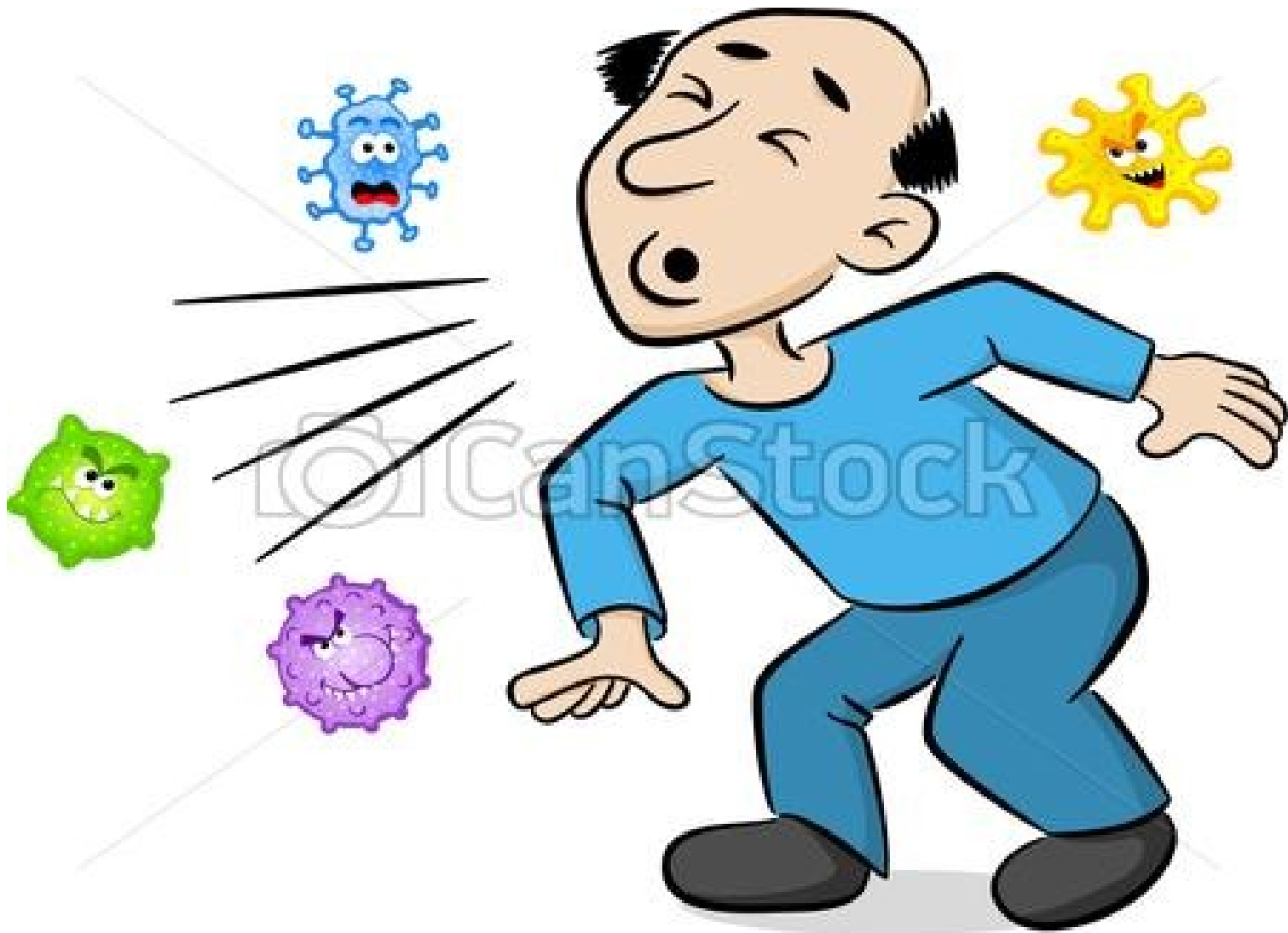


INFECTION CONTROL



PREETI SAMUEL



TERMINOLOGY

- ◉ INFECTION- it is the entry of foreign species in the host and causing some sign and symptoms to host.
- ◉ INFLAMMATION- it is the body's (host) response to infection.
- ◉ COMMUNICABLE DISEASES- Diseases which spreads from one person to another through air, coughing, sneezing, touching, etc.
- ◉ ASEPSIS- free from pathogenic micro-organisms.
- ◉ MEDICAL ASEPSIS- Medical asepsis is a clean technique used to reduce the number of micro-organisms and prevent their spread.
- ◉ SURGICAL ASEPSIS- Surgical asepsis is a sterile technique used to eliminate micro-organisms from an area.

