

# Infection Prevention & Control For COVID-19

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TRAINING FOR HEALTH CARE WORKERS



# Definition

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What is infection prevention and control (IPC)?

IPC are evidence-based **practices** and **procedures** that are applied **consistently** in health care settings to **prevent** or **reduce the risk** of **transmission** of microorganisms to health care providers, clients, residents and visitors

# Introduction

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- ❑ Effective IPC is central to providing quality care for patients and a safe working environment for those that work in healthcare settings
- ❑ Any person working in or entering a healthcare facility is at risk of transmitting infection or being infected
- ❑ IPC is everybody's business
- ❑ Effective IPC can significantly reduce the rate of healthcare acquired infections (HIA)

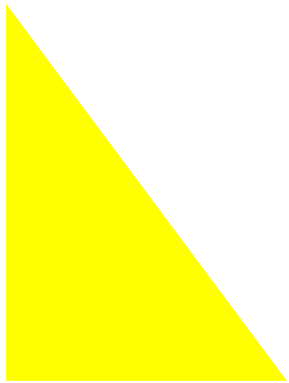
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# **Principles of disease transmission**

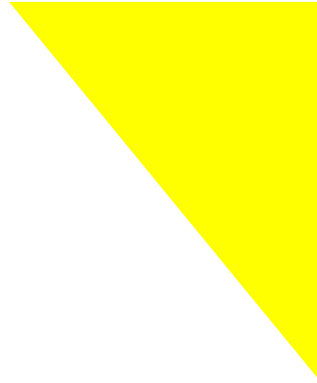
# Chain of infection

For infection to occur (in health care settings), the following MUST be present: (1) agent (2) reservoir (3) portals of entry and exit (4) mode of transmission (5) susceptible host

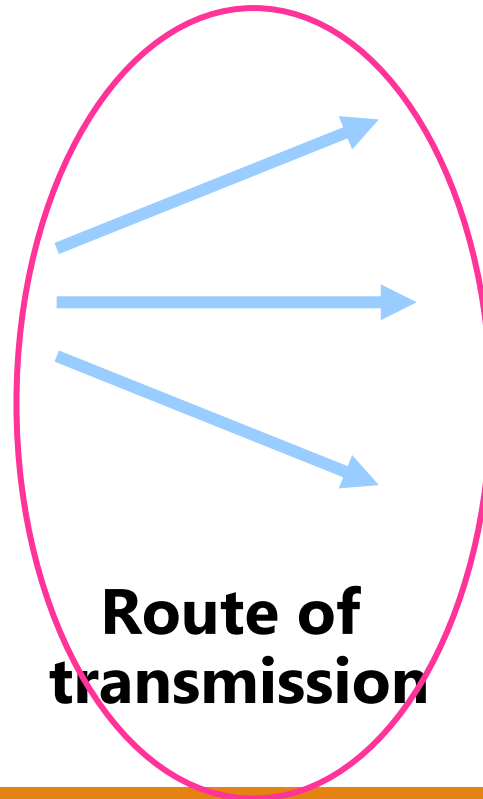
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**Virulence  
of  
pathogen**



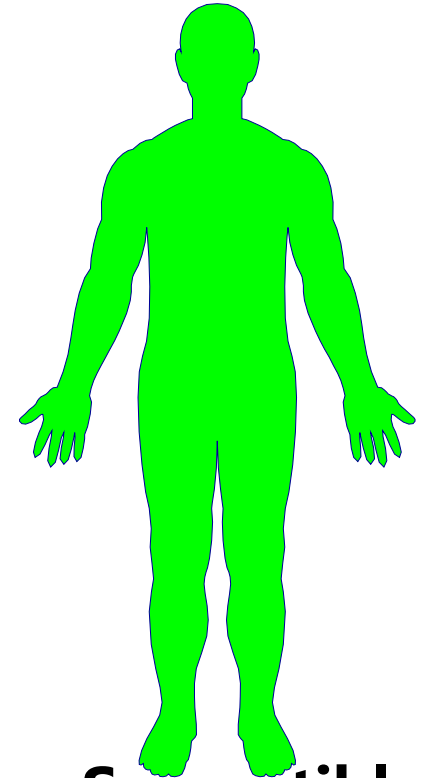
**Quantity  
of  
pathogen**



**Route of  
transmission**



**Port**



**Susceptible  
host**

# Routes of transmission 2019-COVID - 2019

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## **Direct**

- Contact: respiratory discharge, feces, fluids, foods, greetings
- Droplet: Large nuclei spread within 1 meter by coughing, sneezing, talking, medical procedures

## **Indirect**

- Air-borne – fine droplets or dust with infectious agent evaporated or aerosolized by procedures

