



Personal Protective Equipment PPE

الادارة العامة لمكافحة عدوى المنشآت الصحية

General Directorate of Infection Prevention and Control in Healthcare Facilities



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Learning objectives:

➤ **By the end of this component, the trainer should confirm that the trainee able to:**

- Identify which is the PPE
- Identify the different types of PPE types and indications of use for each type.
- Demonstrate PPE correct sequences and techniques for donning and doffing of PPE.
- Identify the correct PPE disposal.
- Identify the safe principles of extended and re-use of N95 respirator.
- Define what is PAPR and indications of use
- Demonstrate PAPR assembly and check for air flow and charging
- Demonstrate the proper use of the PAPR including donning, doffing, and disassembly especially for non-fit participants.
- Identify the proper way of cleaning and disinfections of the PAPR parts.

OBJECTIVES:

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- Identify which is the PPE.
- Identify the different types of PPE types and indications of use for each type.
- Demonstrate PPE correct sequences and technique for donning and doffing of PPE.
- Identify the correct PPE disposal.



Self-Assessment BICSL Training Virtual Audit tool (SA2023A)

Personal Protective Equipment (PPE)

- Define what is Personal protective equipment PPE.
- Gown, Surgical mask, Respirator N95 mask, Goggles, Face shield, Gloves.
- Explain use Indications.
- Explain and demonstrate proper donning.
- Explain and demonstrate proper doffing.
- Explain and demonstrate correct disposal.
- Ask the participant to demonstrate correct PPE donning and doffing including sequence and disposal.
- The trainer corrects any mistakes during demonstration and ask the participant to repeat several times until he/she apply the correct practice.

Personal Protective Equipment (PPE)

Personal protective equipment PPE Define what is ▪

	Define what is Personal protective equipment PPE	
Gown	Explain gown use indications	
	Explain and demonstrate gown proper donning	
	Explain and demonstrate gown proper doffing	
	Explain and demonstrate gown correct disposal	

Personal Protective Equipment

“specialized clothing or equipment worn by an employee for protection against infectious materials” (OSHA, 2014).

PPE Used in Healthcare Settings



Gowns/aprons



Gloves



Surgical Masks



Kimberly-Clark



3M

Masks and respirators (N95)



Face shields



Goggles

Powered, Air-Purifying Respirators (PAPR)

Used for respiratory protection from infectious disease transmission



How to Select your PPE?

- Type of exposure anticipated.
 - Splash/spray versus touch.
 - Category of isolation precautions.
- Durability and appropriateness for the task.
- Fit.



1. Gown



Gowns

- **Explain gown use Indications**
- **Explain and demonstrate gown proper donning.**
- **Explain and demonstrate gown proper doffing.**
- **Explain and demonstrate gown correct disposal.**

- **Define what is Personal protective equipment PPE**

	Define what is Personal protective equipment PPE	
Gown	Explain gown use Indications	
	Explain and demonstrate gown proper donning	
	Explain and demonstrate gown proper doffing	
	Explain and demonstrate gown correct disposal	

Gowns

General indications for use of gowns

- a. Protect from the contamination of clothing with potentially infectious material.
- b. Gowns should be worn as part of Standards Precautions or Contact Precautions.

Types:

- a. Clean /Isolation gown: used for isolation.
- b. Sterile gown: used for performing invasive procedures, such as inserting a central line.

- **Define what is Personal protective equipment PPE**

	Define what is Personal protective equipment PPE	
Gown	Explain gown use Indications	
	Explain and demonstrate gown proper donning	
	Explain and demonstrate gown proper doffing	
	Explain and demonstrate gown correct disposal	

Gowns

How to put on a Gown

- Select appropriate type and size.
- Opening is in the back
- Secure at neck and waist
- If gown is too small, use two gowns
 - Gown #1 ties in front
 - Gown #2 ties in back

Gowns

How to put on a Gown

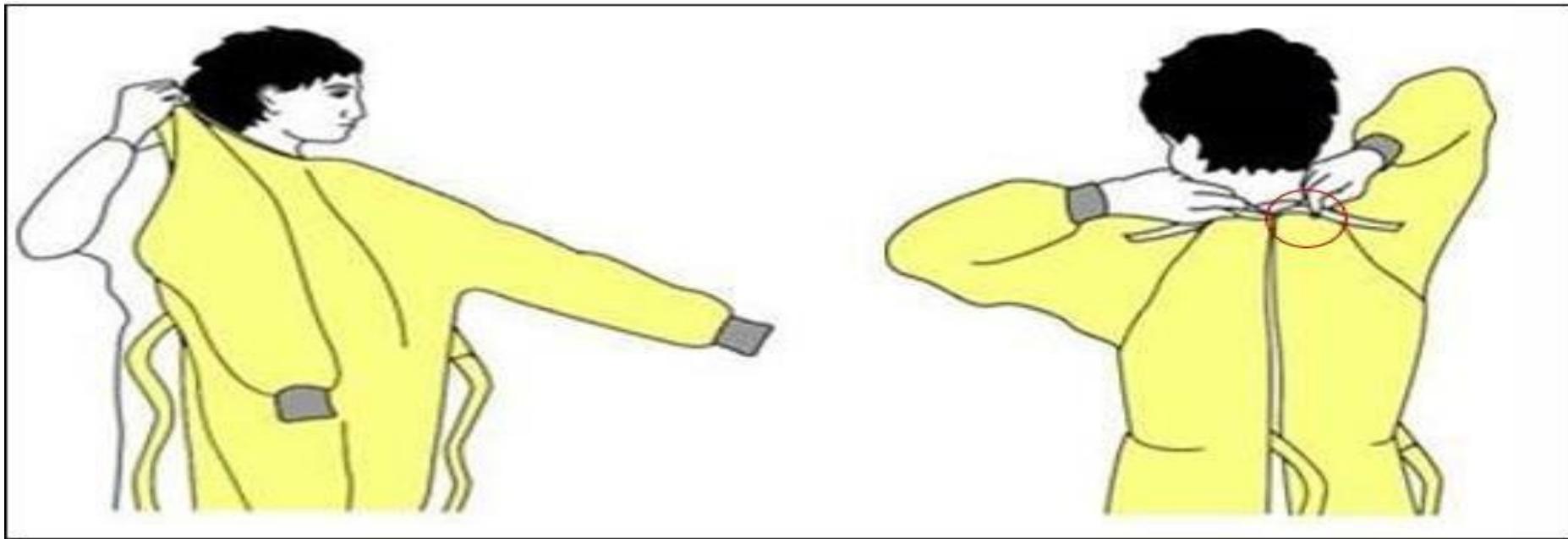


Figure 6: How to put on a gown (CDC, 2014).