- ⦿ **AEROBIC:** requiring oxygen to exist
- ⦿ **ANAEROBIC:** capable of existing without oxygen.
- ⦿ **ANTISEPTIC:** a chemical solution, which will reduce and prevent growth of microorganisms on skin.
- ⦿ **CONTAMINATION:** the soiling or pollution of inanimate objects or living material with harmful, potentially infectious or other unwanted material, for example organic matter or micro organisms

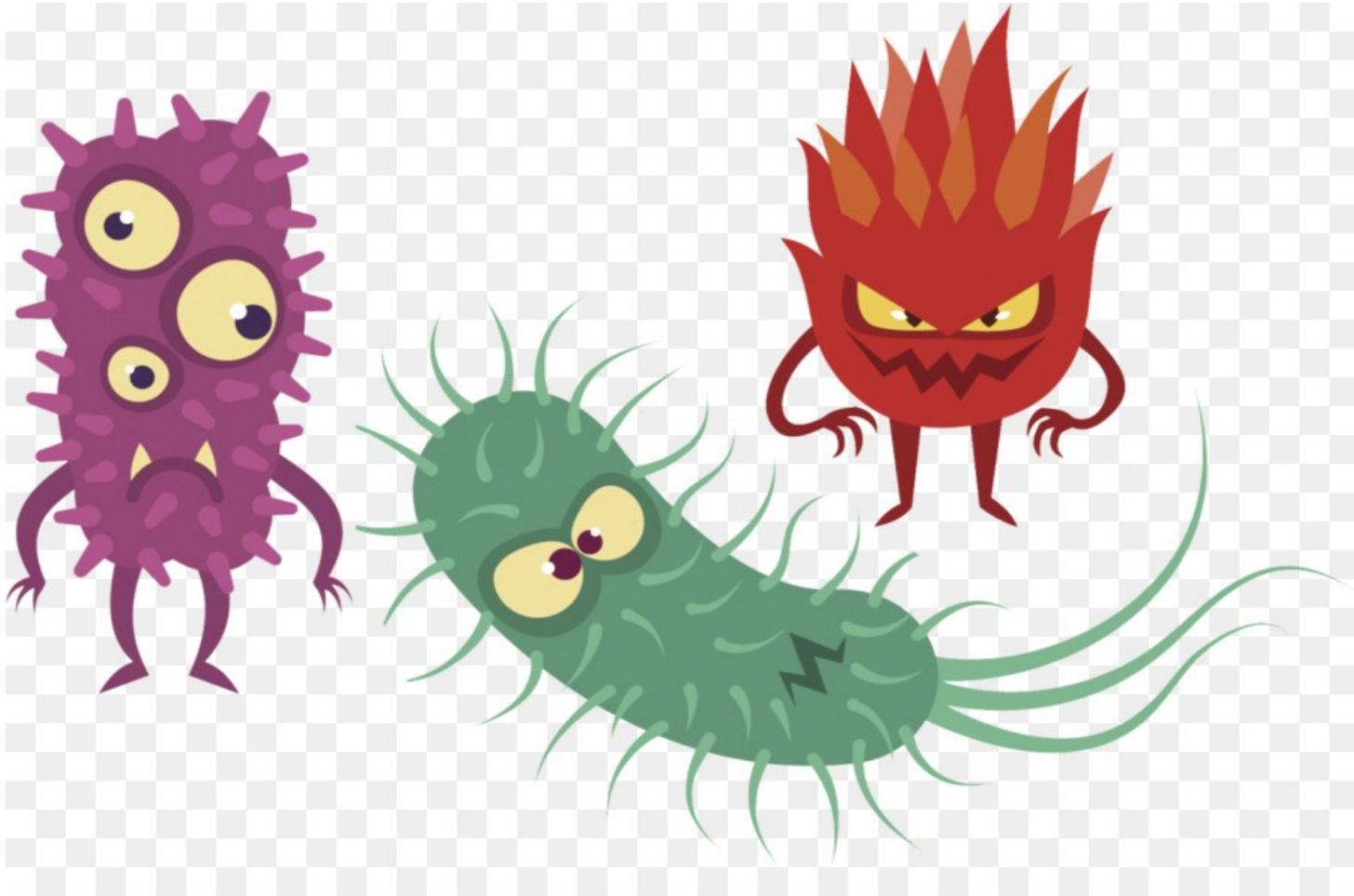
- ⊙ ENDEMIC: present within a localized area or peculiar to persons in such an area
- ⊙ EPIDEMIC: (of a disease) attacking or affecting many persons simultaneously in a community or area; a widespread occurrence of disease
- ⊙ EPIDEMIOLOGY: the branch of medical science concerned with occurrence, transmission and control