# Methods of reducing spread of infection

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Uses of IPC precautions concept - are sets of practices and procedures intended to prevent the transmission of infectious agents

- Standard precautions
- Transmission based precautions

## Standard precautions:

First-line IPC practices and procedures

Assumes infectious agents are present in ALL patient's blood, body fluids, secretions, intact skin and mucous membranes

Practices applied at **all times**, for **all patients**, regardless of their perceived or confirmed infectious status to ensure a basic level of IPC

# Standard precautions includes:

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- ❑ Hand washing skills
- ❑ Use of PPE: gloves, mask, gown
- ❑ Routine cleaning of frequently touched surfaces
- ❑ Prompt and careful cleaning up of spills of body fluids
- ❑ Safe handling and disposal of needles & other sharps
- ❑ Safe systems for waste segregation & disposal
- ❑ Disinfection, sterilization of patient care equipment, linen contaminated with infective material



# Hand hygiene practices

Cornerstone of infection prevention and control

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**Single most effective method to prevent the spread of many communicable diseases**

Use of plain soap & water to mechanically remove pathogens

Hand antisepsis: antimicrobial soap & water, alcohol based hand gel

What are the 5 moments of hand washing?

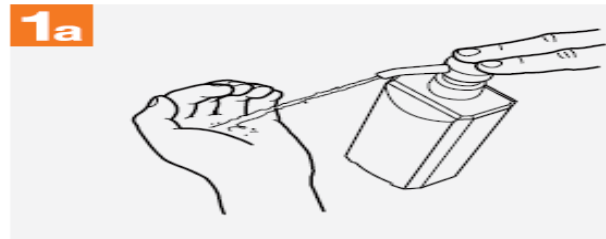
What are the techniques of:

- Handwashing?
- Alcohol based handgel application?

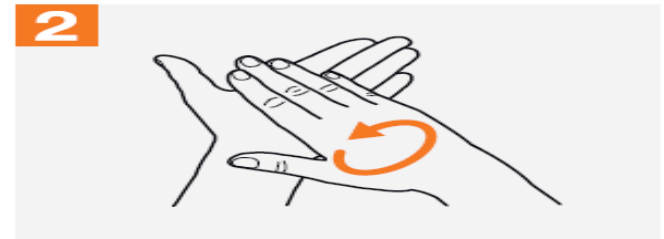
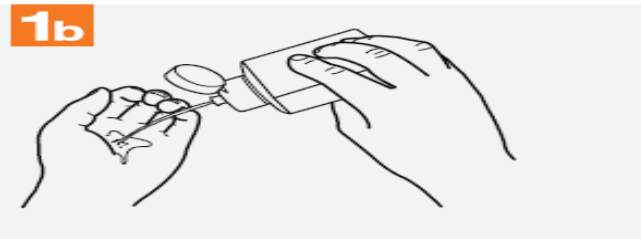
# How to Handrub?

**RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED**

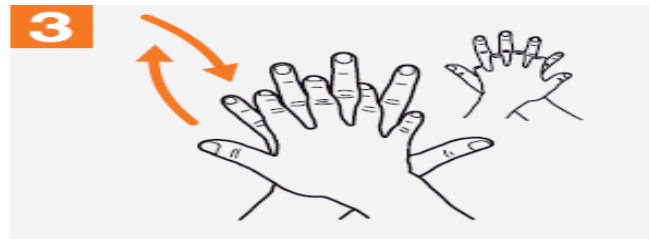
 **Duration of the entire procedure: 20-30 seconds**



Apply a palmful of the product in a cupped hand, covering all surfaces;



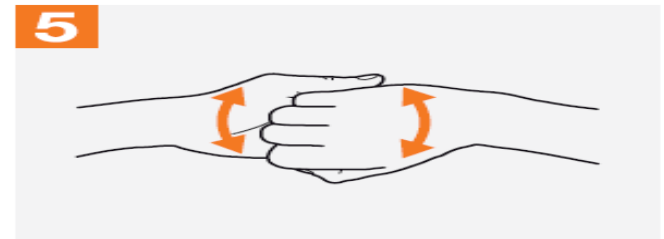
Rub hands palm to palm;



Right palm over left dorsum with interlaced fingers and vice versa;



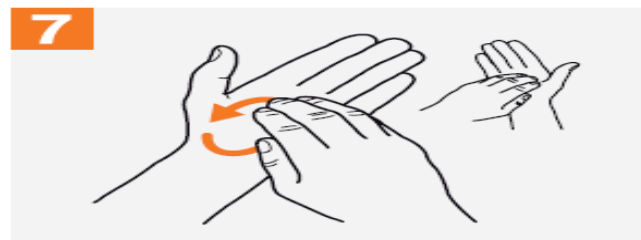
Palm to palm with fingers interlaced;