- **Define what is Personal protective equipment PPE**

Define what is Personal protective equipment PPE	
	Explain gown use Indications
Gown	Explain and demonstrate gown proper donning
G	Explain and demonstrate gown proper doffing
	Explain and demonstrate gown correct disposal

Gowns

How to put on a Gown

How to Remove Isolation Gown :

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

Gowns

How to put on a Gown

How to Remove Isolation Gown:



- **Define what is Personal protective equipment PPE**

Define what is Personal protective equipment PPE	
	Explain gown use Indications
Gown	Explain and demonstrate gown proper donning
	Explain and demonstrate gown proper doffing
	Explain and demonstrate gown correct disposal

2. Surgical mask



Surgical Masks

- Explain surgical mask use Indications.
- Explain and demonstrate surgical mask proper donning.
- Explain and demonstrate surgical mask proper doffing.

Surgical Masks

Surgical mask	Explain surgical mask use Indications	
	Explain and demonstrate surgical mask proper donning	
	Explain and demonstrate surgical mask proper doffing	

Surgical Masks

Indications:

- a. Surgical masks: protect nose and mouth from exposure to respiratory secretions and sprays of blood or body fluids.
- b. Surgical masks should be worn as part of **Standard Precautions** or **Droplet Precautions**.

Surgical Masks

Surgical mask	Explain surgical mask use Indications	
	Explain and demonstrate surgical mask proper donning	
	Explain and demonstrate surgical mask proper doffing	

Surgical Masks

How to put on a Mask :

- Place over nose, mouth and chin.
- Fit flexible nosepiece over Nose Bridge.
- Secure on head with ties or elastic.
- Adjust to fit.



Surgical Masks

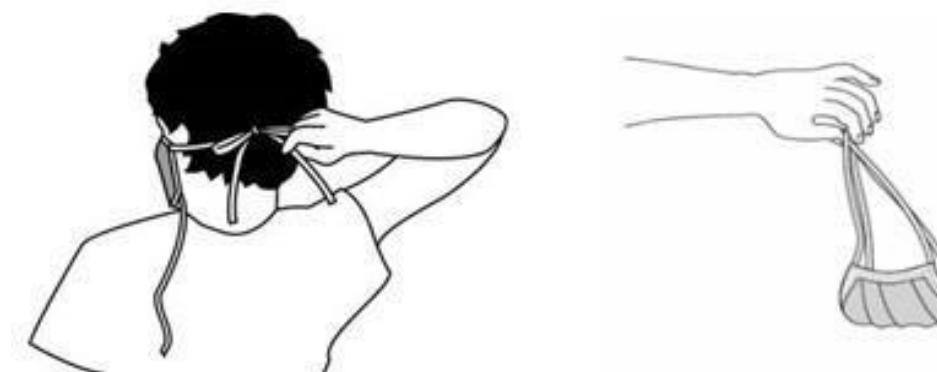
Surgical mask	Explain surgical mask use Indications	
	Explain and demonstrate surgical mask proper donning	
	Explain and demonstrate surgical mask proper doffing	

Surgical Masks

How to removing Surgical Mask

Removing a Mask :

- The front of the mask is considered contaminated and should not be touched.
- Remove by handling only the ties or elastic bands starting with the bottom then top tie or band.
- Lift the mask away from the face and discard it into the designated waste container.
- If contaminated perform hand hygiene.



3. Respirator mask

Respirator or N95 mask

- Explain respirator use Indications.
- Explain and demonstrate respirator proper donning.
- Explain and demonstrate respirator proper doffing.
- Explain and demonstrate respirator correct disposal.



Respirator or N95 mask

Respirator N95 mask	Explain respirator use Indications	
	Explain and demonstrate respirator proper donning	
	Explain and demonstrate respirator proper doffing	
	Explain and demonstrate respirator correct disposal	

Respirator or N95 mask

Indications:

a. N95 respirators reduce the wearer's exposure to airborne particles, from small particle aerosols to large droplets.

These respirators filter out **at least 95%** of very small (0.3 micron) particles.

b. Respirators should be worn as part of Airborne Precautions.

Note:

- Not everyone is able to wear a respirator due to medical conditions that may be made worse when breathing through a respirator. Before using a respirator or getting fit-tested, workers must have a medical evaluation to make sure that they are able to wear a respirator safely for the medical evaluation form)



Respirator or N95 mask

Instructions for N95 respirator use

- A. Fit testing must be done before using a respirator in the workplace.
- B. Achieving an adequate seal to the face is essential. Conduct a user seal check each time the respirator is used.
- C. When properly fitted and worn, minimal leakage occurs around edges of the respirator when the user inhales.

Remember!

- **User Seal Checking (formerly known as Fit Check):**

A simple procedure intended to help the wearer verify that he/she has properly put on the respirator. To seal check a respirator, the wearer should forcefully inhale and exhale several times. The respirator should collapse slightly upon inhaling and expand upon exhaling. It should be completed each time the respirator is donned and is only applicable when a respirator has already been successfully fit tested on the individual.

Respirator or N95 mask

Respirator N95 mask	Explain respirator use Indications	
	Explain and demonstrate respirator proper donning	
	Explain and demonstrate respirator proper doffing	
	Explain and demonstrate respirator correct disposal	

Respirator or N95 mask

How to put on a Particulate Respirator (see Figure 8)

- Select a fit tested respirator
- (Advise against) Put on respirator under the veil or disposable veil
- Place over nose, mouth and chin
- Fit flexible nose piece over nose bridge
- Secure on head with elastic
 - Adjust to fit
- Perform a user seal check
 - **Inhale:** respirator should collapse
 - **Exhale:** check for leakage around face.

