



# **General Microbiology 2022-2023 Infection Control Lectu**

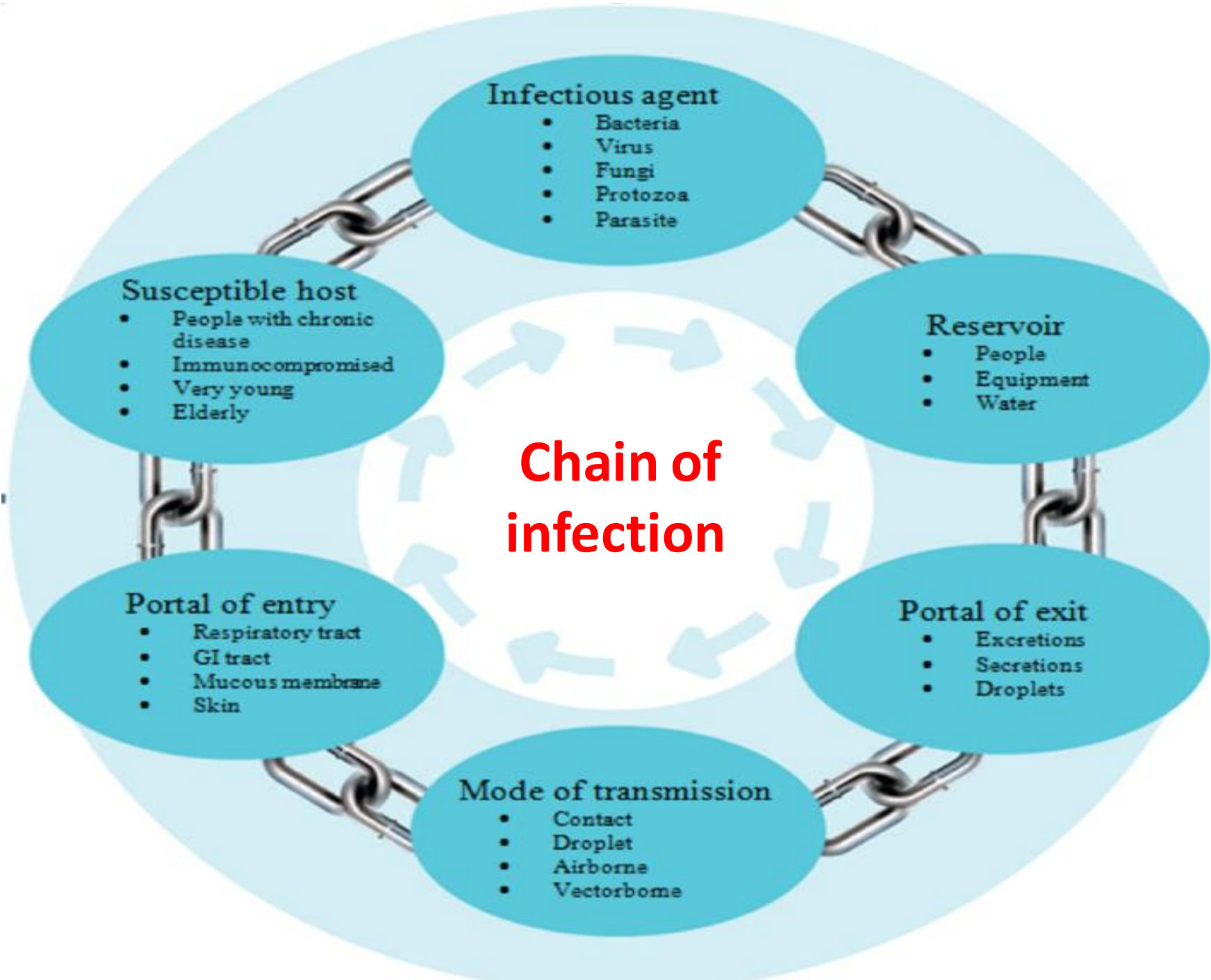
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# Infection Control

## Definition:

- Is the discipline concerned with preventing nosocomial or healthcare-associated infection
- **Aims of infection control:** to control the spread of infections within the healthcare setting including from
  - patient-to-patient
  - patients to staff
  - staff to patients, or among-staff



### Infectious agent

- Bacteria
- Virus
- Fungi
- Protozoa
- Parasite

### Susceptible host

- People with chronic disease
- Immunocompromised
- Very young
- Elderly

### Reservoir

- People
- Equipment
- Water

## Chain of infection

### Portal of entry

- Respiratory tract
- GI tract
- Mucous membrane
- Skin

### Portal of exit

- Excretions
- Secretions
- Droplets

### Mode of transmission

- Contact
- Droplet
- Airborne
- Vectorborne

**Precautions**

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graph TD; A[Precautions] --> B[Standard Precautions]; A --> C[Transmission-Based Precautions];
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**Standard  
Precautions**

**Transmission-  
Based  
Precautions**

# Standard Precautions

## Definition of Standard Precautions:

- Include a group of infection prevention practices that **apply to all patients**, regardless of suspected or confirmed infection status, in any setting in which healthcare is delivered.
- Are based on the principle that all body fluids may contain transmissible infectious agents including:
  - Blood.
  - Secretions and excretions except sweat.
  - Non intact skin and mucous membranes.