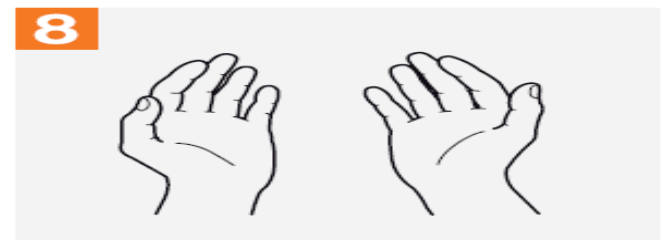
Backs of fingers to opposing palms with fingers interlocked;



Rotational rubbing of left thumb clasped in right palm and vice versa;




Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



Once dry, your hands are safe.

# Hand Hygiene Technique with Soap and Water

WHO GUIDELINES ON HAND HYGIENE IN HEALTH CARE

 **Duration of the entire procedure: 40-60 seconds**



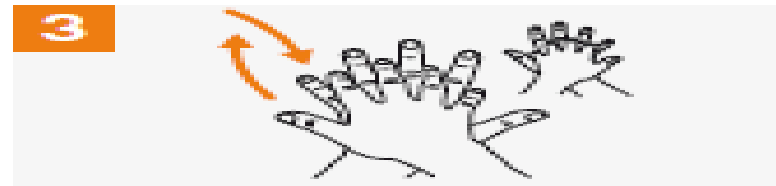
**Wet hands with water;**



**Apply enough soap to cover all hand surfaces;**



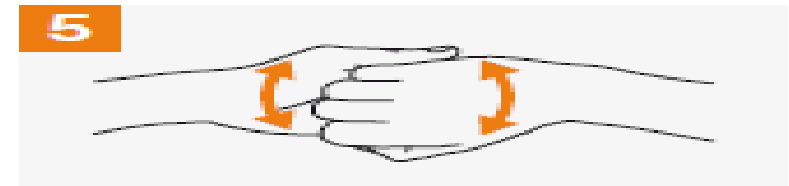
**Rub hands palm to palm;**



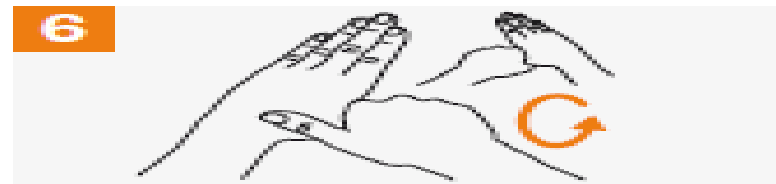
**Right palm over left dorsum with interlaced fingers and vice versa;**



**Palm to palm with fingers interlaced;**



**Backs of fingers to opposing palms with fingers interlocked;**



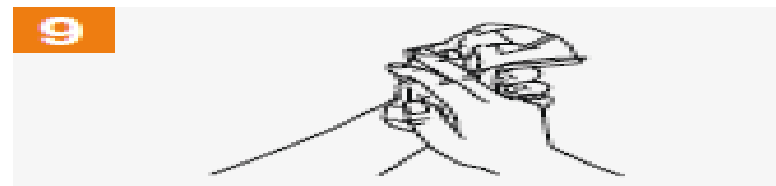
**Rotational rubbing of left thumb clasped in right palm and vice versa;**



**Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;**



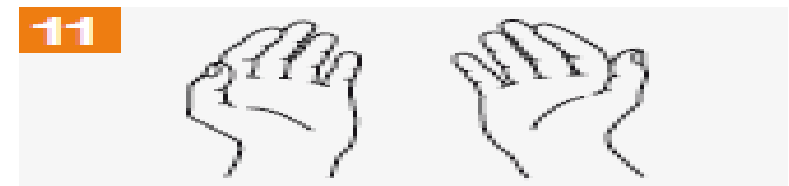
**Rinse hands with water;**



**Dry hands thoroughly with a single use towel;**



**Use towel to turn off faucet;**



**Your hands are now safe.**

# Transmission-based precautions:

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Additional practices for specific situations where standard precautions are not sufficient to interrupt transmission

They are IPC practices and procedures based on:

- Infectious agent
- Mode of exit, entry, transmission, host susceptibility

There are three types of transmission based precautions

- Contact precautions
- Droplet precautions
- Airborne precautions

# Contact precautions

Prevent transmission of pathogens through direct or indirect contact with patients or patient care environment

Examples of diseases

- COVID -19
- RVF
- Cholera
- Avian influenza
- Ebola hemorrhagic fever
- Shigellosis

# Contact Precautions

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## **Health worker: Use of personal protective equipment (PPE)**

Gloves : non-sterile, clean, disposable gloves

Gowns

- Appropriately-sized disposable which is worn once before disposal

Apron

Disinfect –remains in the isolation room

## **Patient**

Use disposable equipment or dedicated reusable equipment for each patient (clean and disinfect between each patient use).