Respirator or N95 mask

How to put on a Particulate Respirator (see Figure 8)



Position the respirator in your hands with the nose piece at your fingertips.



Cup the respirator in your hand allowing the headbands to hang below your hand. Hold the respirator under your chin with the nosepiece up.



The top strap (on single or double strap respirators) goes over and rests at the top back of your head. The bottom strap is positioned around the neck and below the ears. Do not crisscross straps.



Place your fingertips from both hands at the top of the metal nose clip (if present). Slide fingertips down both sides of the metal strip to mold the nose area to the shape of your nose.

Respirator or N95 mask

User Seal Checking (formerly known as Fit Check)



Place both hands over the respirator, take a quick breath in to check whether the respirator seals tightly to the face.



Place both hands completely over the respirator and exhale. If you feel leakage, there is not a proper seal.



If air leaks around the nose, readjust the nosepiece as described. If air leaks at the mask edges, re-adjust the straps along the sides of your head until a proper seal is achieved.



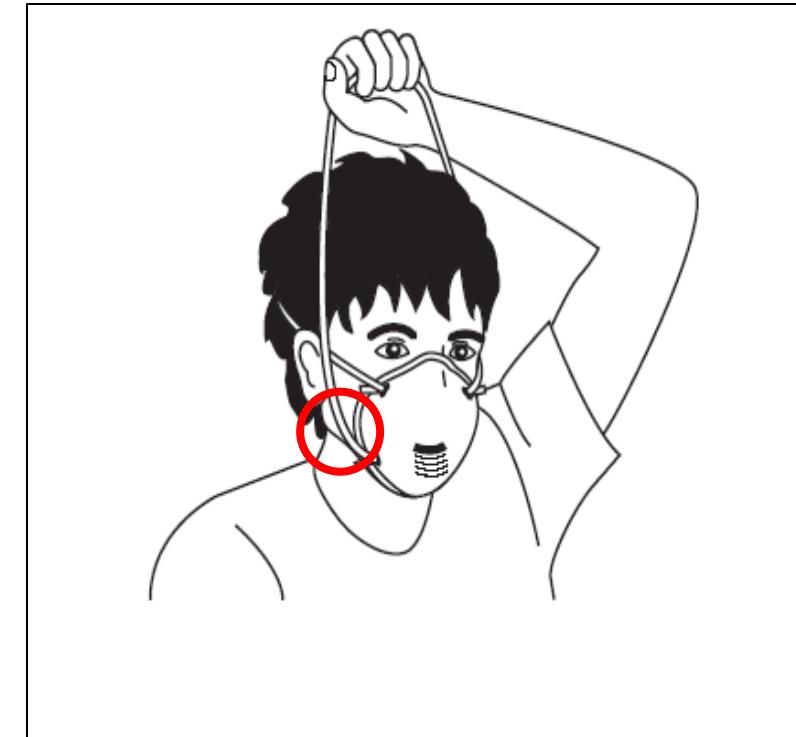
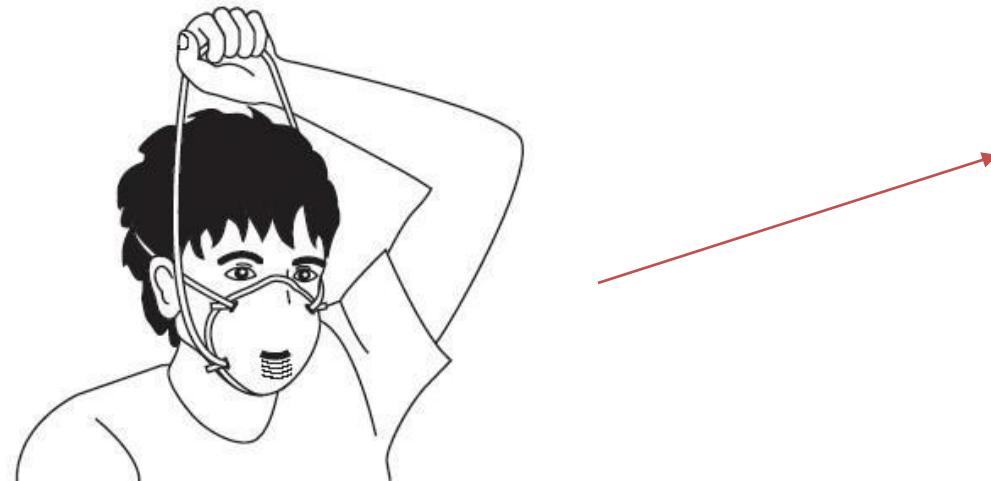
If you cannot achieve a proper seal due to air leakage, ask for help or try a different size or model.

Respirator or N95 mask

Respirator N95 mask	Explain respirator use Indications	
	Explain and demonstrate respirator proper donning	
	Explain and demonstrate respirator proper doffing	
	Explain and demonstrate respirator correct disposal	

How to Remove a Particulate Respirator (see Figure 16)

- Lift the bottom elastic over your headfirst.
- Then lift off the top elastic.
- Discard.
- If contaminated perform hand hygiene.



Don't forget



Fit test

- Used to find the suitable size of N95 mask for the health care provider.
- For bearded personals, the Power Air Purifying Respirator (PAPR) must be used.

Seal test



- To ensure the N95 mask is fitted and there no air leakage.

Respirator or N95 mask

General instructions

1. Clean hands with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the respirator.
2. Discard N95 respirators following use during aerosol generating procedures.
3. Discard N95 respirators contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients.
4. Discard N95 respirators following close contact with, or exit from, the care area of any patient co-infected with an infectious disease requiring contact precautions.
5. Consider use a disposable face shield over an N95 respirator and/or other steps (e.g., masking patients, use of engineering controls) to reduce surface contamination.