# Standard Precautions



**Hand hygiene**



**Use of gloves**



**Personal protective equipment**



**Use of gowns/apron**



**Safe handling of sharps**



**Safe handling of waste**



**Environmental cleaning**



**Safe handling of soiled linen**

# Personal protective equipments (PPEs)

**Gloves**



**Gowns**



**Apron**



**cap/hair cover**



**Eye Protection**



**Mask**



**Safety Devices**



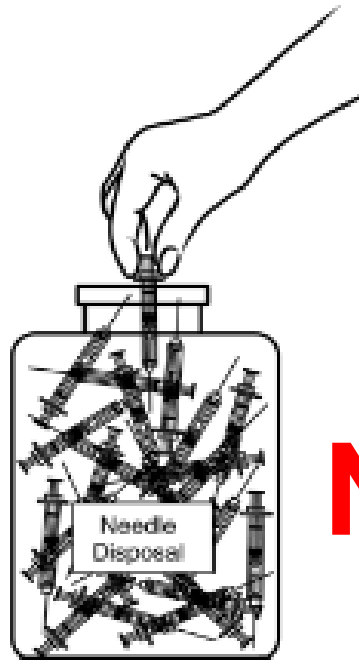
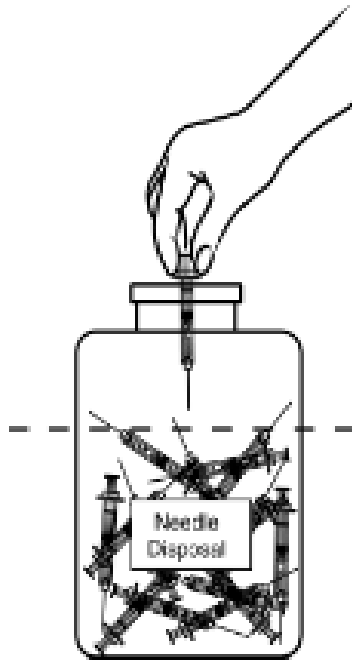
**shoe covers**



# Sharp containers



Yes



NO





# Prevention of needle stick/sharp injuries

Never recap

Never recap

**NEVER RECAP**

.....

**AIDS**



**Hepatitis**



Never recap

Never recap

**NEVER RECAP**

# Recapping using one handed technique

**If you must recap, use the "one-hand" technique:**

## Step 1

- Place the cap on a flat surface, then remove your hand from the cap.

## Step 2

- With one hand, hold the syringe and the needle to pick up the cap.

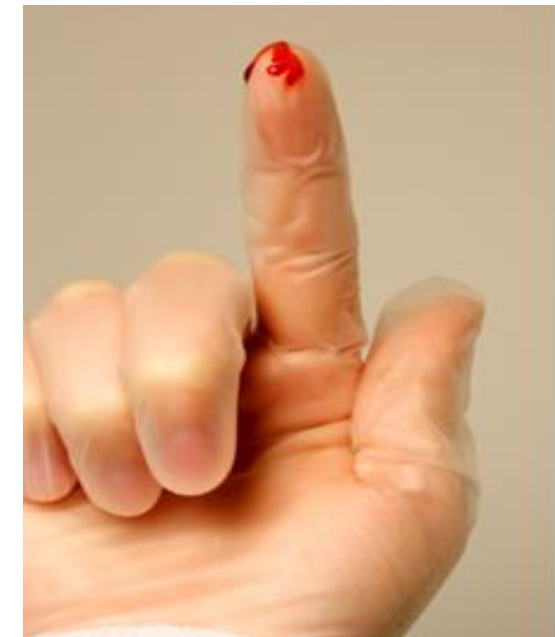
## Step 3

- When the cap covers the needle completely, use the other hand to secure the cap on the needle hub. Be careful to handle the cap at the bottom only (near the hub).

