold sores (herpes simplex)
- Conjunctivitis
- Hand, foot and mouth disease
- Head lice
- Ringworm
- Scabies
- School sores (impetigo)
- Warts.

Sexually transmitted infections

- These infections are most commonly transmitted by sexual contact. Sexual contact means genital to genital.
- Examples of sexually transmitted diseases:
- Genital herpes
- Genital warts
- Gonorrhoea (symptoms are painful urination and pain around the urethra)
- Hepatitis B
- HIV/AIDS
- Non specific urethritis (NSU)
- Pubic lice (crabs)
- Syphilis

Food or waterborne diseases

- These diseases result from ingestion of water or a wide variety of foods contaminated with disease-causing micro-organisms or their toxins. Often these infections are also spread by the faecal-oral route.
- Examples of food or waterborne diseases:
- Cholera
- Giardiasis
- Salmonella infection
- Typhoid

Saliva

- Some infections are spread by direct contact with saliva .indirect contact with contaminated objects (such as children sucking and sharing toys).
- Examples of diseases spread by saliva:
- Cytomegalovirus (CMV) infection
- Glandular fever(an acute disease characterized by fever and swollen lymph nodes).
- Hepatitis B.

Diseases where person-to-person spread occurs rarely

- Some infectious diseases are almost without exception never spread by direct contact with an infected person. These diseases are usually spread by contact with an environmental source such as animals, insects, water or soil.
- Examples of diseases spread by contact with animals:
- Cat-scratch disease
- Rabies
- Dengue fever
- Malaria

Examples of diseases spread by contact with water or soil:

- Amoebic meningitis
- Tetanus.

Hospital-acquired infections or HAI

- **Risk of infection** is defined as "the state in which an individual is at risk to be invaded by an pathogenic agent.
- Infections of the lungs, wounds, urinary tract and bloodstream can occur in hospital.
- These are called hospital-acquired infections or HAI. There are things you can do before and during your stay in hospital that will help reduce the chance of getting sick during your stay. They are also known as nosocomial infections.

Hospital infections

- An infection is a disease caused by micro-organisms like viruses, fungi, bacteria or parasites. These micro-organisms are often called ‘bugs’ or ‘germs’. Bacteria are the most common cause of HAI.
- HAI usually occurs two to three days after admission to hospital. These infections cause:
- Longer stay in hospital
- Longer recovery time
- Costs associated with a longer stay in hospital and longer recovery time.

Some people are more susceptible

- All patients admitted to hospital are at some risk of contracting an HAI. If you are very sick or have had surgery, you have an increased risk. Some patients are more vulnerable than others. These include:
- **Very young people** - premature babies and very sick children
- **Very old people** - the elderly
- **Those with medical conditions** - such as diabetes
- **People with defective immunity** - people with diseases that compromise their immune system or people who are being treated with chemotherapy or steroids

Other risk factors

- There are other risk factors that may increase your likelihood of acquiring HAI. These include:
- **Length of stay** - a long hospital stay can increase the risk: for example, admission for complex or multiple illnesses.
- **Operations and surgical procedures** - the length and type of surgery can also impact.
- **Hand washing techniques** - inadequate hand washing by hospital staff and patients may increase your risk.
- **Antibiotics** - overuse of antibiotics can lead to resistant bacteria, which means that antibiotics become less effective.
- **Equipment** - invasive procedures can introduce infection into the body: for example, procedures that require the use of equipment such as urinary catheters, IV drips and infusions, respiratory equipment and drain tubes.
- **Wounds** - wounds, incisions (surgical cuts), burns and ulcers are all prone to infection.
- **High-risk areas** - some areas of the hospital are more likely to have infection, such as intensive care units (ICU) and high dependency units (HDU).

Types of infections

- The most common types of infection acquired in hospitals are:
- Urinary tract infections (UTI)
- Wound infection
- Pneumonia (lung infection)
- Bloodstream infection.
- Infections are treated with antibiotics and usually respond well. Occasionally, infections can be serious and life threatening. Some bacteria are hard to treat because they are resistant to standard antibiotics. These bacteria are sometimes called ‘superbugs’.

Controlling infection

- Spread of infection can be controlled and reduced by:
- Strict hospital infection control procedures and policies
- Correct and frequent hand washing by all hospital staff and patients
- Cautious use of antibiotic medication.
- **How to reduce your risk**
- If you are going to hospital, there are things you can do before admission and in hospital that will help reduce the chance of you getting an infection.

Before admission

- Follow these steps before you go to hospital:
- **Stop smoking** - smoking can interfere with healing processes. It also damages the airways, which can make lung infections more likely.
- **Maintain a healthy weight** - people who are overweight are more prone to infection.
- **Inform your doctor of all existing or recent illness** - a cold or the flu can lead to a chest infection, so let your doctor or the hospital staff know if you are not well.
- **Manage diabetes** - if you are a diabetic, make sure that your blood sugar levels are under control.

During your stay

- Some things that can help reduce the chance of infection while you are in hospital include:
- Make sure that you wash your hands properly, especially after using the toilet. Remind hospital staff to do the same before and after they attend to you.
- Let your nurse know if the site around the needle is not clean and dry if you have an IV drip.
- Tell your nurse if the dressings are not clean, dry and attached around any wounds you may have.
- Let your nurse know if tubes or catheters feel displaced.
- Do your deep breathing exercises - the staff will instruct you. This is very important because they can help prevent a chest infection.
- Ask relatives or friends who have colds or are unwell not to visit.

What to expect if you get an infection

- If you do acquire an infection in hospital, other procedures and practices (apart from antibiotic treatment) may be put in place to stop the spread of infection to other patients. Depending on the type of infection, these might include:
- Isolation in a single room
- Being put last on the operation surgery list
- Being nursed by staff wearing gloves and gowns

THE END

THANK YOU STUDENTS