Respirator or N95 mask

Respirator N95 mask	Explain respirator use Indications	
	Explain and demonstrate respirator proper donning	
	Explain and demonstrate respirator proper doffing	
	Explain and demonstrate respirator correct disposal	

4. Face Protection

- A. Goggles
- B. Face shield



Goggles

- Explain goggles use Indications.
- Explain and demonstrate goggles proper donning.
- Explain and demonstrate goggles proper doffing.
- Explain and demonstrate goggles correct disposal



Goggles

Goggles	Explain goggles use Indications	
	Explain and demonstrate goggles proper donning	
	Explain and demonstrate goggles proper doffing	
	Explain and demonstrate goggles correct disposal	

Goggles

Goggles:

Indications:

- Goggles:

Protect only eyes from splashes of blood or body fluids.

Goggles

5	Explain goggles use Indications	
6	Explain and demonstrate goggles proper donning	
7	Explain and demonstrate goggles proper doffing	
8	Explain and demonstrate goggles correct disposal	

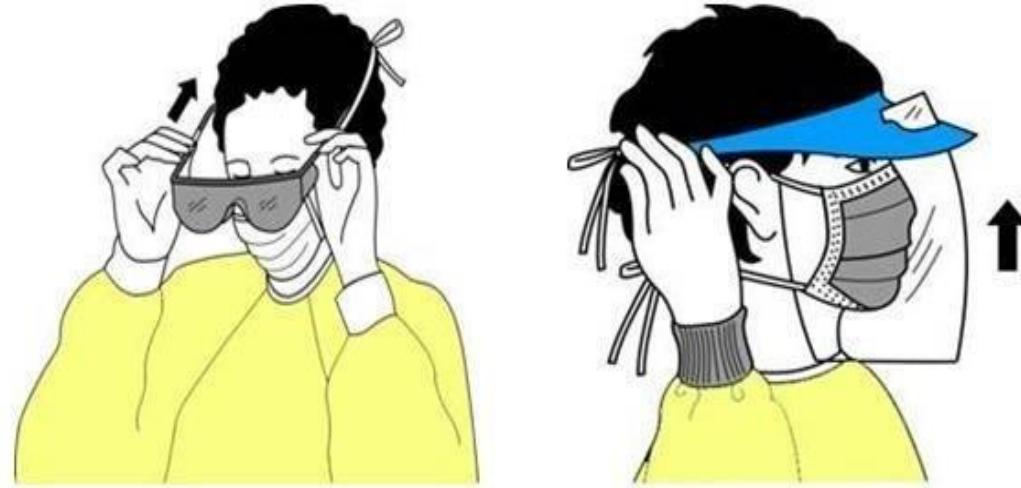
Goggles

How to Put on Eye Protection

- Position goggles over eyes and secure to the head using the ear pieces or headband

Goggles

How-to Put-on Eye Protection



Goggles

goggles	Explain goggles use Indications	
goggles	Explain and demonstrate goggles proper donning	
goggles	Explain and demonstrate goggles proper doffing	
goggles	Explain and demonstrate goggles correct disposal	

Goggles

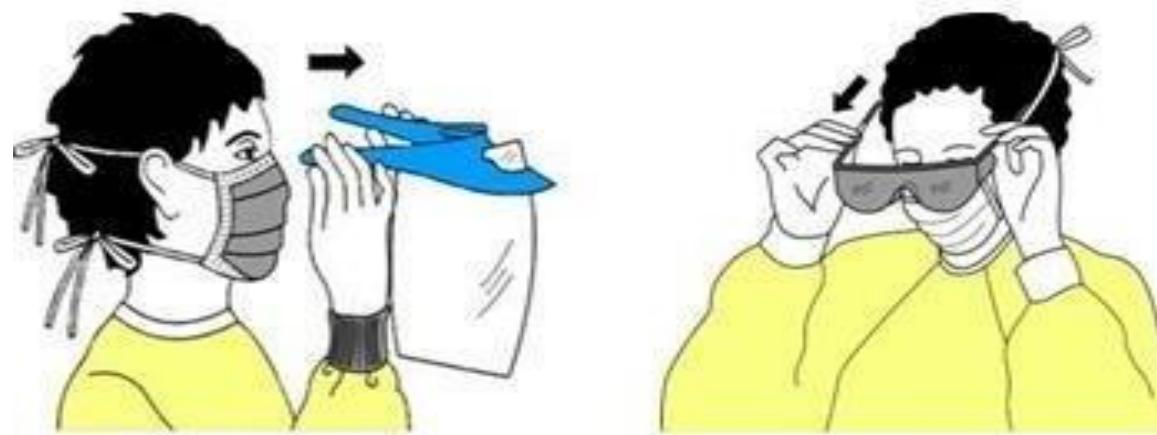
How to Remove Eye Protection

How to Remove Goggles or Face Shield :

- Using ungloved hands, grasp the “clean” ear or head pieces and lift away from face.
- If goggle or face shield are reusable, place them in a designated container for later reprocessing. Otherwise, discard them in the waste container. If contaminated perform hand hygiene.

Goggles

How to Remove Goggles or Face Shield



Goggles

Personal glasses not a substitute for goggles

Goggles

goggles	Explain goggles use Indications	
goggles	Explain and demonstrate goggles proper donning	
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Goggles

Goggles	Explain goggles use Indications	
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	Explain and demonstrate goggles proper doffing	
	Explain and demonstrate goggles correct disposal	

Face shield

- Explain Face shield Indications.
- Explain and demonstrate Face shield proper donning.
- Explain and demonstrate Face shield proper doffing.
- Explain and demonstrate Face shield correct disposal.



Face shields

Face shield	Explain Face shield Indications	
	Explain and demonstrate Face shield proper donning	
	Explain and demonstrate Face shield proper doffing	
	Explain and demonstrate Face shield correct disposal	

Face shields

Indications:

- Face shields:

Protect face, nose, mouth, and eyes when there is a risk of exposure to splashes and body fluids.