- ◉ EXUDATE: fluid from a wound, usually made up of serum, leucocytes and wound debris
- ◉ FOMITES: inanimate objects or material on which disease producing agents may be conveyed, for example bedding and clothes
- ◉ INCIDENCE: degree, extent or frequency of occurrence; amount
- ◉ MORPHOLOGY: the science that deals with the form and structure of living things
- ◉ RESERVOIR: a place where potentially pathogenic microorganisms can survive and may be transferred onto patients

- ◉ **SOILED:** term used to describe objects or items contaminated with debris, organic matter, which potentially can harbour pathogenic organisms
- ◉ **SOURCE:** is the part of the reservoir which provides the organisms that have infected or colonized patients i.e. where the organisms have come from
- ◉ **VECTORS:** an organism, usually an insect, that carries a disease-producing material from one host to another, either within or on the surface of its body.
- ◉ **VEHICLE:** an object that can carry pathogenic organisms to a patient, for example dust, bedpans, blankets.

- ◉ **NOSOCOMIAL INFECTION-** Infection which occurs while seeking treatment in hospital.

MICROORGANISMS



INTRODUCTION

- ◉ An infection is the detrimental colonization of a host organism by a foreign species.
- ◉ During infection the infecting organism seeks to utilize the host's resources to multiply (usually at the expense of host).
- ◉ The infecting organism, or pathogens interferes with the normal functioning of the host and can lead to chronic wounds, gangrene, loss of an infected limb and even death.

- ◉ **SECONDARY INFECTION**- is an infection that occurs during or following treatment of another already existing primary infection. Example: patient admitted in hospital, acquired urinary tract infection.
- ◉ **TRANSMISSION**- Is the transfer of a disease/ infection from an infected individual or group to a previously uninfected individual/ group. Pathogens that cause disease may be transmitted from one person to another by one or more of the following means:

1. **Direct contact-** coughing or sneezing on another person eg: chicken pox, common cold, influenza, mumps, TB, Measles, Rubella, Whooping cough.
2. **Direct physical contact-** Touching an infected person including sexual contact eg: HIV/AIDS, Syphilis, Gonorrhoea, etc.
3. **Indirect contact-** usually by touching contaminated surfaces.
4. **Airborne transmission**
5. **Feco-oral transmission-** contaminated food or water. Eg: cholera, hep A, Polio, Rotavirus, Enteric fever.
6. **Vector borne transmission-** malaria
7. **Iatrogenic transmission-** due to medical procedures such as transplantation of infected material.

DISEASE TRANSMISSION



TRANSMISSION OF DISEASE

1. HORIZONTAL DISEASE TRANSMISSION-

- Disease transmission from one individual to another.
- Horizontal transmission can occur by either direct contact (touching, biting) or indirect contact (vectors or fomites that allows the transmission of disease without physical contact) eg: TB

2. VERTICAL DISEASE TRANSMISSION-

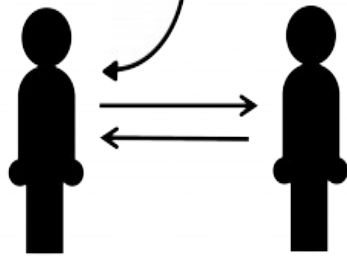
- Passing a disease causing agent vertically from mother to child eg: AIDS, Hepatitis B, Syphilis.