Isolation or cohorting of patients

Limit patient movement and minimize contact with other non-infected persons.

# Droplet precautions

Prevent infection by large droplets

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(> 5 microns) from

- Sneezing
- Coughing
- Talking

Examples

- 2019-COVID -2019
- RVF
- Neisseria meningitidis
- Pertussis
- Influenza
- Avian influenza (probable)



# Droplet precautions

*Taken in addition to Standard and contact Precautions*

## **Health worker: Use of PPE**

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Medical-surgical/N95 mask when within 1m (3") of patient

Wear face shield or goggles

## **Patient**

Isolate the patient in a well ventilated single room.

- If not possible, cohort patients with same suspected etiology in same room.
- If not possible, place patient beds at least 1m apart and arranged to keep a distance between patients.

Limit patient movement out of the isolation room

Have patient use a medical-surgical mask when outside the isolation room



# Airborne precautions

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*Taken in addition to Standard, Contact and Droplet Precautions*

Prevent spread of infection through very small (< 5 microns) airborne particles

## Examples

- Tuberculosis
- Measles
- *Varicella*
- *Variola*

# Airborne precautions

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N95 mask (or equivalent) for personnel

- Check seal with each use

Negative pressure isolation room

- Air exhaust to outside versus re-circulated

Patient to wear a surgical mask while inside and outside of the isolation room

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# **Infection prevention and control for 2019- COVID -2019**

# Principles of IPC strategies associated with health care for suspected COVID -2019 infection

1. Ensuring triage, early recognition, and source control (isolating patients with suspected COVID -2019 infection);
2. Applying standard precautions for all patients;
3. Implementing empiric additional precautions (droplet and contact and, whenever applicable, airborne precautions) for suspected cases of COVID -2019 infection;
4. Implementing administrative controls;
5. Using environmental and engineering controls.

# 1. Ensuring triage, early recognition, and source control

Encourage HCWs to have a high level of clinical suspicion (by use of case definition)

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Establish a triage station equipped with a thermo-gun and screening questions capturing clinical, travel, and contact information

Institute screening using thermo-gun and questions

Anybody with a temperature = to or  $>38^{\circ}\text{C}$  or answers positively to any of the screening questions will be directed to a separate room for evaluation by a clinician using the working case definition

Anybody who meets the working case definition should be isolated

# 2. Applying standard precautions for all patients

## 1/2

Ensure that the following respiratory hygiene measures are used:

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Ensure that all patients cover their nose and mouth with a tissue or elbow when coughing or sneezing

Offer a mask to patients with suspected 2019-COVID -2019 infection while they are in waiting/public areas or in isolation rooms

Perform hand hygiene always.

# 2/2

HCWs should apply the WHO's My 5 Moments for Hand Hygiene approach

- before touching a patient,
  - before any clean or aseptic procedure is performed,
  - after exposure to body fluid,
  - after touching a patient, and
  - after touching a patient's surroundings.
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Hand hygiene includes either cleansing hands with an alcohol-based hand rub (ABHR) or with soap and water

Alcohol-based hand rubs are preferred if hands are not visibly soiled

Wash hands with soap and water when they are visibly soiled.

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## 3. Implementing empiric additional precautions



# Contact and droplet precautions 1/5

- In addition to using standard precautions, all individuals, including family members, visitors and HCWs, should use contact and droplet precautions before entering the room where suspected or confirmed COVID -2019 patients are admitted
- Patients should be placed in adequately ventilated single rooms. For general ward rooms with natural ventilation, adequate ventilation is considered to be 60 L/s per patient
- When single rooms are not available, patients suspected of being infected with COVID -2019 should be grouped together

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- Where possible, a team of HCWs should be designated to care exclusively for suspected or confirmed cases to reduce the risk of transmission
  - HCWs should use a mask
  - Regardless of whether they are suspected to have COVID -2019 infection
  - HCWs should wear eye protection (goggles) or facial protection (face shield) to avoid contamination of mucous membranes
  - HCWs should wear a clean, non-sterile, long-sleeved gown

