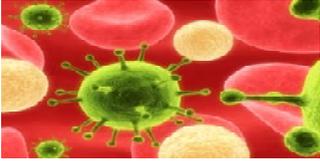


# Infection Control Workshop #2

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 Director of Nursing and Health Services  
 NYS OMRDD




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## Quick Review from Workshop #1

- Infection control can be attained different methods
- Terms used in Infection Control
- Infectious Agents: biological, chemical, environmental
- Chain of Infection
- Body's Natural Defenses
- Host Susceptibility




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## Workshop #2

- The learner will be able to:
  - Describe modes of infection transmission.
  - Describe transmission precautions in non-hospital setting.
  - Describe/Perform proper hand hygiene.
  - Describe/Perform proper cough hygiene.
  - List Standard Precautions Technique.
  - Describe/Perform proper personal protective equipment use.
  - Describe/Perform proper disposal of potentially contaminated waste.
  - Describe/Perform sharps disposal.

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## Transmission of Disease

- the passing of a disease from an infected individual or group to a previously uninfected individual or group
- Microorganisms vary widely in the length of time that they can survive outside the human body, and so vary in how they are transmitted.

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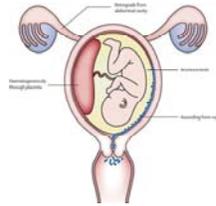
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## Horizontal vs. Vertical Transmission

- Horizontal:
  - Most common
  - From one person to another in the same generation
- Vertical
  - Typically from mother to child
  - Intrauterine
  - During childbirth
  - Breast milk



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## Modes of Transmission

- The infectious agent can be passed by
  - Direct –person-to-person.
  - Indirect Contact
  - Droplet/Residue/Dust- particles, droplets, in air or dust
  - Air-borne
  - Fecal-oral contact
  - Vehicles-water/blood/food- contaminated items.

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## Direct Contact Transmission

- The physical transfer of microorganisms by physical contact between an infected person and a susceptible person,
- includes
  - touching an infected individual,
  - kissing,
  - sexual contact,
  - contact with oral secretions, or
  - contact with body lesions.
- Often occurs between staff providing close personal care and consumers.



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## Indirect transmission

- a susceptible person is infected from contact with a contaminated surface.
- Infectious agent capable of surviving on surfaces for some period of time.
- Fomites include:
  - Door knobs, door handles, handrails
  - Tables, beds, chairs
  - Washroom surfaces
  - Cups, dishes, cutlery, trays
  - Medical instruments
  - Computer keyboards, mice, electronic devices with buttons
  - Pens, pencils, phones, office supplies
  - Therapy items, mats,



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## Droplet transmission

- transferred by infected droplets contacting surfaces of the eye, nose, or mouth
- Droplets generated when an infected person
  - coughs,
  - sneezes,
  - sings or
  - talks.
- also generated during certain medical procedures, such as bronchoscopy.
- Large in size (more than 5  $\mu\text{m}$ ) so quickly settle out of air.



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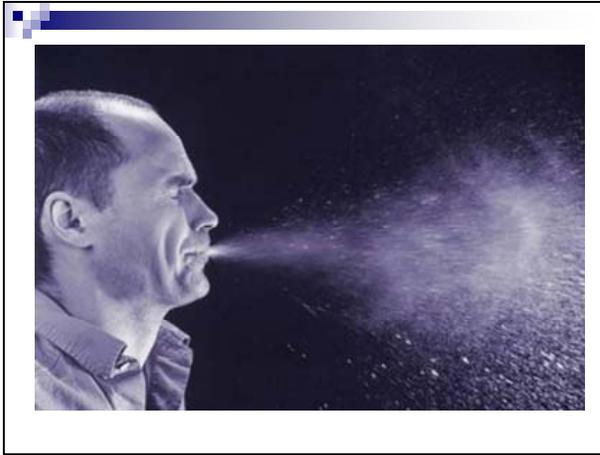
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**Airborne transmission**

- droplet nuclei (residue from evaporated droplets) or dust particles containing microorganisms can remain suspended in air for long periods of time
- organisms must be capable of surviving for long periods of time outside the body and must be resistant to drying
- allows organisms to enter the upper and lower respiratory tracts.