Modes of Infectious Disease Transmission

A. General Transmission

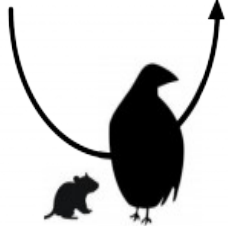
Abiotic environmental factors

- Wind
- Water
- Inhalation of spores
- Entry into skin



Animal vectors

- Mosquitoes (malaria, dengue)
- Fleas (bubonic plague)



B. Human to Human Transmission

Direct Contact



- Pathogen survives best inside the body
- Eg: HIV, Herpesviruses, Ebola

Indirect Contact



- Pathogen survives harsh environment
- Pick up pathogen from surface or air
- Eg Influenza, norovirus

Droplets



- Pathogens are in droplets, but do not survive long this way
- Eg: Ebola, *Bordetella pertussis*

Airborne



- Pathogens aerosolized and stay infective
- Eg: Influenza, Tuberculosis

Fecal - Oral

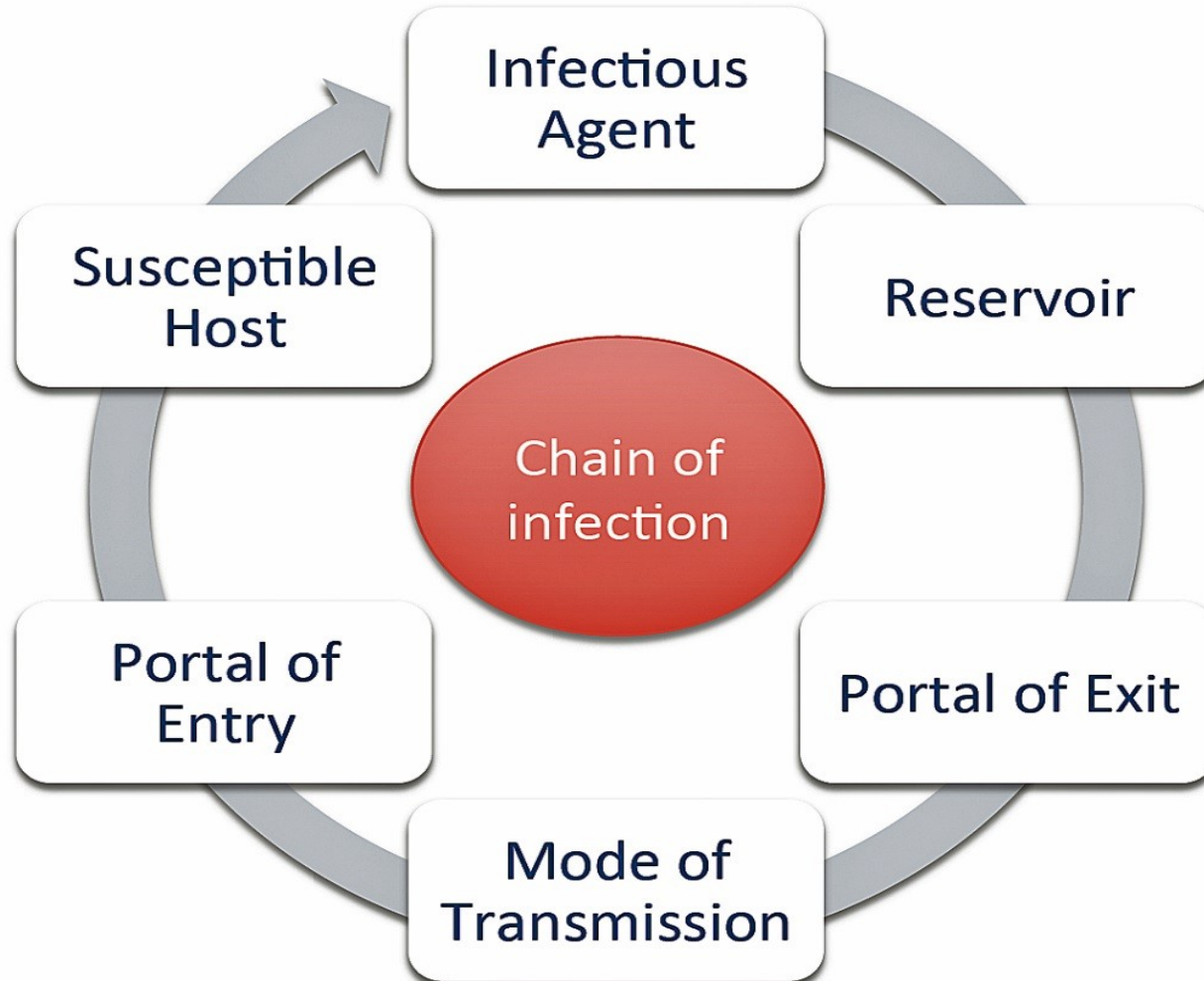


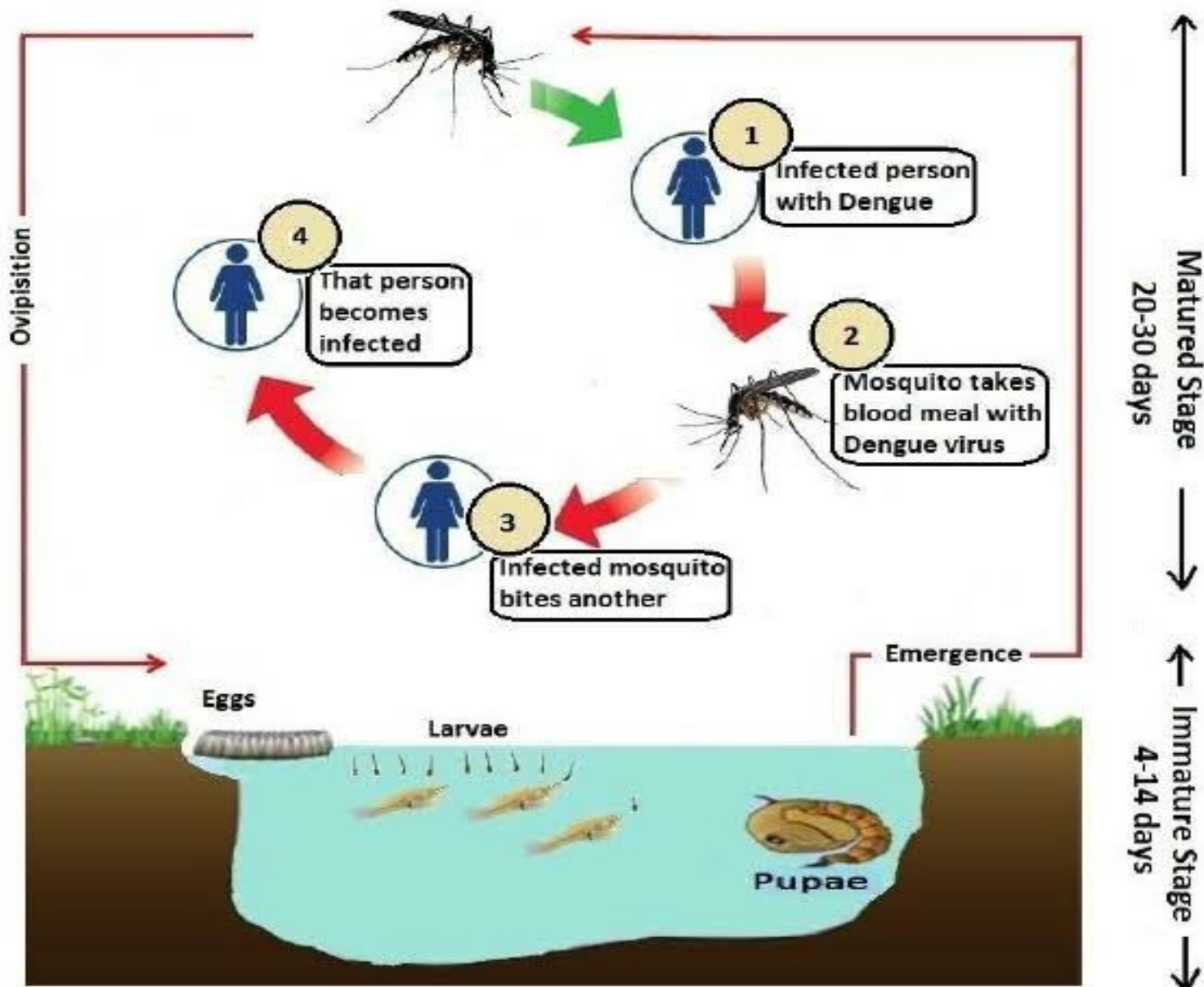
- Through contaminated water or food
- Eg: Cholera, Norovirus, Shigella

CHAIN OF INFECTION

- ◉ Occurrence of infection is a cyclic process.
- ◉ Chain of infection has following elements:
 - Infectious agent/ pathogen
 - Reservoir
 - Portal of exit
 - Mode of transmission
 - Portal of entry in host
 - Susceptible host

Chain of Transmission





INTRODUCTION

- Nosocomial infection comes from Greek words "nosus" meaning disease and "komeion" meaning to take care of
- Also called as **HOSPITAL ACQUIRED INFECTION**
- Infections are considered nosocomial if they first appear 48hrs or more after hospital admission or within 30 days after discharge.