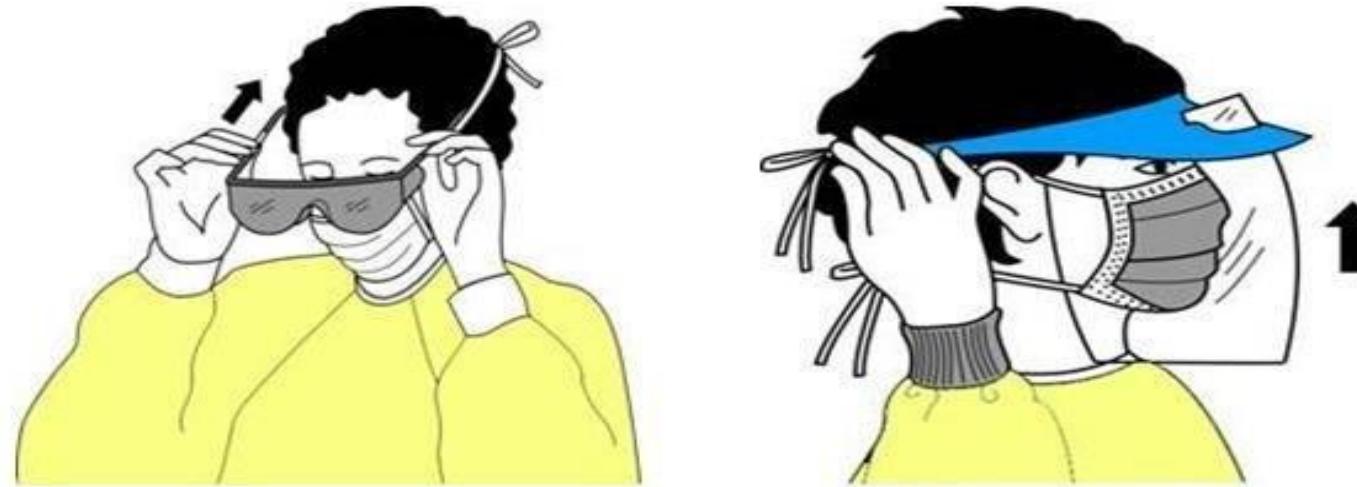
Face shields

Face shield	Explain Face shield Indications	
	Explain and demonstrate Face shield proper donning	
	Explain and demonstrate Face shield proper doffing	
	Explain and demonstrate Face shield correct disposal	

Face Protection

How-to Put-on Face Protection

- Position face shield over face and secure on brow with headband.
- Adjust to fit comfortably.



Face shields

Face shield	Explain Face shield Indications	
	Explain and demonstrate Face shield proper donning	
	Explain and demonstrate Face shield proper doffing	
	Explain and demonstrate Face shield correct disposal	

Goggles

How to Remove Eye Protection

How to Remove Goggles or Face Shield :

- Using ungloved hands, grasp the “clean” ear or head pieces and lift away from face.
- If goggle or face shield are reusable, place them in a designated container for later reprocessing. Otherwise, discard them in the waste container. If contaminated perform hand hygiene.



Instructions for use of Goggles/Face shields:

- a) Eye protection should be removed and reprocessed if it becomes visibly soiled or difficult to see through.**
- b) If a disposable face shield is reprocessed, it should be dedicated to one HCW.**
- c) Eye protection should be discarded if damaged (e.g., face shield can no longer fasten securely to the provider, if visibility is obscured and reprocessing does not restore visibility).**
- d) HCW should take care not to touch their eye protection. If they touch or adjust it, they must immediately perform hand hygiene.**

5. Gloves



- Explain gloves use Indications.
- Explain and demonstrate proper donning of gloves.
- Explain and demonstrate proper doffing of gloves.

Gloves

Gloves	Explain gloves use Indications	
	Explain and demonstrate proper donning of gloves	
	Explain and demonstrate proper doffing of gloves	

Gloves Types



1 Sterile:

Mostly used for surgery they are disposable, sterile, and individually wrapped items.

2 Non-sterile:

Disposable single use gloves (e.g., latex gloves) and usually not individually wrapped. They are used to protect against direct exposure to blood or other body fluids and prior to contact with contaminated equipment or surfaces.



3- Utility gloves:

Are used for handling contaminated items and waste and performing environmental cleaning activities. They can be reused after decontamination but they should be discarded when punctured or torn.



Gloves

Indications:

- a. Before a sterile procedure
- b. When anticipating contact with blood or another body fluid, regardless of the existence of sterile conditions and including contact with non-intact skin and mucous membrane
- c. Contact with a patient (and his/her immediate surroundings) during contact precautions.

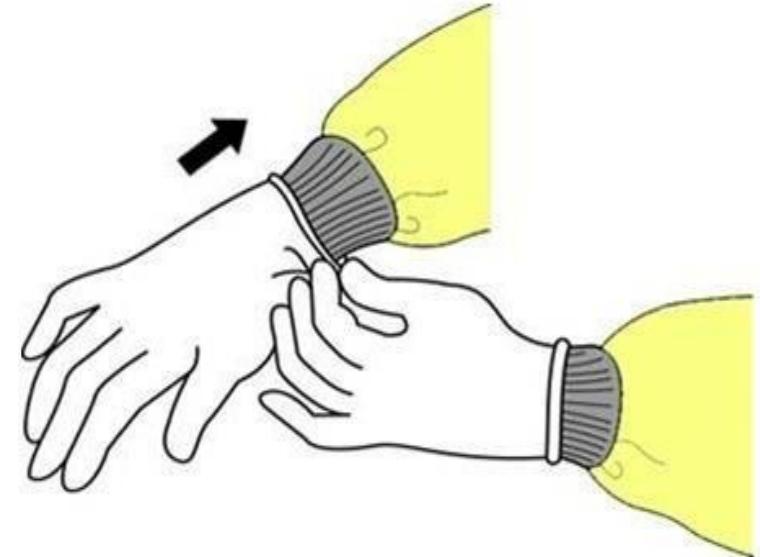
Gloves

Gloves	Explain gloves use Indications	
Gloves	Explain and demonstrate proper donning of gloves	
Gloves	Explain and demonstrate proper doffing of gloves	

Gloves

How-to Put-on Gloves:

- Put on gloves last.
- Select correct type and size.
- Insert hands into gloves.
- Extend gloves over isolation or sterile gown cuffs.