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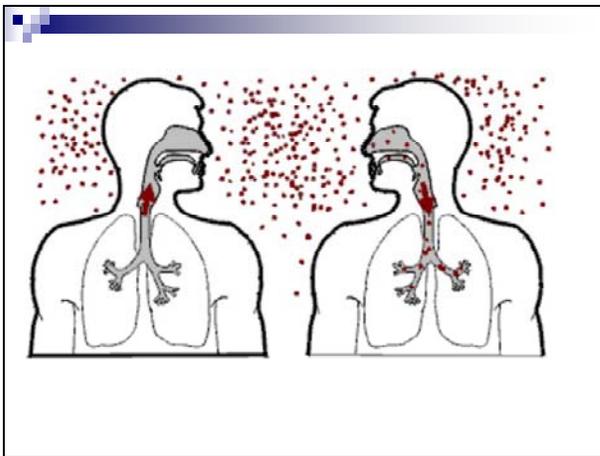
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## Fecal-Oral Transmission

- usually associated with organisms that infect the digestive system
- microorganisms multiply inside the digestive system (usually within the intestines) and are excreted in the feces
- Contaminated hands transmit the organism
- inadequate handwashing main cause of transmission



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## Vehicle transmission



- transmission is via a medium such as:
  - air
  - food
  - liquid
  - drugs
- These are all things routinely taken into the body.
- Serve as a "vehicle" into the body



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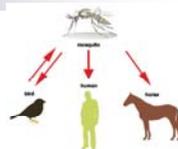
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## Vector transmission

- vector
  - transmitter of disease-causing organisms
  - carries pathogens from one host to another
    - an arthropod (most important) or
    - other agent
- sometimes other animals serve as intermediary hosts
  - Domesticated or wild animals
- transmission depends upon the attributes and requirements of at least three different living organisms:
  - the pathologic agent
  - the vector and
  - the human host



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## Vector transmission

- prevalent in the tropics and subtropics and are relatively rare in temperate zones
- Notable exception: Lyme Disease
- worldwide resurgence of vector-borne diseases since the 1970s
  - development of insecticide and drug resistance;
  - changes in agricultural practices;
  - deforestation; and
  - increased travel.



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## Factors for Infectious Agent Transmission & Progression

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## Infectivity

- the ability to enter, survive in, and multiply in a susceptible host
- the proportion of exposures in defined circumstances that result in infection



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## Pathogenicity

- The ability of an infectious agent to cause disease (i.e. harm the host)



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## Virulence

- often used interchangeably with pathogenicity,
- refers to the degree of severity of the disease caused by the infecting organism
- the extent of the virulence is usually correlated with the ability of the pathogen to multiply within the host



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## Invasiveness

- degree to which an organism is able to spread through the body from a focus of infection



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## Toxigenicity

- the ability of a microbe to produce bio-chemicals, known as toxins that disrupt the normal functions of cells or are generally destructive to human cells and tissues



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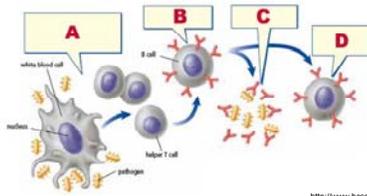
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## Antigenicity

- The capacity of a pathogen to induce an immune response



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## Questions ?

- What questions have come up so far?



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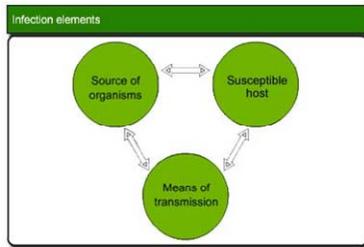
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## Transmission Control



[http://www.health.qld.gov.au/Entococcolprocessing/module\\_11\\_1.asp](http://www.health.qld.gov.au/Entococcolprocessing/module_11_1.asp)

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## Transmission Control - Source

- Minimizing or eliminating organisms at the source
- Source can be anything that harbors the organism
- Breeding places can be drained or insecticides used to eliminate vectors of disease



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## Transmission Control: Susceptible Host

- Immunizations
- Chemoprophylaxis
- Proper nutrition and rest



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## Transmission Control-Means of Transmission

### STANDARD PRECAUTIONS

A simple, consistent and effective approach to infection control

Minimise contact with blood and body substances by utilising safe work practices and protective barriers.