NOSOCOMIAL INFECTION

- ⦿ Nosocomial infections are also known as hospital-acquired/associated infections.
- ⦿ Nosocomial Infections is Infection acquired in the hospital > 48 hours after admission.
- ⦿ Nosocomial pathogens can be transmitted through person to person, environment or contaminated water and food, infected individuals, contaminated healthcare personnel's skin or contact via shared items and surfaces.

- ⦿ “Nosocomial” term is used for any disease acquired by patient under medical care.
- ⦿ It is an infection acquired by patient during hospital stay. Recently, a new term, **“healthcare associated infections”** is used for the type of infections caused by prolonged hospital stay and it accounts for a major risk factor for serious health issues leading to death.

DEFINITION

“Hospital acquired infection or Nosocomial infection are defined as infections developing in patients after admission to the hospital, which were neither present nor in incubation at the time of hospitalization. Infection that first appears after 48 hrs and 4 days after admission are usually considered nosocomial infections.”

- ◎ **The situations in which infections are not believed as nosocomial are:**
- (1) The infections that were present at the time of admission and become complicated, nevertheless pathogens or symptoms change resulting to a new infection;
- (2) The infections that are acquired trans-placentally due to some diseases like rubella, syphilis, etc and appear 48 hrs after birth.

TYPES OF NOSOCOMIAL INFECTION

- ⊙ The sites which are common include
 - urinary tract infections (UTI)
 - surgical and soft tissue infections
 - gastroenteritis
 - meningitis
 - respiratory infections

AGENTS OF NOSOCOMIAL INFECTION

- ⦿ Bacteria are responsible for about 90% infections, whereas protozoans, fungi, viruses and mycobacteria are less contributing compared to bacterial infections.
- ⦿ The agents that are usually involved in hospital acquired infections include:

1. *Staphylococcus aureus* -

- Out of many species of *S. aureus* is considered one of the most important pathogens, responsible for nosocomial infections.
- It mainly colonizes in nasal passages.
- *S. aureus* infects not only the superficial but also the deep tissues.
- Toxin-mediated diseases of *S. aureus* include food poisoning, toxic shock syndrome and exfoliative toxins cause staphylococcal scalded skin syndrome.

2. *Escherichia coli*-

- It can colonize in gastrointestinal tract of human beings and other animals. *E. coli* is responsible for a number of diseases including UTI, septicemia, pneumonia, neonatal meningitis, peritonitis and gastroenteritis.

3. *Pseudomonas aeruginosa*-

- *P. aeruginosa* contributes to 11% of all nosocomial infections, which result in high mortality and morbidity rates.
- The sites of colonization are kidney, urinary tract and upper respiratory tract.