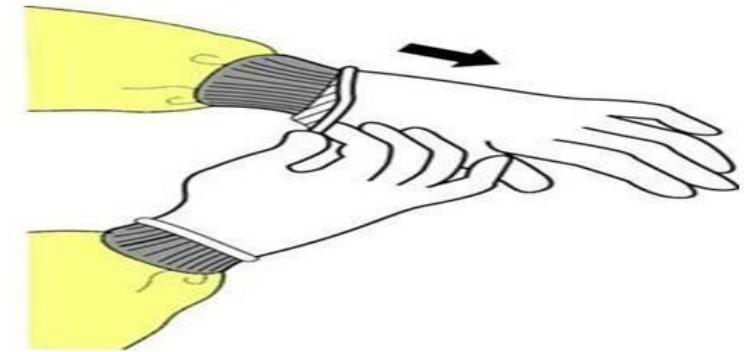
Gloves

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Gloves

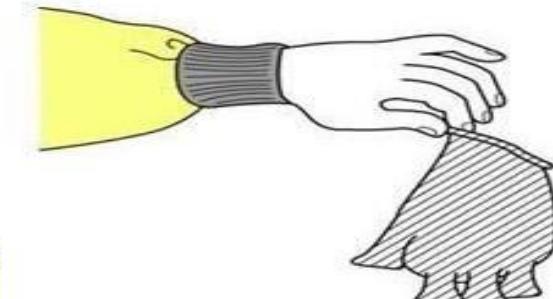
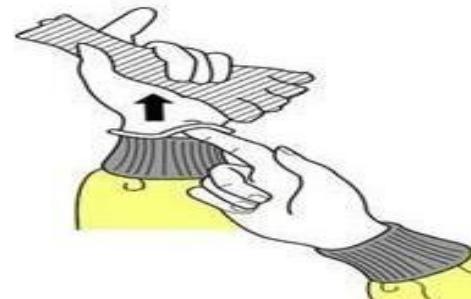
Step 1: How to Remove Gloves :

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



Step 2: How to Remove Gloves :

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



General indications for glove removal:

- a. As soon as gloves are damaged (or non-integrity suspected).
- b. When contact with blood, another body fluid, non-intact skin and mucous membrane has occurred and has ended.
- c. When contact with a single patient and his/her surroundings, a contaminated body site on a patient has ended.
- d. Moving from a contaminated body site to another body site during care of the same patient
- e. When there is an indication for hand hygiene

Important Point:

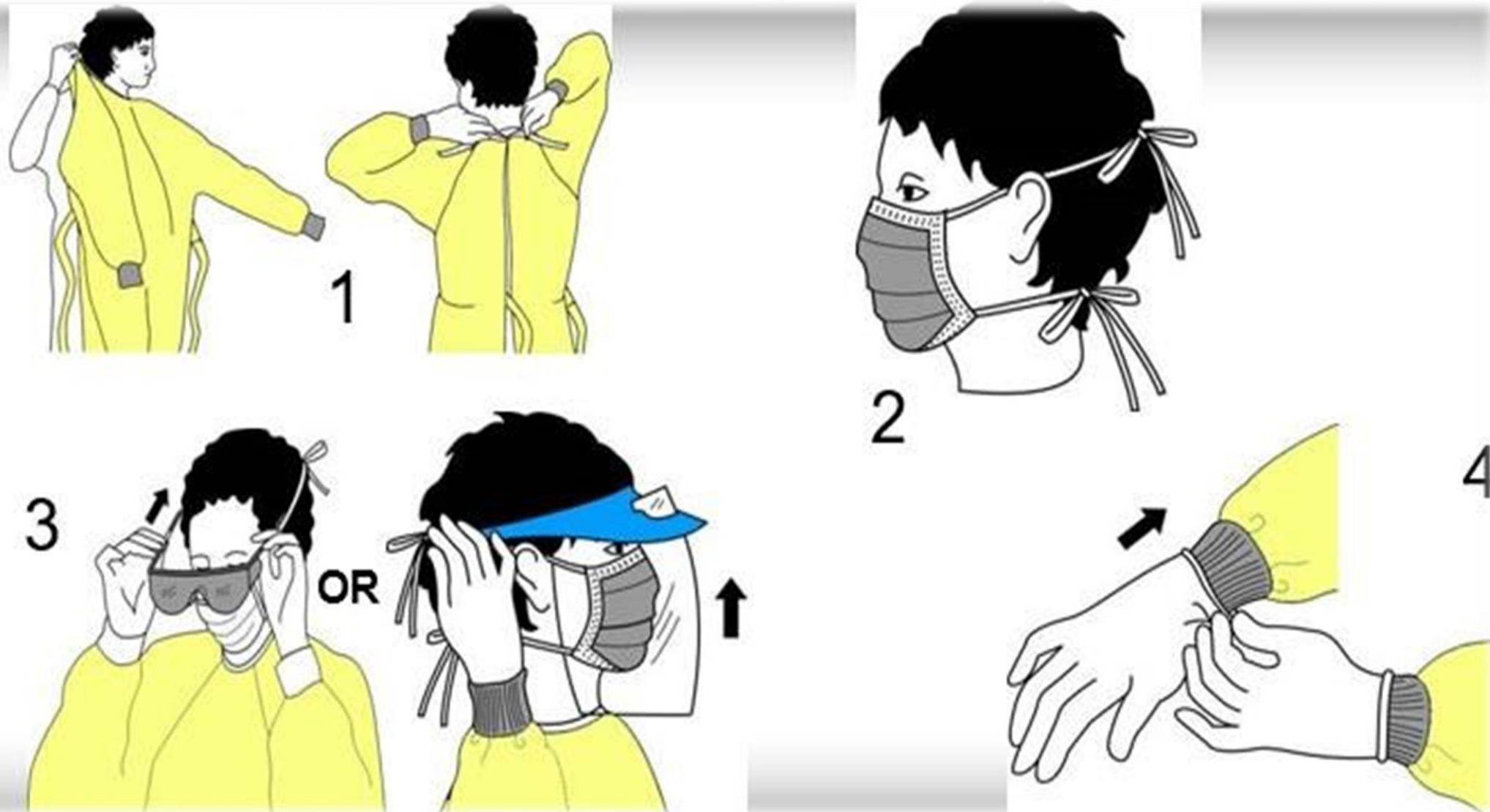
- Medical gloves should be selected appropriate to job task, patientcare activities and hand size.
- Medical gloves should be discarded immediately after removal.
- Gloves should **NOT BE** washed, decontaminated, or reprocessed for any reuse purpose
- Disinfection of gloved hands with ABHR is not recommended.
- The use of gloves does not replace the need for hand hygiene
- In situation where gloves are removed because of a tear or a puncture and the HCW has had contact with blood or another body, hand washing with soap and water is necessary.