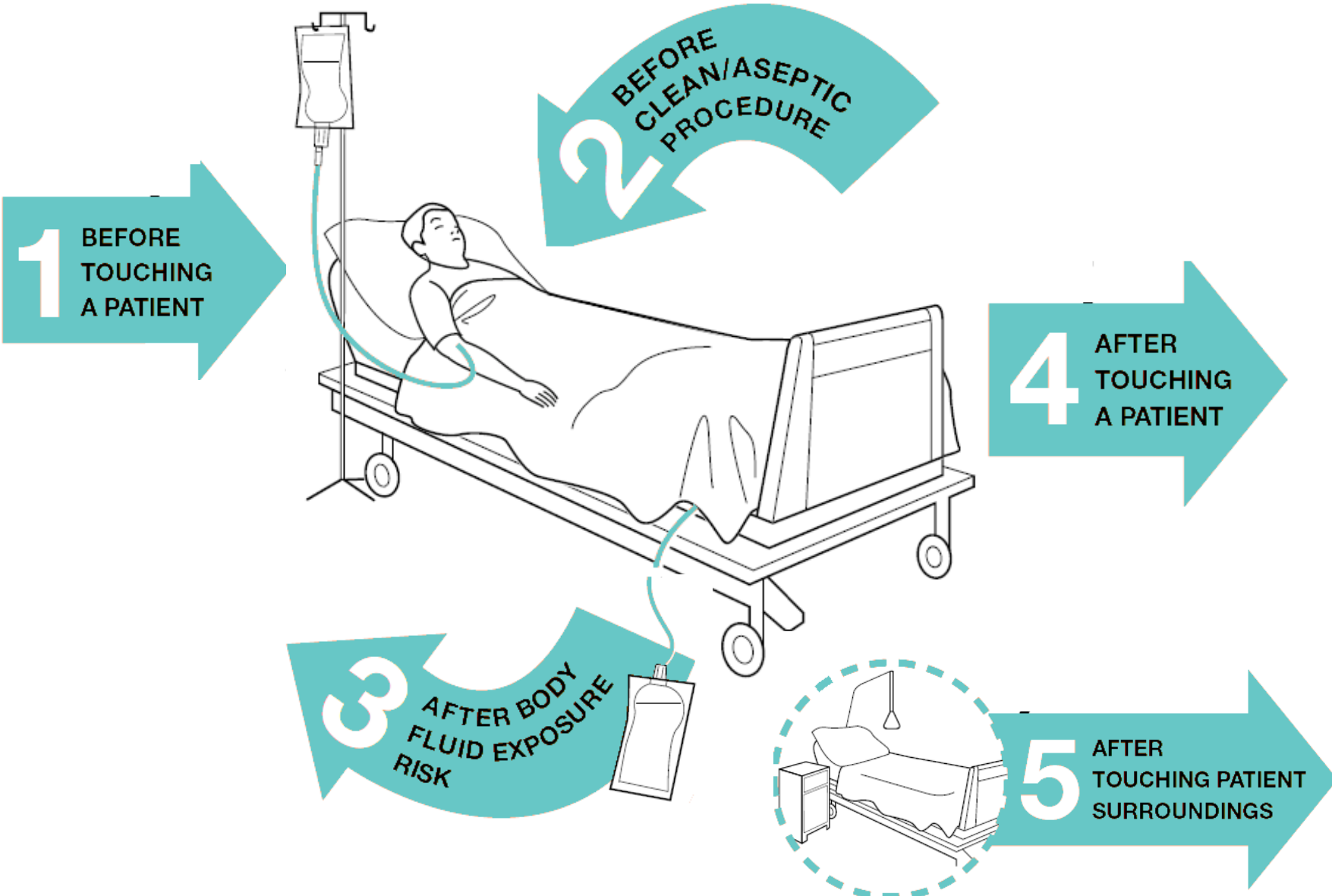


# What should I do if I injured myself with a used needle?

- A. If skin is penetrated encourage the wound to bleed, ideally by **holding it under running water**
- B. **Do not squeeze** the affected area.
- C. **Wash** the affected area with **soap and water**. **Alcohol-based hand rub** can be used to clean the area if soap and water are not available.
- D. **Report the incident** immediately to your supervisor.
- E. Ask about **follow-up care**, including post-exposure prophylaxis
- F. **Complete an accident report form**, including the date and time of the exposure, how it happened, and name of the source individual (if known).



