Title: **TRANSMISSION OF MICROORGANISMS**

Objective/ purpose/ learning goals: Students will learn about:

Methods of disease transmission
Importance of infection control
Methods to control and or prevent transmission

Key terms: disease transmission, contact (direct and indirect) diseases, airborne diseases, control and prevention of disease transmission

Introduction:

Microorganisms are present everywhere, however, a very small percentage of these microorganisms are pathogenic (cause disease). Spread (transmission) of pathogenic microorganisms, can cause illness in susceptible individuals. Types of transmission are broadly categorized as: Contact transmission, vehicle transmission and vector transmission.

Contact transmission: spread of pathogen by direct contact, indirect contact or droplet contact. Direct contact transmission typically involves close physical contact between an infected person and a susceptible person. Indirect contact transmission occurs when a susceptible host is infected from contact with a contaminated surface or object. *Infection by touching respiratory droplets (droplets of mucous) released by a sick individual during exhaling, coughing or sneezing are considered to be examples of droplet contact transmission.* Frequent and thorough handwashing effectively prevents transmission. Regular disinfection, use of gloves, masks and attention to good personal hygiene are highly recommended

Vehicle transmission: spread of pathogens by contaminated food, drink, air or bodily fluid. Vehicle transmission can be reduced by proper storage and thorough cooking of food, frequent hand and utensil washing, adequate sewage treatment and water filtration, and use of personal protective gear.

Vector transmission: spread of pathogens by organisms. Biological vectors serve as host for the pathogen, whereas mechanical vectors do not. Examples of vectors are mosquitoes, flies, mites, ticks, rats, dogs. *Vectors are mobile and can spread pathogens not just by biting but also through feces of the vector, landing on food or drink.*

Disinfection of surfaces, use of insecticides, increased public awareness of proper hygiene and proper food handling can reduce transmission.

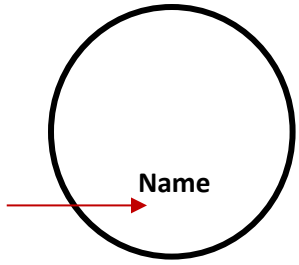
Learning about transmission of pathogenic microorganisms is important for appropriate infection control measures.

In this exercise, you are going to learn about transmission of bacteria by simple handshaking and try to determine who started the chain of transmission (patient zero).

Materials, equipment and organisms:

Each student will need:
One **TSA** plate
One petri plate with a wet cotton pad
One sterile glove (from a 3/pk)

Procedure:



1. Write your name on the media side (bottom) of the **TSA** plate (*not the lid*).

2. Carefully take out **ONE** sterile glove from the packet and put it on your **right hand** (may not fit properly, but do the best you can).

3. Now open the **petri** plate with moist cotton and pick up the cotton pad using your '**gloved**' hand. Gently squeeze the cotton, **on the petri plate**, and rub the liquid on all your gloved fingers for appx. 30 secs. Then place the cotton back into the petri plate and discard in the biohazard bag.

4. **Do not discard your glove. WAIT FOR YOUR PROFESSOR TO TELL YOU WHEN YOU CAN SHAKE HANDS**.

5. Each student will randomly shake hands with two other students in the room. Do not shake hands with the person next to you. Wander around the room. You must record the names of the other two students. If you wish, you may write the other names on the TSA agar plate with your name.

After shaking hands, open the TSA plate and gently rub the gloved fingers on the surface of the agar. Quickly close the plate. Use your left hand to take off your glove and *place it biohazard bag for disposal.*

6. Place your TSA plates in the bin on the side counter for incubation at room temperature.

Safety and disposal:

a. You are using a live culture of bacteria (*Serratia marcescens*) for this experiment, please pay attention when you squeeze the cotton pad on the petri plate and rubbing it on all of your fingers. Let your professor know if you dropped (or you think) any liquid on the table. Your work area will need to be disinfected.

b. Discard the petri plate, cotton pad and used glove in the red biohazard bag.

Day 2:

Your instructor will return your plates after 48 hrs. of incubation at room temperature.

Look for microbial growth on your TSA plate (growth of *Serratia marcescens* is indicated by the red pigmentation).

Students who are "infected" will go to the board and write their name and the names of the other two people with whom they shook hands.

Results:

Are you infected? Yes No

Write down the names of the infected people and their contacts from the board.

(i) Concept check/review questions: methods of transmission, preventive measures

(ii) Sample questions:

Why is it important to learn about transmission of microorganisms?

Give examples of diseases transmitted by each of the three categories.