How to Safely Don, Use, and Remove PPE

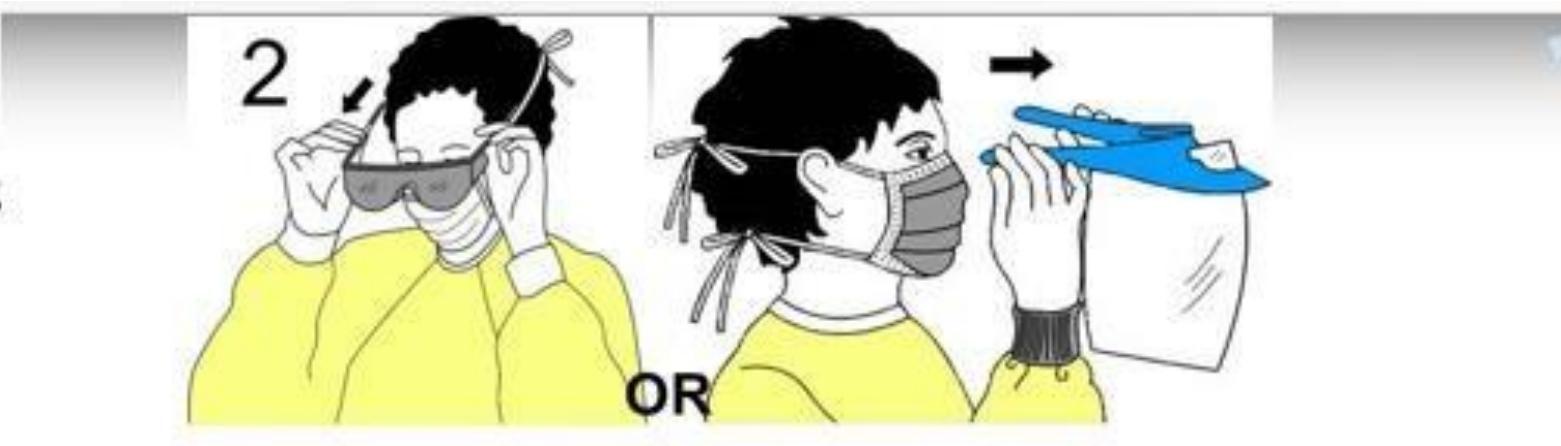
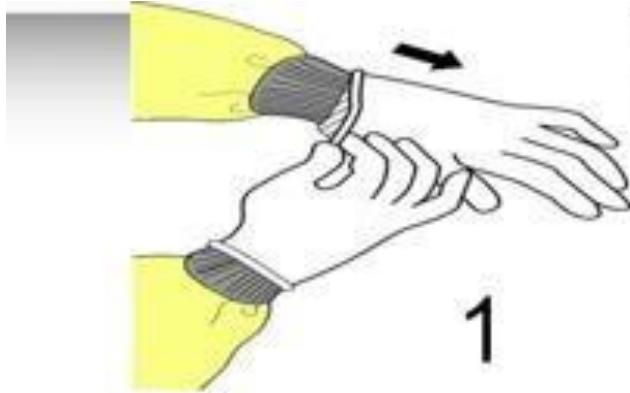
➤ Key Points About PPE:

- **Before donning** PPE you should perform hand hygiene.
- **Use carefully** – **don't** spread contamination.
- **Remove and discard** carefully.
- **Immediately perform** hand hygiene.