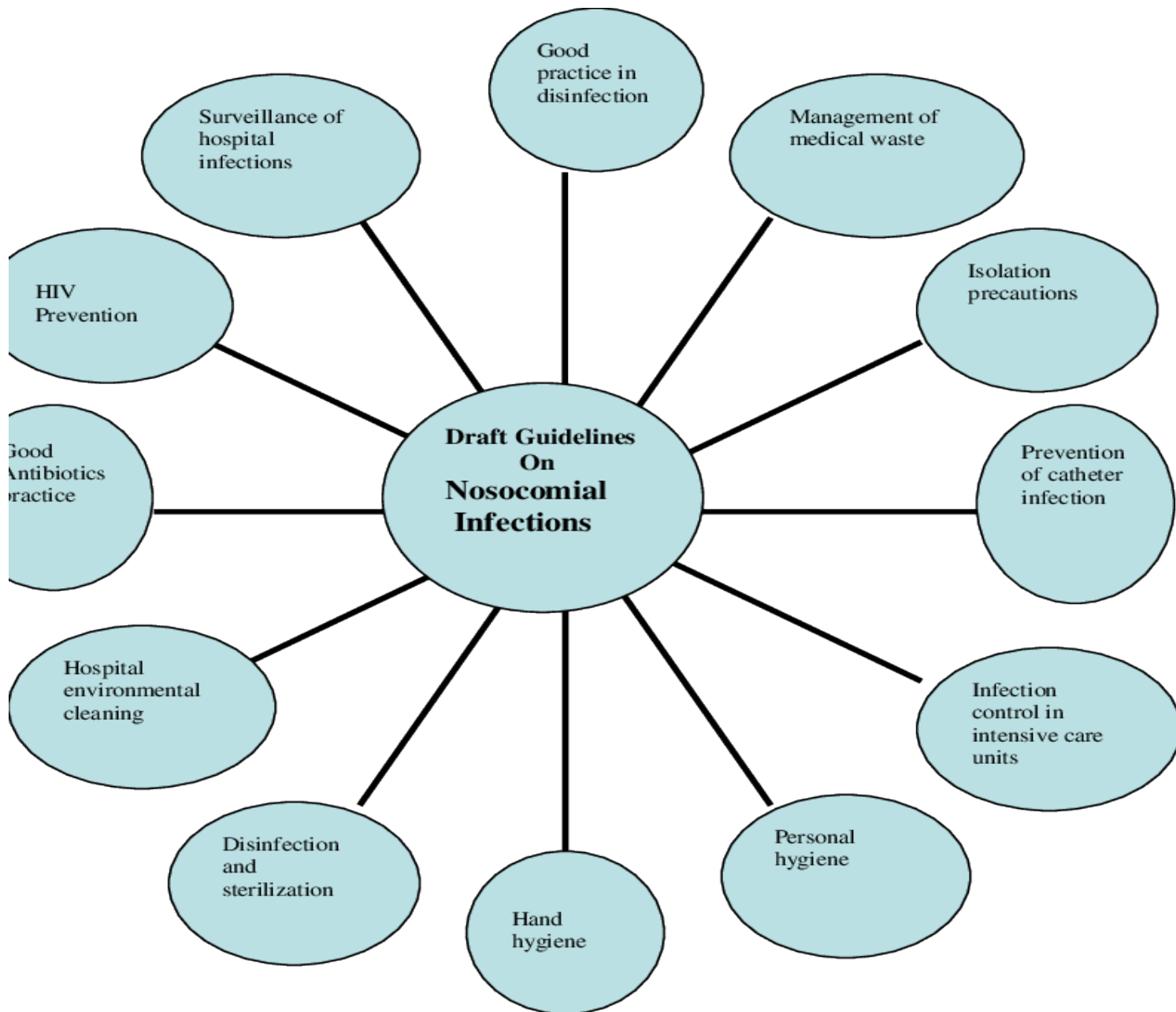
4. *Clostridium difficile* (*C. difficile*)-

- ⦿ *C. difficile* is an important nosocomial pathogen which mainly causes diarrhea.

- ◉ **Selected antibiotic-resistant nosocomial pathogens**
- Multi-drug-resistant nosocomial organisms include Methicillin-resistant *S. aureus* (MRSA), vancomycin-resistant enterococci, etc.
- Improper use of antibiotics is thought to be the major cause of this drug resistance.

CONTROL OF NOSOCOMIAL INFECTION

1. Aseptic techniques should be strictly followed.
2. Regular hand washing.
3. *Surveillance of nosocomial infections-*
 - Surveillance can be interpreted as “the ongoing, systematic collection, analysis, and interpretation of health data.”





"Stay back, you guys! This stuff has killed 99.99% of our fellow germs!"

UNIVERSAL PRECAUTION



- ◉ The Centers for Disease Control and Prevention (CDC) recommends two tiers in the prevention of infection within healthcare settings.
- ◉ The first tier includes universal precautions and other standard safety precautions.
- ◉ Both are intended to reduce the risk of transmission of blood borne viruses and other common organisms found within healthcare settings, and therefore should be utilized at all times.

- ◉ The CDC adopted the term universal precautions and devised the recommendations in 1987, largely in response to the HIV epidemic.
- ◉ The recommendations state that blood and body fluid precautions should be implemented consistently for all patients regardless of their blood borne infection status, as this would not always be known.

- ⦿ All healthcare workers, staff, patients, and visitors are encouraged to undertake universal precautions at all times.
- ⦿ In addition, these measures can also help to minimize cross infection of other organisms.

UNIVERSAL PRECAUTIONS / STANDARD SAFETY MEASURES

1. Hand washing
2. Gloves
3. Gown
4. Mask
5. Goggles
6. Environmental cleaning
7. Waste disposal

◉ Universal precautions measures include the following:

1. **Gloves-**

- ◉ Gloves should be well-fitting and available for use wherever contact with blood or body fluids is anticipated.
- ◉ Although gloves cannot prevent penetrating injuries from sharp instruments and equipment, they can reduce the incidence of hand contamination from blood and body fluids.
- ◉ In addition, any broken skin on the hands of health staff - for example, cuts - should be covered, ideally with an effective barrier that is both waterproof and breathable.