- ❑ HCWs should also use gloves
- ❑ The use of boots, coverall and apron is not required during routine care
- ❑ After patient care, appropriate doffing and disposal of all PPE's and hand hygiene should be carried out. Also, a new set of PPE's is needed, when care is given to a different patient
- ❑ Equipment should be either single-use and disposable or dedicated equipment (e.g., stethoscopes, blood pressure cuffs and thermometers).
- ❑ If equipment needs to be shared among patients, clean and disinfect it between use for each individual patient (e.g., by using ethyl alcohol 70%)

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- ❑ HCWs should refrain from touching eyes, nose or mouth with potentially contaminated gloved or bare hands
  - ❑ Avoid moving and transporting patients out of their room or area unless medically necessary. Use designated portable X-ray equipment and/or other designated diagnostic equipment. If transport is required, use predetermined transport routes to minimize exposure for staff, other patients and visitors, and have the patient using a medical mask
  - ❑ Ensure that HCWs who are transporting patients perform hand hygiene and wear appropriate PPE as described in this section;

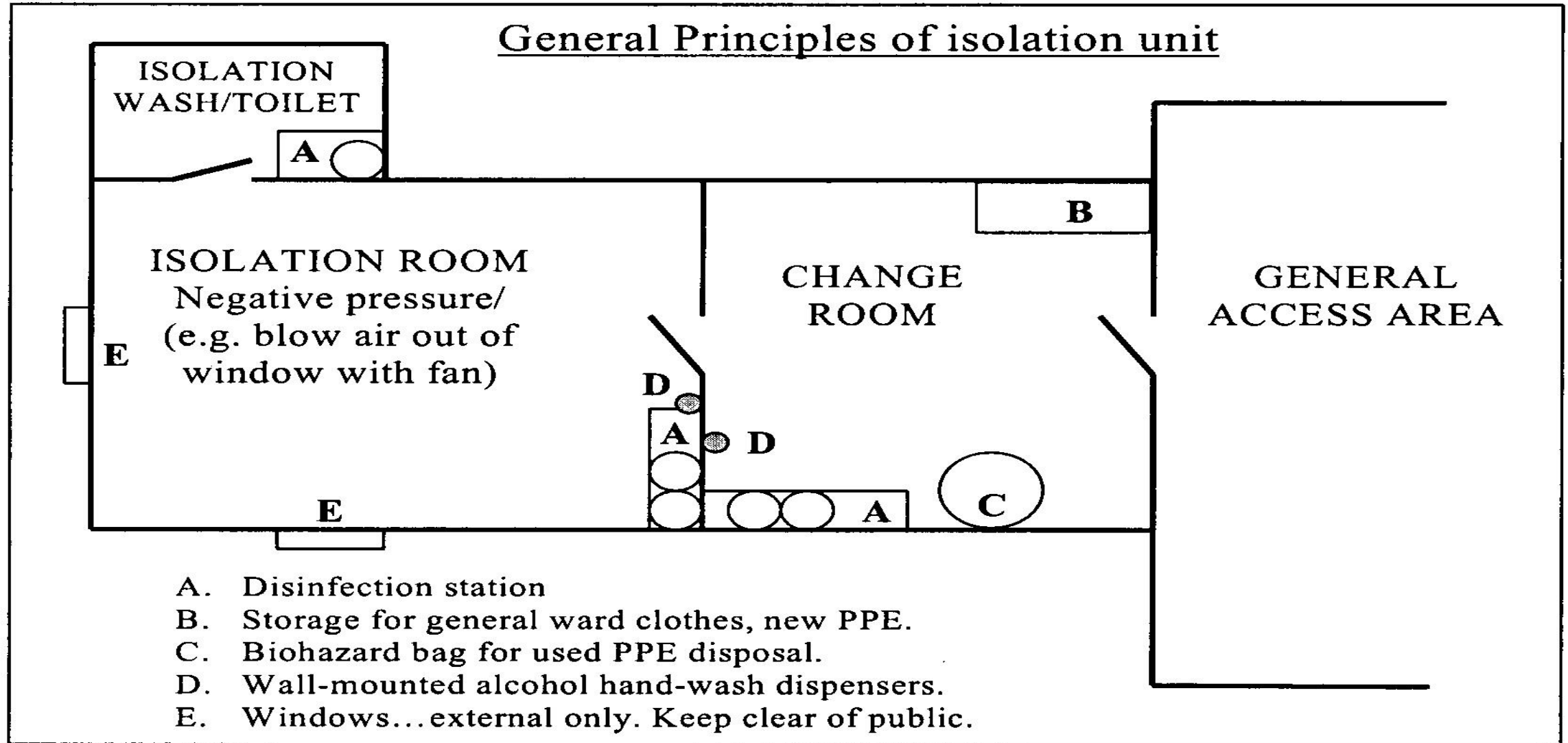
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- Notify the area receiving the patient of any necessary precautions as early as possible before the patient's arrival
  - Routinely clean and disinfect surfaces which the patient is in contact
  - Limit the number of HCWs, family members and visitors who are in contact with a suspected and confirmed 2019-COVID -2019 patient
  - Maintain a record of all persons entering the patient's room, including all staff and visitors.