# When you should wash your hands?



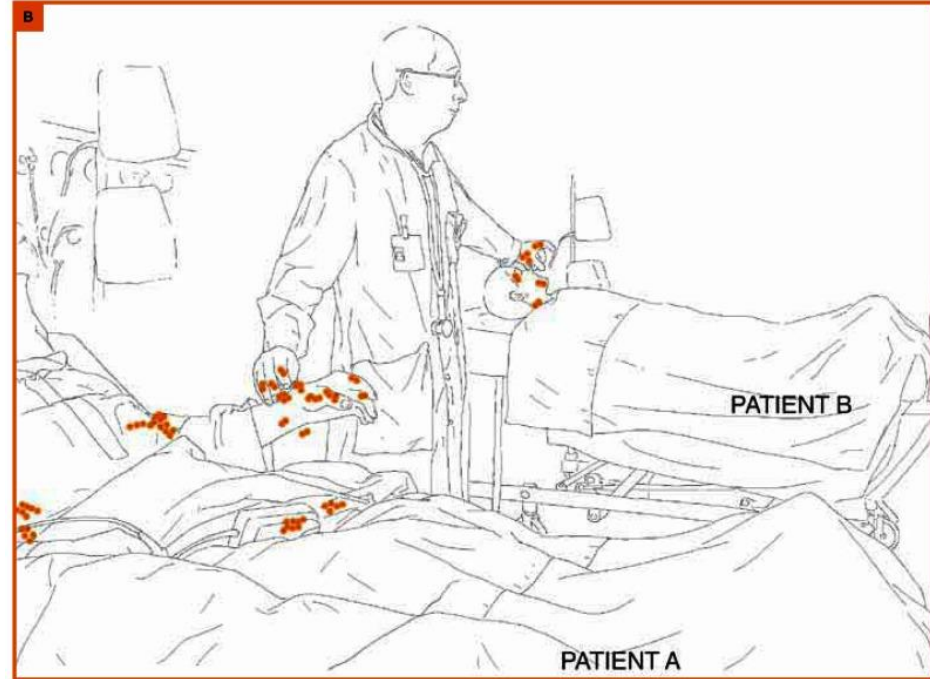
# Gloves

## When to wear gloves?

- When anticipated that contact with **blood or other potentially infectious materials**, **mucous membranes**, non intact skin.

## Rules:

- Do not wash gloves for the purpose of reuse since this is associated with transmission of pathogens
- Change gloves during patient care if the hands will move from a contaminated body-site to a clean body-site
- Do not wear the same pair of gloves for the care of more than one patient
- Remove gloves after contact with a patient and/or the surrounding environment (including medical equipment) using proper technique to prevent hand contamination



# Proper technique to remove gloves



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

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

# Gowns

## Why to wear a gown?

- To protect skin and prevent soiling or contamination of clothing during procedures and patient-care activities when contact with blood, body fluids, secretions, or excretions is anticipated
  - Remove gown and perform hand hygiene before leaving the patient's environment
  - Do not reuse gowns, even for repeated contacts with the same patient

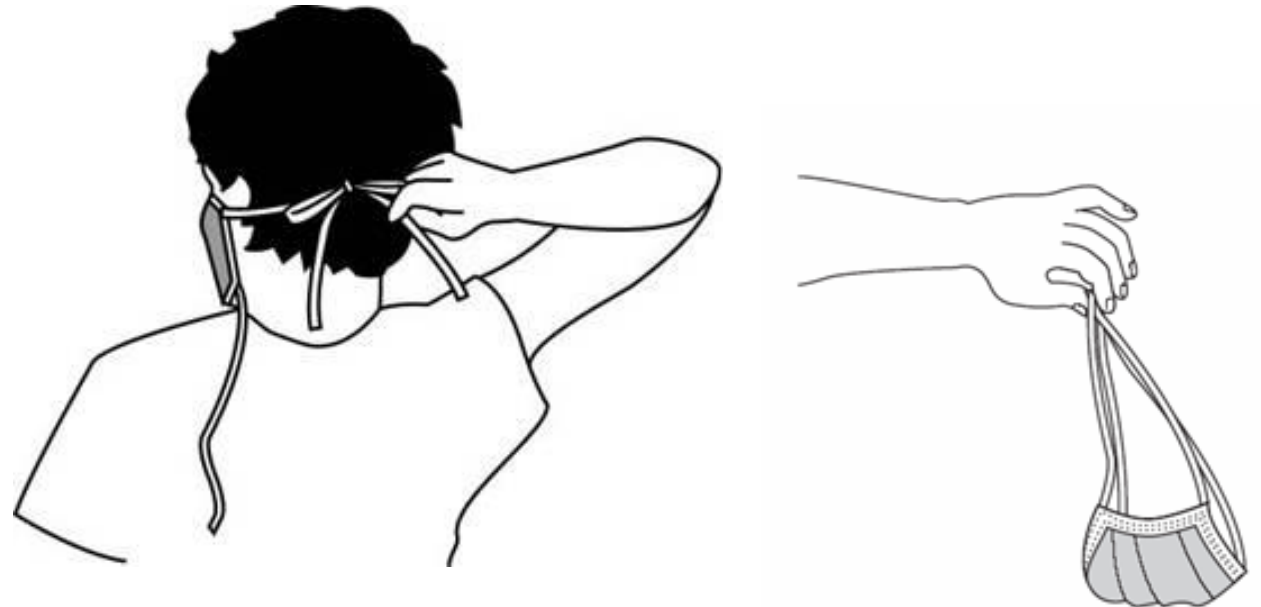


## Removing Gown

- Unfasten ties
- Peel gown away from neck and shoulder
- Turn contaminated outside toward the inside
- Fold
- Discard

