Transmission (How Germs Spread)



Learner outcomes

By the end of this module you will be able to:

- State the goal of infection prevention and control.
- List the links in the chain of transmission.
- Describe the general principles of transmission of infectious agents.
- Suggest some strategies to break the chain of transmission.



Chain of Transmission



Chain of Transmission

- The **Chain of Transmission** is the way all infectious diseases spread.
- The goal of infection prevention and control practice is to break the chain at one of its links.
- Before reviewing the ways in which to break the chain, it is important to review each link.



Chain of Transmission



Credit: York Region Community and Health Services - Public Health

Infectious Agent = Germ

- The infectious agent is the germ or organism that causes the infection.
 - bacteria
 - viruses
 - fungi
 - parasites



Reservoir = Hiding Place

- The reservoir is the place where an infectious agent can live. These include:
 - in or on humans
 - on objects
 - surfaces in the environment
 - animals



Portal of Exit = Way Out

- The portal of exit is the point where the infectious agent leaves the reservoir.
- For example:
 - blood
 - non-intact skin (e.g. draining wounds)
 - respiratory tract secretions (e.g. from the mouth or nose through coughing or sneezing)
 - gastrointestinal tract (e.g.vomitting)



Mode of Transmission = Getting Around

- There are a variety of ways in which infectious agents can travel from one host to another.
 - Contact, vehicle, droplet, droplet/contact, airborne and vector borne
- More details on each mode of transmission will be reviewed later in this module.



Portal of Entry = Getting In

- The portal of entry is the point where the infectious agent enters the new host.
- For example:
 - non-intact skin (e.g. wound)
 - respiratory tract (e.g. inhaling)
 - gastrointestinal tract (e.g. eating)
 - mucous membranes (e.g. eyes, mouth)



Susceptible Host = Next Sick Person

- A susceptible host is any person who is at risk of infection due to a variety of reasons including:
 - age (e.g. the very young and the very old)
 - poorly functioning immune system (e.g. cancer)
 - existing illness (e.g. diabetes or lung disease)



Modes of Transmission





- Infectious agents or germs are spread through touching.
- This is the most common mode of transmission and there are two types:
 - direct
 - indirect







 Direct transmission happens by touching someone who is infected (e.g. on their hands).

 Indirect transmission happens by touching a contaminated object (e.g. touching a commode).





Photo credit: Public Health Ontario



- Vehicle transmission occurs when items are contaminated and multiple people are exposed to the item.
- In long-term care homes, this could include commodes, bed rails and shared equipment like blood pressure cuffs and stethoscopes.





- Coughs and sneezes can result in large respiratory droplets.
- These droplets can spread up to 2 metres before they fall to the ground as they are heavier than air.
- The infected droplets can enter the eyes, nose or mouth of another person and cause infection in the susceptible host.



Photo credit: Public Health Ontario





- The most common types of diseases associated with droplet transmission are respiratory in nature.
 - The only exception is norovirus which is also spread through the spray from forceful vomiting.



Droplet/Contact

- Respiratory droplets can also land on surfaces and contaminate them.
- If someone touches these contaminated surfaces, they can become infected by touching their eyes, nose or mouth.



Photo credit: Public Health Ontario





- This transmission happens when very tiny droplets leave the respiratory tract of an infected person (cough or sneeze) and remain suspended in the air and travel on air currents.
- If inhaled they can cause infection.
- Both tuberculosis and chickenpox spread this way.
- This mode of transmission is not usually seen in long-term care or retirement homes.



Breaking the Chain



Breaking the Chain

- Remember, the goal of infection prevention and control practice is to break a link in the chain.
- By breaking the chain, the risk of transmitting infection is reduced.
- The last section of the module provides examples of how this can be accomplished.



1. Identify or Manage

- Identify or manage the infectious agent through
 - regular, active surveillance & early identification; this could include monitoring signs and symptoms
 - reporting any suspected outbreaks to the Health Unit
 - policies that address staff illnesses and visitor restrictions



2. Reduce the Reservoir

- Reduce the reservoir or hiding place through:
 - early identification and management of ill residents and staff
 - immunization offered to residents, staff, volunteers and students
 - safe food handling practices
 - environmental cleaning following best practices



3. Identify Mode of Transmission

- Identify how the infectious agents are "getting around" and prevent their spread through:
 - regular use of routine practices (hand hygiene, risk assessment, use of PPE)
 - timely implementation of additional precautions
 - environmental cleaning
 - other specific (outbreak) control measures



4. Reduce Susceptibility of Host

- Reduce host susceptibility through:
 - immunization offered to residents, staff, volunteers and students
 - promoting a healthy lifestyle through wellness activities (e.g. healthy eating, regular activity, getting enough sleep)



Before ending the module...



Check your learning

Now you have reached the end of the module, can you:

- State the goal of infection prevention and control?
- List the links in the chain of transmission?
- Describe the general principles of transmission of infectious agents?
- Suggest some strategies to break the chain of transmission?



Back at work

When you return to work, what will you do differently as a result of this module?







- Respiratory & Enteric Outbreak Preparedness in Long-Term Care Homes and Retirement Homes; York Region Public Health (used with permission)
- Environmental Cleaning Toolkit; Chain of Transmission; Public Health Ontario