# Airborne precautions for aerosol-generating procedures 1/4

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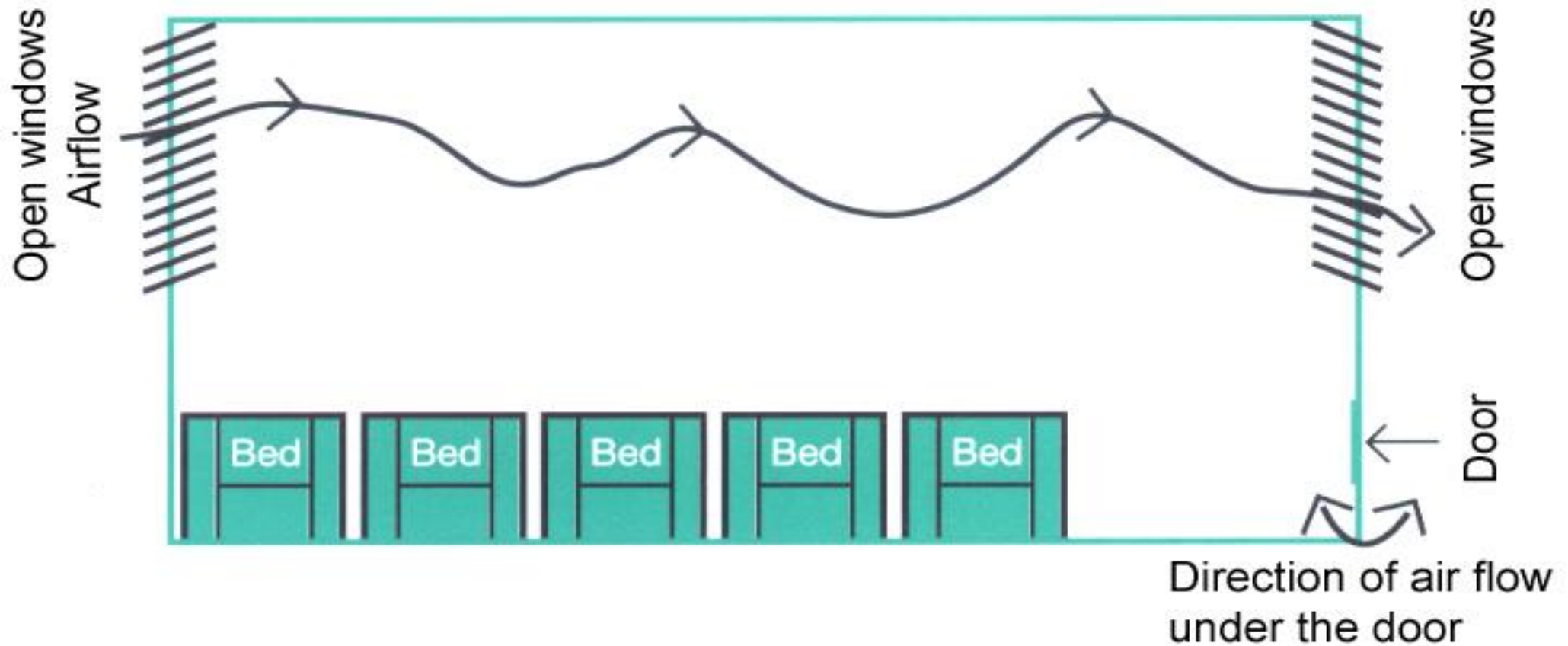
- ❑ Ensure that HCWs performing aerosol-generating procedures:
- ❑ Perform procedures in an adequately ventilated room – that is, natural ventilation with adequate air flow or in negative pressure rooms and controlled direction of air flow when using mechanical ventilation
- ❑ Use a particulate respirator at least as protective as N95.
- ❑ When HCWs put on a disposable particulate respirator, they must always perform the seal check. Note that if the wearer has facial hair (i.e., a beard) it may prevent a proper respirator fit

# Negative Pressure Isolation Room 2/4



# Natural Ventilation Cohorting Room 3/4

Figure 2. Natural ventilation; free flow of ambient air in and out through open windows.