## Removing Mask

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





# Mouth, Nose, Eye Protection

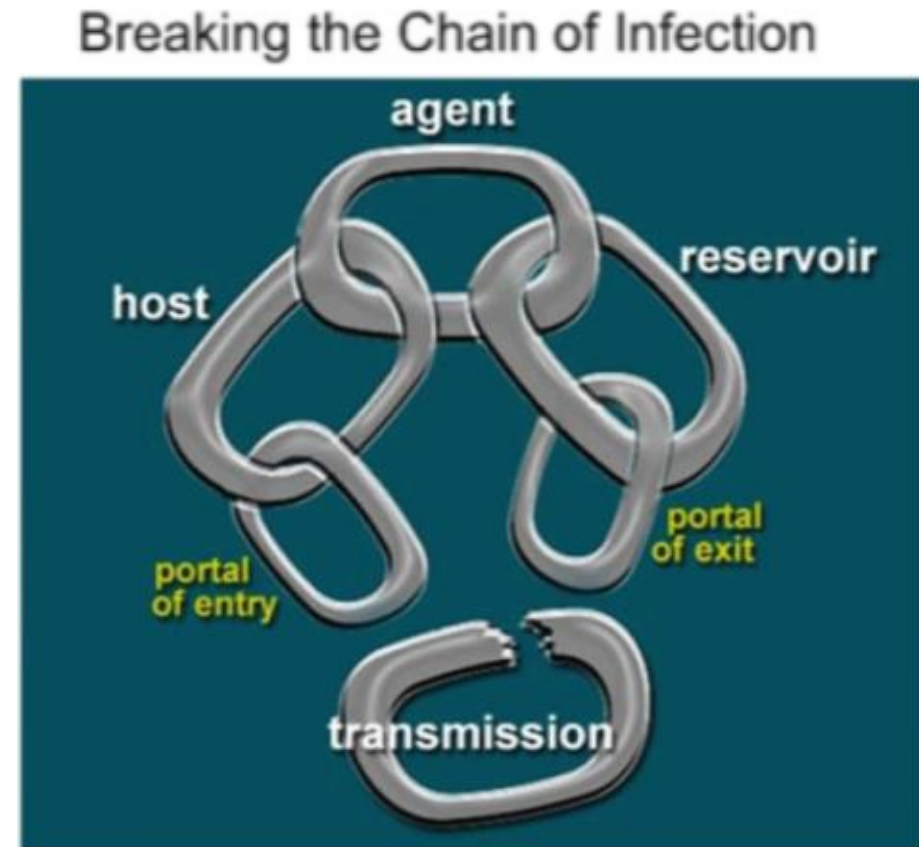
When to wear PPE to protect the mucous membranes of the eyes, nose and mouth?

- during procedures and patient-care activities that are likely to generate splashes or sprays of blood, body fluids, secretions and excretions (aerosol-generating procedures).



# Transmission-Based Precautions

- Transmission-based precautions are used **in addition to standard precautions** when use of standard precautions **alone does not fully prevent** communicable disease transmission
- Types of transmission-based precautions:
  - a. **Contact precautions.**
  - b. **Droplet precautions.**
  - c. **Airborne precautions.**



# Contact Precautions

“Contact organisms sticks like Vaseline to surfaces until cleaned”



## Mode of transmission



Direct contact where there is skin to skin contact between two persons



Indirect contact where there is contact with an inanimate object which may serve as the vehicle for transmission of pathogens

## Indication:

They are intended to prevent transmission of infectious agents which are spread by direct or indirect contact with the patient or the patient's environment

# Contact Precautions

## Examples include

Enteric infections with prolonged environmental survival such as	<i>C. difficile</i>
Highly contagious skin infections	scabies, impetigo, pediculosis, disseminated varicella zoster (shingles)
Resistant bacterial infections	(MRSA, VRE)
Diapered or incontinent patients with	enterohemorrhagic <i>E. coli</i> , shigella, hepatitis A, or rotavirus

# Contact Precautions

## 1. Patient placement

- Place patients in a single-patient room when available
- When single-patient rooms are in short supply
  - Prioritize patients.
  - Cohort patients.
- If it becomes necessary to place a patient who requires Contact Precautions in a room with a patient who is not infected or colonized with the same infectious agent.
  - Avoid immunocompromised patient.
  - Ensure physical separation.
  - Change protective clothes and perform hand hygiene between contact with patients in the same room.

## 3. Patient transport

- limit transport and movement.
- In transportation, ensure that infected or colonized areas of the patient's body are contained and covered.
- Remove and dispose of contaminated PPE and perform hand hygiene prior to transporting patient.
- wear clean PPE to handle the patient at the transport destination.

# CONTACT PRECAUTIONS

STOP



Wash Hands on  
**Entering**



Gloves



Gown



Wash Hands on  
**Leaving** Room

# Droplet Precautions



Droplet

transmission,  
where large  
respiratory  
particles travel  
up to 2 meters

## Definition

Droplets can be generated from the source person during coughing, sneezing, talking and during the performance of certain procedures such as suctioning or bronchoscopy

## Patient placement

The same as contact precautions

# Droplet Precautions

## Patient transport:

- limit transport and movement.
- Instruct patient to wear a mask and follow Respiratory Hygiene/Cough Etiquette.
- No mask is required for persons transporting patients.