STANDARD PRECAUTIONS APPLY TO ALL PATIENTS

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## Hand Hygiene for Transmission Control

- One of the easiest and most effective ways to control transmission

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## Handwashing basics : when

- Always wash your hands before:
  - Preparing food
  - Eating
  - Treating wounds or giving medicine
  - Touching a sick or injured person

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## Handwashing Basics: When

- Always wash your hands after:
  - Preparing food, especially raw meat or poultry
  - Using the toilet
  - Changing a diaper
  - Touching an animal or animal toys, leashes or waste
  - Blowing your nose, coughing or sneezing into your hands
  - Treating wounds
  - Touching a sick or injured person
  - Removing gloves
  - Handling garbage or something that could be contaminated, such as a cleaning cloth or soiled shoes

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## Handwashing basics: How



- Generally best to wash hands with plain soap and water
- Antibacterial soap is no more effective at killing germs than is regular soap
- Do it right!
- <http://www.cdc.gov/CDCTV/HandsTogether/>

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**McGill** Student Health Services & Environmental Health and Safety

### EFFECTIVE HANDWASHING

7 Steps to Prevent the Spread of Germs

1. Wet hands under a comfortably warm running water and maintain hands and wrists.
2. Apply a generous portion of liquid soap.
3. Generate a lather and rub hands well for approx. 15 seconds. Clean between fingers, calluses, under fingernails and backs of hands.
4. Rinse well under running water.
5. Hold hands so that water flows from the wrist to fingertips.
6. Dry hands thoroughly with clean paper towels or air dryer.
7. Turn off the faucet with a clean towel, if available.

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## Hand sanitizers

- Not cleaning agents
- Easy and quick to use
- Cause less skin irritation
- Portable
- Must be at least 60% alcohol
- Place where no sink



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**Step 1**  
Apply enough sanitizer to completely cover both hands.



**Step 2**  
Rub hands together, palm to palm.



**Step 3**  
Rub back of each hand with palm of other hand.



**Step 4**  
Spread sanitizer over and under fingernails.



**Step 5**  
Spread sanitizer between fingers.



**Step 6**  
Keep rubbing hands together until they are dry. Do not dry with a towel.

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## Cough Hygiene For Transmission Control

- intended to be incorporated into infection control practices as a new component of Standard Precautions

### ■ CDC Recommendations:

- ✓ Educate consumers/personnel on source control
- ✓ Post signs "Cover your Cough" if appropriate
- ✓ Provide tissues and receptacles
- ✓ Provide alcohol-based hand rubs or sinks
- ✓ Offer masks to consumers or personnel
- ✓ Social distancing -maintain 3 feet from others



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## Standard Precautions

- Primary strategy to preventing nosocomial infections
- apply to **all individuals** patients, clients and staff—regardless of whether or not they are infected
- Based on principle that all blood and other body fluids, secretions and excretions (except sweat), nonintact skin and mucous membranes may contain transmissible infectious agents
- implementation is meant to reduce the risk of transmitting microorganisms from known or unknown sources of infection (e.g., patients, contaminated objects, used needles and syringes, etc.) within the

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## Standard Precautions

Includes:

- hand hygiene;
- use of
  - gloves,
  - gown,
  - mask,
  - eye protection, or face shield, depending on the anticipated exposure; and
  - safe injection practices.
- Handling equipment or items in the patient environment likely to have been contaminated with infectious body fluids in a manner to prevent transmission of infectious agents (e.g. wear gloves for direct contact, contain heavily soiled equipment, properly clean and disinfect or sterilize reusable equipment before use on another patient)



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## Donning and Removing Personal Protective Equipment Practicum

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## What is PPE?

- Personal Protective Equipment (PPE):  
"specialized clothing or equipment worn by an employee for protection against infectious materials" (OSHA)



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## Which PPE do we use?

- Gloves
- Gowns
- Goggles/Face Shield
- Particulate Respirator/Surgical masks



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## Which PPE to wear?

- Type of exposure anticipated
  - Splash/spray versus touch
- Category of isolation precautions
- Disease (known vs unknown)
- If in doubt, ASK!
  - Medical/Clinical Director,
  - Infection Control Nurse
  - Internet/CDC

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## Donning PPE

- Gowns
- Mask or Respirator
- Goggles or Face shields
- Gloves



"Why do you always get to wear the good mask?"

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## Don a Gown

- Select appropriate type and size
- Opening is in the back
- Secure at neck and waist
- Do not tie in the front



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## Don a Mask

- Place over nose, mouth and chin
- Fit flexible nose piece over nose bridge
- Secure on head with ties or elastic
- Adjust to fit



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## Don Eye and Face Protection

- Position goggles over eyes and secure to the head using the ear pieces or headband
- Position face shield over face and secure on brow with headband
- Adjust to fit comfortably



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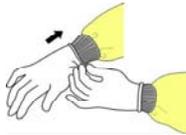
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## Don Gloves

- Don gloves last
- Select correct type and size
- Insert hands into gloves
- Extend gloves over isolation gown cuffs



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## Removing PPE

- Gloves
- Goggles or Face Shields
- Gown
- Mask or Respirator



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## Remove Gloves (1)