- Use eye protection (i.e., goggles or a face shield)
- Wear a clean, non-sterile, long-sleeved gown and gloves.
- If gowns are not fluid resistant, HCWs should use a waterproof apron for procedures expected to have high volumes of fluid that might penetrate the gown
- Limit the number of persons present in the room to the absolute minimum required for the patient's care and support.

# 4. Implementing administrative controls

Administrative controls and policies for the prevention and control of transmission of COVID 19 infections within the healthcare setting include, but may not be limited to:

- Establishing sustainable IPC infrastructures and activities
- Educating patients' caregivers
- Developing policies on the early recognition of acute respiratory infection potentially caused by 2019-COVID -2019
- Ensuring access to prompt laboratory testing for identification of the etiologic agent
- Preventing overcrowding, especially in the emergency department
- Providing dedicated waiting areas for symptomatic patients
- Appropriately isolating hospitalized patients
- Ensuring adequate supplies of PPE
- Ensure the adherence of IPC policies and procedures for all facets of health care.

# Administrative measures related to healthcare workers

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- ❑ Ensuring an adequate patient-to-staff ratio
- ❑ Establishing a surveillance process for acute respiratory infections potentially caused by COVID -2019 among HCWs
- ❑ Ensuring that HCWs and the public understand the importance of promptly seeking medical care
- ❑ Monitoring HCW compliance with standard precautions and providing mechanisms for improvement as needed.

# 5. Using environmental and engineering controls

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- These controls address the basic infrastructure of the health care facility.
- These controls aim to ensure there is adequate ventilation in all areas in the healthcare facility, as well as adequate environmental cleaning.

Additionally,

**Spatial separation** of at least 1 meter should be maintained between all patients.

Both spatial separation and adequate ventilation can help reduce the spread of many pathogens in the healthcare setting.

# Cleaning and disinfection procedures

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- ❑ Ensure that cleaning and disinfection procedures are followed consistently and correctly.
- ❑ Cleaning environmental surfaces with water and detergent and applying commonly used hospital disinfectants (such as sodium hypochlorite) is an effective and sufficient procedure.
- ❑ Manage laundry, food service utensils and medical waste in accordance with safe routine procedures.

# How to Put on and Remove Personal Protective Equipment

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# PPE Donning Steps

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1. Wash hands
2. Wear first layer of protective clothing
3. Put on rubber boots
4. Put on first pair of gloves
5. Put on the outer gown
6. Put on the plastic apron
7. Put on the second pair of gloves
8. Put on the mask
9. Put on a head cover
10. Put on the goggles

# N95 Particulate Respirator

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- ❑ Pay attention to size (S, M, L)
- ❑ Place over nose, mouth and chin
- ❑ Fit flexible nose piece over nose bridge
- ❑ Secure on head with elastic



- ❑ Adjust to fit and check for fit:
  - ❑ Inhale – respirator should collapse
  - ❑ Exhale – check for leakage around face



# Eye and Face Protection

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- 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

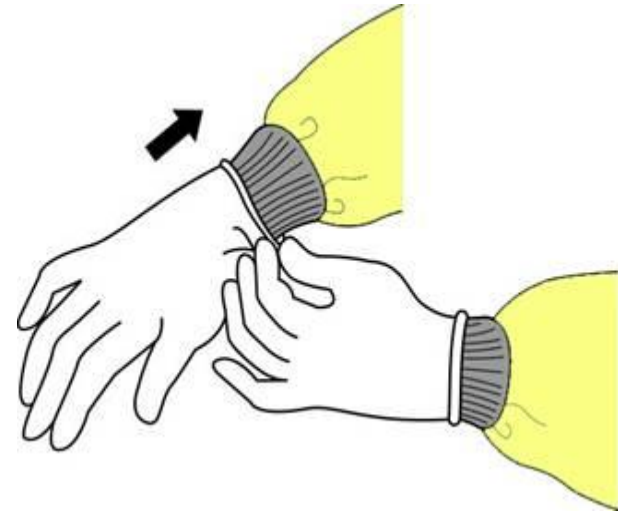


# Gloves

- Don gloves last

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- Select correct type and size
- Insert hands into gloves
- Extend gloves over gown cuffs
- Double glove when supplies permit



# Key Infection Control Points

- Minimize exposures
  - Plan before entering room

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- Avoid adjusting PPE after patient contact
  - Do not touch eyes, nose or mouth!
- Avoid spreading infection
  - Limit surfaces and items touched
- Change torn gloves
  - Wash hands before donning new gloves

# Duration of PPE Use

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## **Surgical Masks (if N95 not available)**