## Examples of Infectious agents:

- *Bordetella pertussis*.
- Influenza virus.
- Adenovirus, rhinovirus.
- *N. meningitidis*.
- Group A streptococcus



# Droplet Precautions

Use of personal protective equipment



**HAND HYGIENE**  
Before Entering  
Room



**GOWN AND GLOVES**  
**REQUIRED**  
To Enter Room



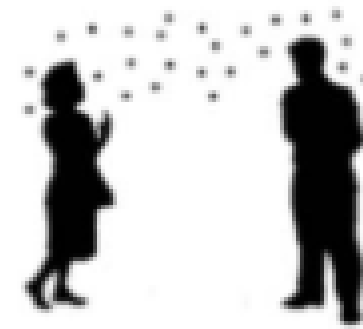
Mask with eye shield  
**REQUIRED**  
Within 6 ft of patient



**HAND HYGIENE**  
After Exiting  
Room

Abscess	Draining, major		Standard & Contact precautions	Duration of illness
	Draining, minor or limited		Standard & Contact precautions	
Adenovirus infection	• Conjunctivitis		Standard & Contact precautions	Duration of illness
	• Disseminated (2 or more sites) infection in immunocompromised host		Standard & Contact precautions	Duration of illness
	• Gastroenteritis		Standard & Contact precautions	Duration of illness
	• Respiratory infection		Standard & Droplet precautions	Duration of illness
Cellulitis (uncontrolled drainage)			Standard & Contact precautions	Duration of illness
Gastroenteritis	Cholera		Standard & Contact precautions	
	Clostridium difficile		Standard & Contact precautions	48hrs after diarrhea stops
	Rotavirus		Standard precautions Contact isolation	Duration of illness
	Shigella spp. Diapered or incontinent		Standard & Contact precautions	Duration of illness
	Viral		Standard & Contact precautions	
	Yersinia enterocolitica		Standard & Contact precautions	
Epiglottitis, due to Haemophilus influenzae type b			Standard precautions Droplet precautions	24Hrs after the initiation of effective antimicrobial therapy
Hepatitis, viral		• Type A	Standard & Contact precautions	
		• Type B, HBsAg positive, acute or chronic	Standard precautions	
		• Type C and other unspecified non-A, non-B	Standard precautions	
		• Type E	Standard & Contact precautions	
Multidrug-resistant organism, infection or colonization (e.g., MRSA, VRE, GNR, resistant Strept pneumoniae)			Standard & Contact precautions	

# Airborne Precautions



Airborne  
transmission  
whereby small  
particles travel  
long distances

Airborne Precautions: **prevent** transmission of infectious agents that **remain** infectious over long distances when **suspended** in **the air**