- Grasp outside edge near wrist
- Peel away from hand, turning glove inside-out
- Hold in opposite gloved hand

PPE Use in Healthcare Settings

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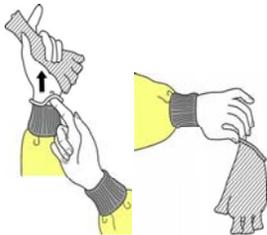
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## Remove Gloves (2)



- Slide ungloved finger under the wrist of the remaining glove
- Peel off from inside, creating a bag for both gloves
- Discard

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## Remove Goggles or Face Shield



- Grasp ear or head pieces with ungloved hands
- Lift away from face
- Place in designated receptacle for reprocessing or disposal

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## Removing A Gown



- Unfasten ties
- Peel gown away from neck and shoulder
- Turn contaminated outside toward the inside
- Fold or roll into a bundle
- Discard

PPE Use in Healthcare Settings

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## Removing a Mask



- Untie the bottom, then top, tie
- Remove from face
- Discard



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## PPE Summary

- The correct order of donning and removing PPE is key to protecting yourself and coworkers from contamination.
- Make it a habit to practice the correct sequence of PPE donning and removal as drills to make it second nature.

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## Transmission-based Precautions

- three categories of Transmission-Based Precautions:
  - Contact Precautions,
  - Droplet Precautions, and
  - Airborne Precautions
- used when the route(s) of transmission is (are) not completely interrupted using Standard Precautions alone

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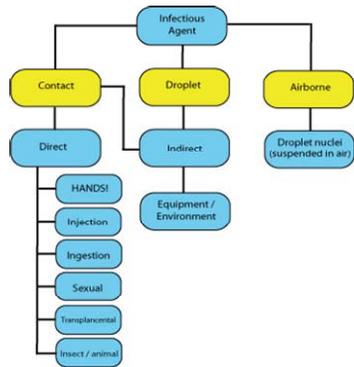
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## Contact Precautions

- reduce the risk of transmission of organisms from an infected or colonized patient through direct or indirect contact
- skin or eye infections that may be contagious (e.g., draining abscesses, skin infections that are wet and draining,
  - herpes zoster,
  - impetigo,
  - conjunctivitis,
  - scabies,
  - lice and
  - wound infections



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## Contact precautions



- Single room if available
- Double room: >3 feet spatial separation between beds
- gown and gloves for all interactions that may involve contact with the patient or potentially contaminated areas
- Donning PPE upon room entry and discarding before exiting the room if feasible
- noncritical patient care equipment for use with a single person, if possible.
- Clean and disinfect any equipment shared among infected and noninfected patients.

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## Droplet Precautions

- pathogens spread wholly or partly transmitted by droplets larger than 5  $\mu\text{m}$  in size to the conjunctiva or mucus membranes of a susceptible host
  - e.g., *H. influenzae*
  - *N. meningitidis* meningitis
  - *M. pneumoniae*
  - influenza
  - Mumps
  - adenovirus
  - rhinovirus
  - rubella viruses
  - diphtheria
  - pertussis (whooping cough)
  - strep pharyngitis



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## Droplet precautions

- Used in addition to standard precautions
- Wear mask if within three feet of infected person



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## Airborne Precautions

- reduce the transmission of particles 5  $\mu\text{m}$  or less in size that can remain in the air for several hours and be widely dispersed
- Microorganisms spread wholly or partly by the airborne route include
  - tuberculosis (TB),
  - chicken pox (varicella virus) and
  - measles (rubeola virus).



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## Airborne Precautions

- placement for persons who require Airborne Precautions is in a single room with door closed or in an airborne infection isolation room (AIIR)
- N-95 respirator
- non-immune HCWs should not care for persons with vaccine-preventable airborne diseases (e.g., measles, chickenpox, and smallpox)



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## Other control measures

- Increase Host Defenses- nutrition/rest/other



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## Other control measures

- Control/Elimination of Infectious Agents
  - Cleaning- use of H<sub>2</sub>O , detergents and mechanical action
  - Disinfecting-elimination of many/all microorganisms with chemical disinfectant (alcohols, chlorines)
  - Sterilization- not used extensively in complete elimination of ALL microor including spores (P&P,2005).



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## Control Reservoir/Portals of Exit

- Disposal of potentially contaminated waste.
- Sharps Control-Storage/Disposal
- <http://www.cdc.gov./niosh/docs88-119/waste>
- Containers should be:
  - Functional
  - Accessible
  - Visible
  - Accommodating

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## Questions ?

- Questions? More questions...



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