- **Wear once and discard**
- **Discard if moist**

## **N95 Particulate Respirators**

- **May use just one with cohorted patients**

## **Eye Protection**

- **May wash, disinfect, reuse**

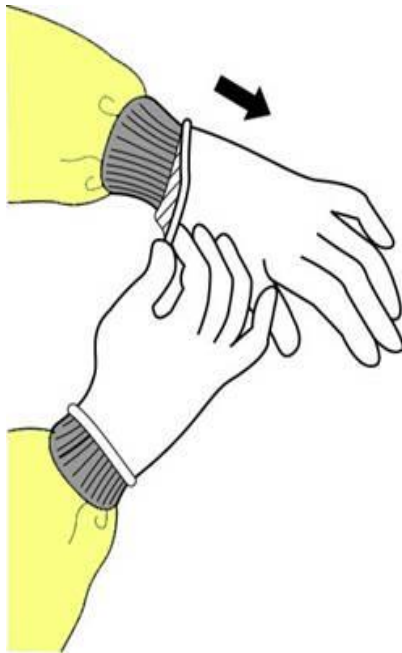
# PPE Removal Steps

Remove in anteroom when possible

1. **Disinfect the outer pair of gloves**
2. **Disinfect the apron and boots**
3. **Remove the outer pair of gloves**
4. **Remove the apron**
5. **Remove the outer gown**
6. **Disinfect the gloved hands**
7. **Remove the goggles**
8. **Remove the head cover (if the mask is not tied to it)**
9. **Remove the mask**
10. **Remove the boots**
11. **Remove the inner pair of gloves**
12. **Wash hands with bleach solution or soap and clean water**

# Removing Gloves

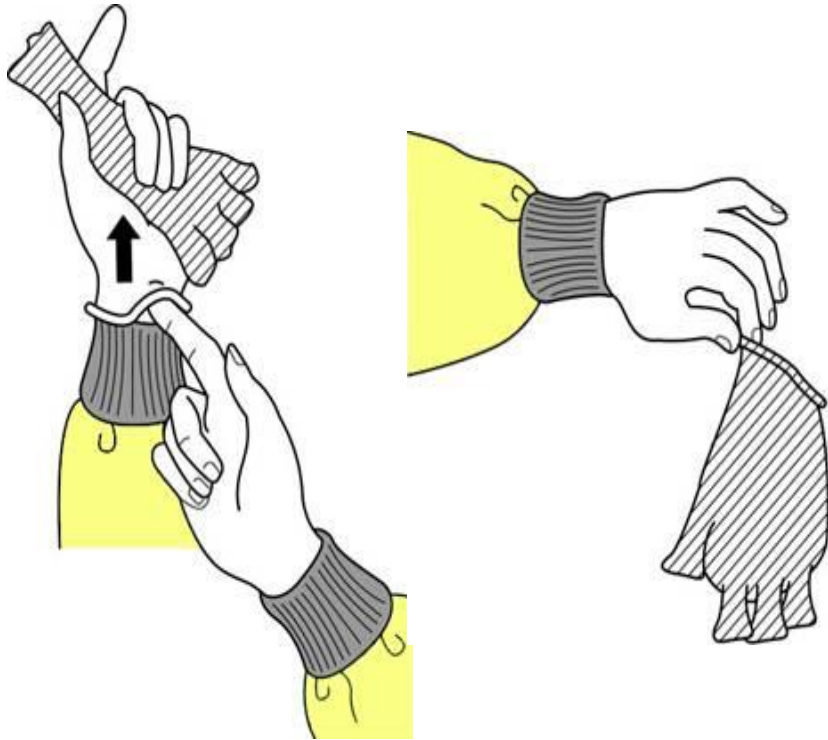
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- **Grasp outside edge near wrist**
- **Peel away from hand, turning glove inside-out**
- **Hold in opposite gloved hand**

# Removing Gloves

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

# Removing A Gown

1. **Unfasten ties**
2. **Peel gown away from neck and shoulder**



3. **Turn contaminated outside toward the inside**
4. **Fold or roll into a bundle**
5. **Discard**



# Removing Goggles or A Face Shield

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

# Removing a Mask

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**Lift the bottom elastic over your head first**

**Then lift off the top elastic**

**Discard**

**Don't touch front of mask**



# If You Must Reuse PPE..

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Use during one shift and for one patient

Discard at the end of each shift

## GOWN

Hang gown with outside facing in

## MASK OR RESPIRATORS

Put the mask into the sealable bag

May touch the front of the mask, but wash hands immediately after removing



# Hand Washing

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- **Between PPE item removal if bare hands touch a potentially contaminated surface**
- **Immediately after removing all PPE**
- **Use soap and water or an alcohol-based hand rub**

# Demonstration

PUT ON AND REMOVE PPE

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