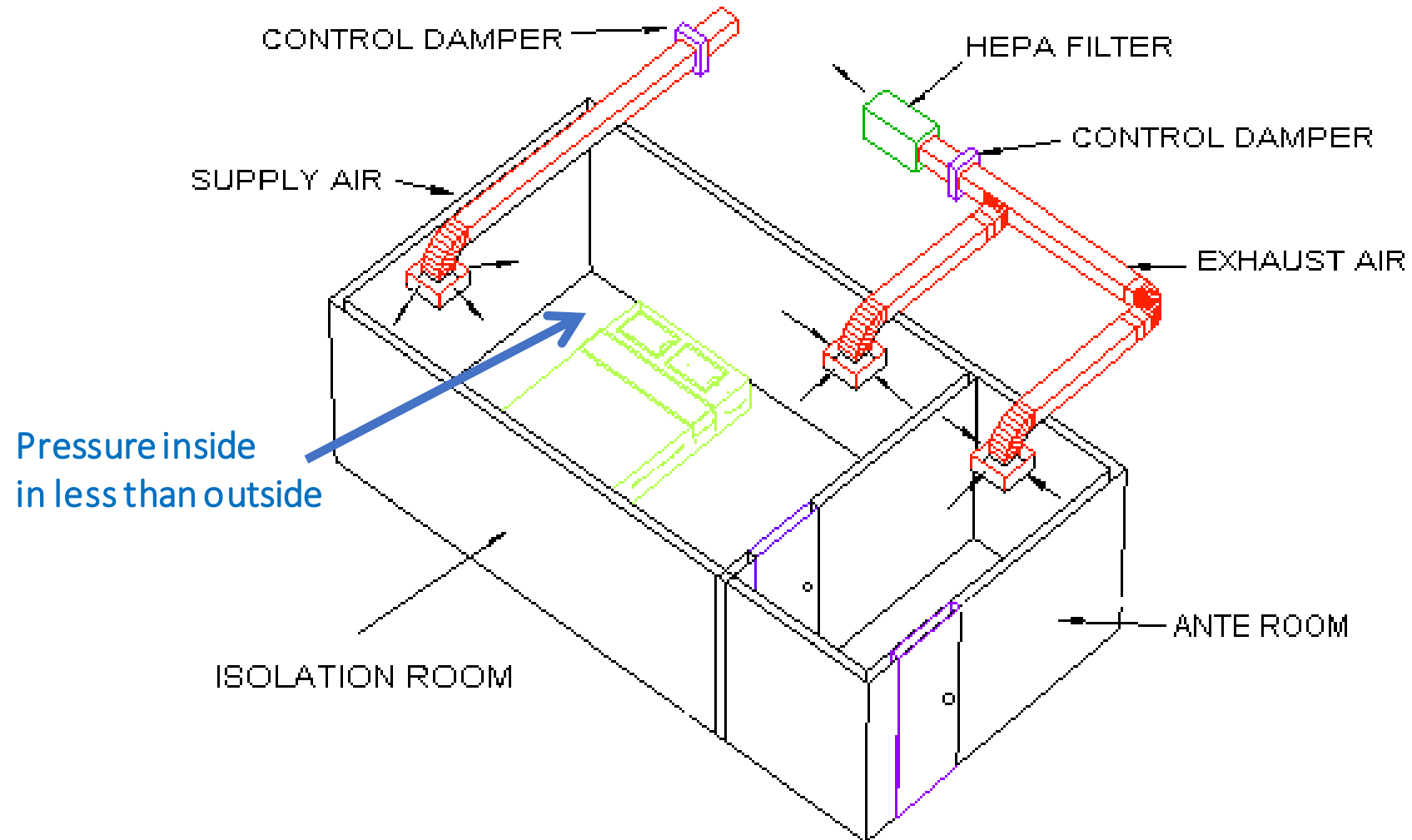
# Airborne Precautions

## 1. Patient placement

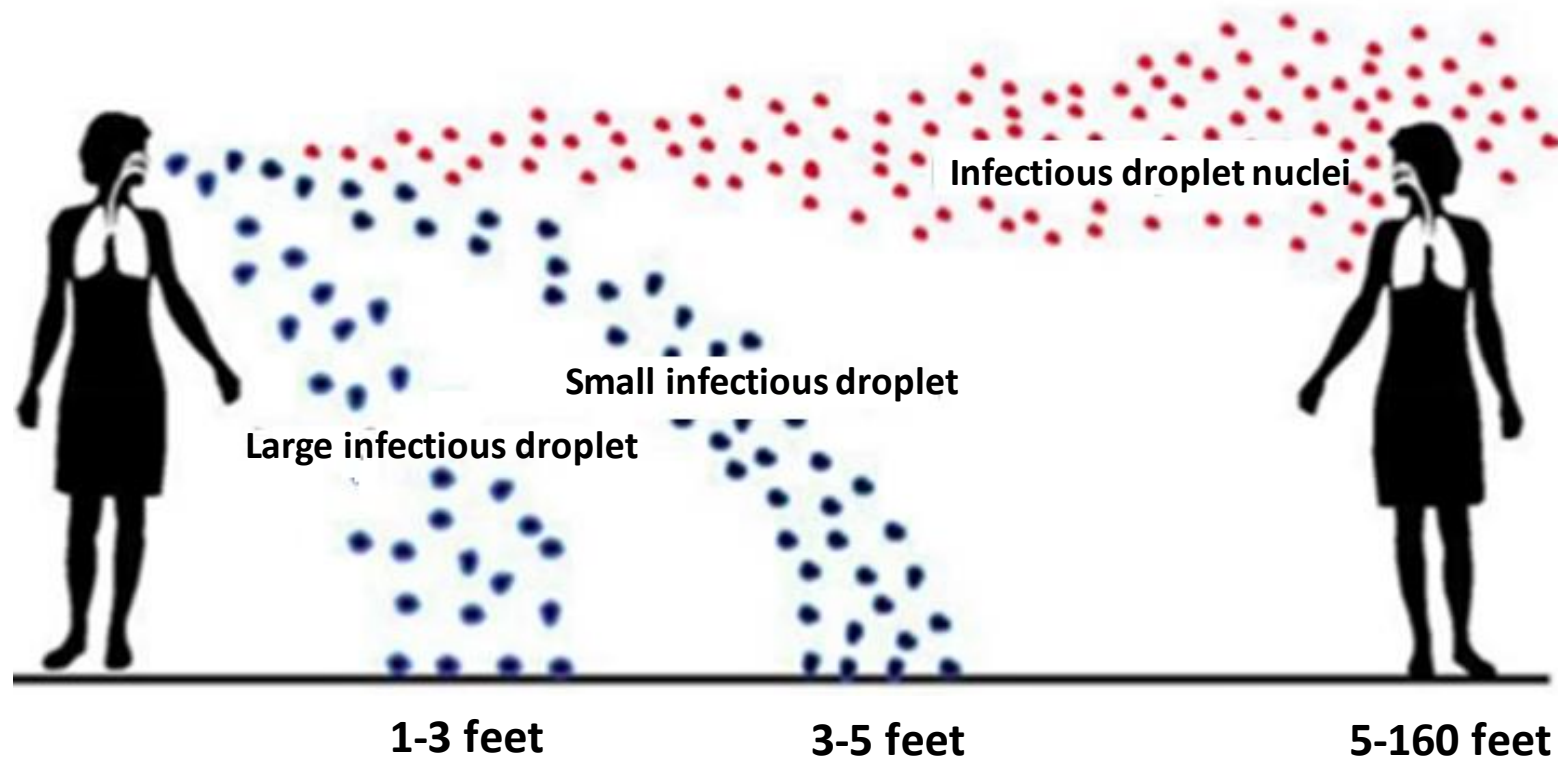
- Place patients in an **AIIR** (**A**irborne **I**nfection **I**solation **R**oom)
- An AIIR is:
  - A single-patient room
  - Equipped with special air handling and ventilation capacity
    - Monitored negative pressure.
    - Air exhausted directly to the outside or recirculated through HEPA filtration before return.