- ◉ Sterile surgical gloves, which fit more tightly than ordinary latex gloves, should also be available for procedures involving sterile areas of the body.
- ◉ Ideally these gloves should not be washed or disinfected as these can cause deterioration or disintegration, causing holes which may not be visible.

2. **Protective clothing** (for example, impermeable plastic aprons or gowns) should be worn where there is a risk of blood or other body fluids splashing onto clothing or bare skin.
3. **Proper handling of contaminated instruments**
 - Needles, blades, scalpels, intravenous devices, and other sharp instruments should be handled with care in order to avoid inoculation injuries or contamination onto mucous membranes.
 - Care should be taken during the use, cleaning and on disposal of sharp instruments.
 - Needles should never be recapped with their covers, never be removed from the syringes.
 - After use, all single use sharps should be placed in puncture resistant containers such as sharps boxes.

⦿ PUNCTURE PROOF CONTAINER-



4. Handling and disposal of linen

- ⦿ Linen contaminated with blood or body fluids should be handled carefully.

5. Proper handling of clinical wastes

- ⦿ Clinical waste includes any materials generated from patient care. This includes waste that could potentially transmit microorganisms. Such clinical waste can include soiled dressings, cotton swabs, and catheter bags.

6. Cleaning of spillages of blood and body fluids

- ⦿ Spillages of blood and potentially infected body fluids onto the floor, on equipment, or other surfaces must be cleaned as soon as they occur, in order to prevent further unnecessary exposure.

7. *Hand hygiene /hand washing-*

- Hand hygiene is a major component of standard precautions and one of the most effective methods to prevent transmission of pathogens associated with health care.
- Hand washing should be done for 40-60 secs.
- Hand rubbing should be done for 20-30 secs.

8. *Wear protective barriers-*

- Gloves
- Lab coat/ gown
- Facial protection- Mask, Eye protection with goggles (to prevent splashes).

- ◉ Cross infection of organisms can be greatly reduced when additional precautions are used. These simple measures include:
 - Handwashing;
 - Asepsis; and
 - Decontamination.

ASEPSIS

ASPESIS

- ◉ Asepsis is the state of being free of pathogenic micro-organisms.
- ◉ **DEFINITION-**
- ◉ Asepsis is the practice to reduce or eliminate contaminants (such as bacteria, fungi) from entering the operative field in surgery or medicine to prevent infection.
- ◉ **ASEPTIC TECHNIQUE-**
- ◉ Aseptic technique is the effort to keep a client as free from hospital micro-organisms as possible.

HANDWASHING

- ⦿ Hand washing is the most important infection control measure in healthcare settings.
- ⦿ Proper hand washing can limit both cross infection of microorganisms and contamination from blood borne pathogens.

HANDWASHING

Indications for hand washing-

- ⦿ Hands should be washed:
 - Before and after any aseptic technique or invasive procedure.
 - Immediately after gloves are removed.
 - Before contact with any susceptible patient or site, for example, intravenous sites or wounds.
 - After contact with any body fluids, this also includes contact with toileting facilities.
 - After handling contaminated equipment, waste or laundry.
 - Before and after contact with any patient under isolation.

- ◉ Soap can be used for routine decontamination of hands. However, bars of soap sitting in stagnant water should be avoided.
- ◉ Liquid soap dispensers are suitable but topping up of these dispensers should be avoided. If dispensers will be reused, they should be cleaned out frequently and thoroughly dried.

ANTISEPTIC SOLUTION USED

- ◉ Before and after touching mucous membranes; for contact with skin that is not intact, including wounds;
- before invasive procedures;
- when caring for high risk patients, for example, patients in critical care areas; and
- when no water or soap is available.
- ◉ Antiseptic cleansers usually have a residual effect and reduce the number of resident organisms and transient organisms.

- ◉ An effective antiseptic hand cleanser will contain any of the following antiseptics:
 - Chlorhexidine gluconate 2-4%
 - 70% ethyl alcohol and 70-90% isopropylalcohol
 - Iodophor 2.5%

STEPS OF HAND WASHING

Step-1



Rub palms together

Step-2



Rub the back of both hands

Step-3



Interface fingers and rub the hands together.

Step-4



Interlock fingers and rub the back of fingers of both hands

Step-5



Rub thumb in a rotating manner followed by the area between index finger & thumb.

Step-6



Rub fingertips on palm for both hands

Step-7



Rub both wrists in a rotating manner
rinse and dry thoroughly.