# Airborne Precautions

**AIIR** (Airborne Infection Isolation Room)



# Airborne Precautions



# Airborne transmitted diseases

ملاحظات	زمن العزل	المادة المعدية	نوع المرض
الأشخاص المعرضون للعدوى الذين لا يملكون المناعة يجب ألا يدخلوا الغرفة	حتى ظهور قشرة لجميع الإصابات، وللمرضى الذين تعرضوا لخطر العدوى من 10 إلى 21 يوم بعد التعرض	إفرازات الجهاز التنفسي أو مكان الإصابة	الجديري <b>Chickenpox</b>
الأشخاص المعرضون للعدوى الذين لا يملكون المناعة يجب ألا يدخلوا الغرفة	فترة البقاء بالمستشفى	إفرازات مكان الإصابة	التهاب هيريس (داء المنطقة المنتشر) <b>Disseminated Herpes Zoster</b>
فقط الأشخاص الأكثر قابلية للعدوى يقومون بارتداء القناع، أو يبقون خارج الغرفة	لمدة 5 أيام بعد ظهور الطفح، وفي حالة ضعف جهاز المناعة للمريض فيكون زمن العزل فترة البقاء بالمستشفى	إفرازات الجهاز التنفسي	الحصية <b>Measles (rubeola), all presentation</b>
	فترة البقاء بالمستشفى	إفرازات مكان الإصابة	الجدري <b>Smallpox</b>
	كحد أدنى 14 يوم بعد بداية العلاج الكيماوي، كما يجب وجود استجابة إكلينيكية مع عدم وجود الجراثيم داخل عينات البلغم، وفي حالة ما إذا كانت العينات سلبية مع تحسن حالة المريض فيمكن أن تصبح فترة الاحتياطيات 5 أيام	تنفسي - ميكروب السل	السل الرئوي <b>Pulmonary Tuberculosis</b> السل لبلعومي <b>pharyngeal Tuberculosis</b>
	فترة البقاء بالمستشفى	تنفسي	<b>Corona virus</b>

# AIRBORNE PRECAUTIONS



PARR: powered  
air purifying air  
respirators (PAPR)



**HAND HYGIENE**  
**Before Entering**  
**Room**



**N95/HEPA OR PAPR**  
**Respirator Mask**

**REQUIRED**  
**To Enter Room**



**Negative Air**  
**Pressure**  
**REQUIRED**  
**Keep Door Closed**



**HAND HYGIENE**  
**After Exiting**  
**Room**



# CDC Transmission- Based Precautions

CONTACT PRECAUTIONS	DROPLET PRECAUTIONS	AIRBORNE PRECAUTIONS
<p>To prevent the spread of infection, <b>ANYONE* ENTERING THIS ROOM <u>MUST</u> WEAR:</b></p> <p> <b>Gloves</b> ✓</p> <p> <b>Gown</b> ✓</p> <p>Applies whether or not contact with the patient or the patient's environment is anticipated.</p> <p>*Patient visitors do not need to wear gloves and a gown, but must <u>wash hands</u> upon entering and leaving this room.</p> <p><small>Updated! Please call the Department of Infection Control &amp; Prevention at 784-2025</small></p>	<p>To prevent the spread of infection, <b>ANYONE ENTERING THIS ROOM <u>MUST</u> WEAR:</b></p> <p> <b>Surgical Mask</b> ✓</p> <p>N-95 Respirators should <u>not</u> be used for personal protection with patients in droplet precautions.</p> <p><small>Updated! Please call the Department of Infection Control &amp; Prevention at 784-2025</small></p>	<p>To prevent the spread of infection, <b>ANYONE* ENTERING THIS ROOM <u>MUST</u> WEAR:</b></p> <p> <b>N-95 Respirator</b> ✓</p> <p>Also ensure that the <b>door</b> to the patient's room <b>remains closed at all times.</b></p> <p>*Patient visitors should wear a blue surgical mask while in the patient's room.</p> <p><small>Updated! Please call the Department of Infection Control &amp; Prevention at 784-2025</small></p>