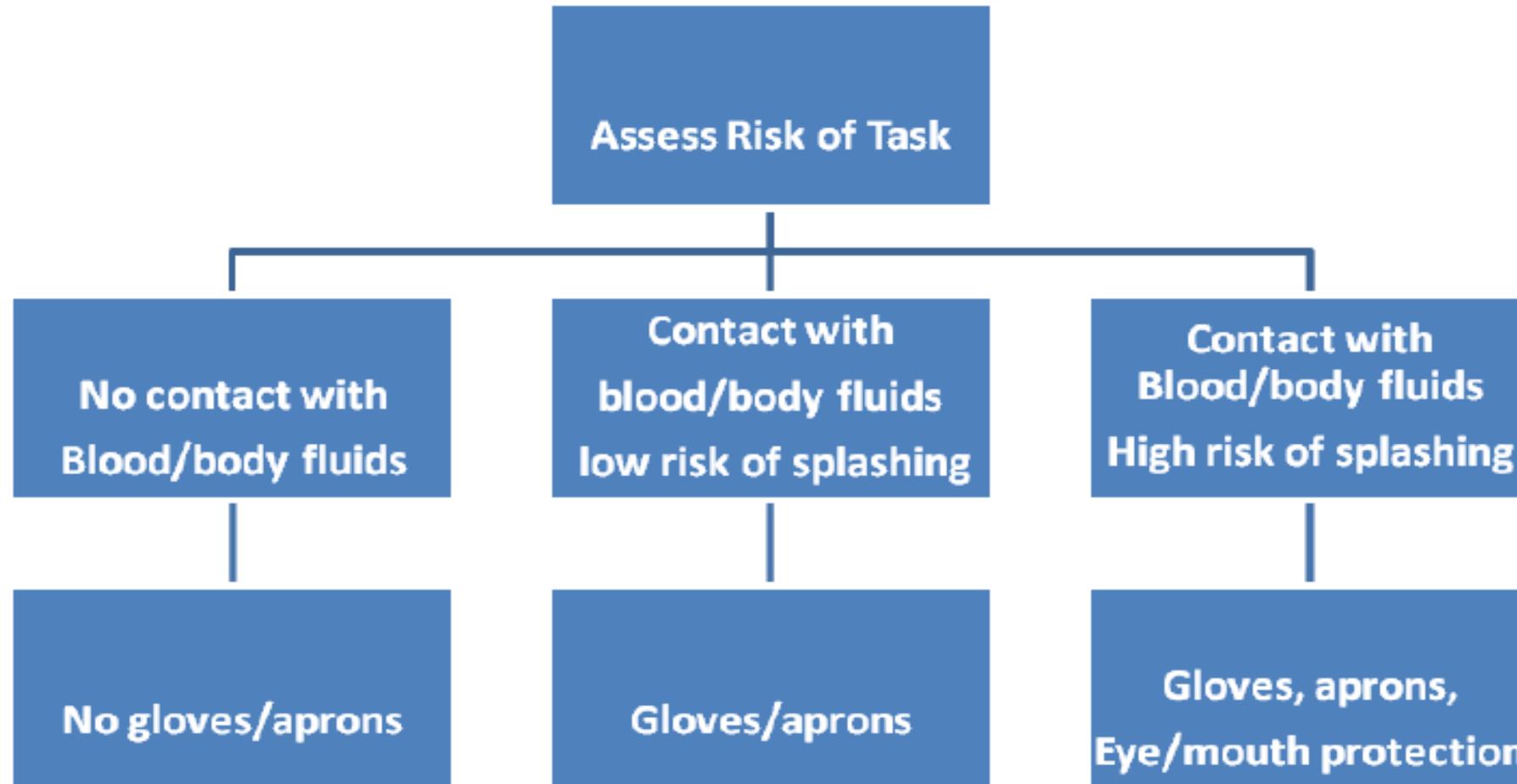
Sequence for Donning PPE



Sequence for Removing PPE



Risk Assessment for use of PPE



How to disposal of PPE

Principles of Safe removal of PPE:

Safe removal of PPE to protect health care workers, patients, and environment from exposure to contaminated materials. To remove PPE safely, you must first be able to identify what sites are considered “clean” and what are “contaminated”.

Where to Remove PPE ?

- **At doorway, before leaving patient room or in the anteroom.**
- **Remove respirator outside the room, after door has been closed.**
- **Make sure that hand hygiene facilities are available at the point needed, e.g., sink or alcohol-based hand rub.**

Recommendations for PPE

Ensure that PPE is:

Safely dispose of personal protective equipment in the right place and in the right way.

➤ **What is PAPR and indications of use?**

Powered Air Purifying Respirator (PAPR) is a battery-powered blower that provides positive airflow through a high efficiency particulate air (HEPA) filters provide 99.97% particulate filtration efficiency that are used for protection of HCWs in health care facilities against respiratory airborne pathogens (*see Figure 22*) when:

- A. Employee has facial hair (e.g., beard) or facial deformity that interferes with N95 mask use.
- B. The approved N95 mask is unavailable or unknown fit test.
- C. Employee has failed fit testing with all available masks.

Each PAPR includes:

- Hood, helmet or headpiece.
- Breathing tube.
- PAPR blower/filtration unit
- Battery pack
- Belt



Note:

- Powered air purifying respirators should be reserved for those team members that cannot safely wear a tight-fitting respirator mask.



Instructions for using PAPR:

1. Before use, confirm that: -

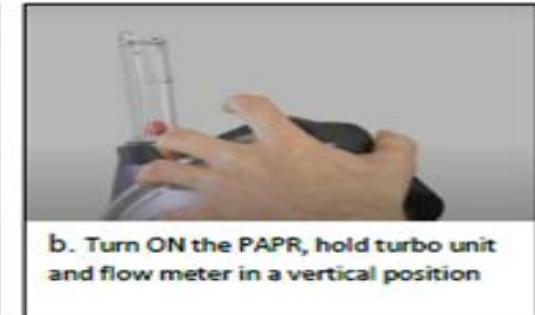
- Maintenance of all parts.
- The battery is chargeable. All PAPRs must be charged according to the manufacturer's instructions. Many batteries require a minimum of 16 hours to attain a full charge.
- Test the battery: Press TEST button on pack to confirm charge is sufficient for duration of the work period.
- Airflow is adequate (typically 6 Cubic Feet meter) .



Instructions for using PAPR:

2. How to do Airflow check:

- Turn the motor/blower unit on by pushing and holding the power button. Run the TR-300 for 1 minute to allow the airflow to stabilize.
- With the airflow indicator in a vertical position, ensure that the bottom of the floating ball rests at, or above, the minimum flow mark (typically 6 CFM)
- Airflow indicator must be in the VERTICAL POSITION for an accurate reading.
- Low flow alarm check: Check the low airflow alarm by simulating a low airflow condition. Tightly cover the outlet of the motor/blower with the palm of your hand. TR-300+ in less than 30 seconds, the unit will sound an audible alarm and the red fan shape LED will flash.



Note:

- If any part of PAPR fails inspection or is damaged and needs to be replaced, **DO NOT USE**



Instructions for using PAPR:

3. Donning (putting on) the PAPR and in-use procedure

- Connect breathing tube to turbo unit: Insert breathing tube into plastic cover and connected properly to air turbo unit until an audible click is heard.
- Put Turbo around waist
- Switch turbo ON
- Connect the breathing tube to the head hood
- Fit the Head hood to the head.

Note:

- PAPR is turned on BEFORE entering exposure.
- Leave from the patient room IMMEDIATELY if you notice that airflow is interrupted or the equipment gives alarm.



4. Doffing (taking off) the PAPR

- Remove a PAPR only outside a contaminated room.
- Remove the hood by bending over slightly, grasp the back of the head hood with both hands, and remove it off gently.

5. Cleaning and disinfection

- Disconnect all component parts of PAPR.
- Blower unit AND all its component parts (blower/filtration unit, battery, breathing tube, and hood/helmet) must be cleaned and disinfected: -
- Cleaning of all parts with a clean soft cloth dampened with warm water and mild detergent. Then disinfection with either 0.5 % chlorine solution or Alcohol 70 % after each use.
- Disposal of single use hood or it can be dedicated for one user with disinfection after each use.

6. Storage

AFTER disinfection and drying, store on shelf in cool, dry, dark area, out of sunlight.

Note:

- If it dedicated for multiple users, the inner side of the hood should be disinfected with 70% alcohol.
- Do NOT submerge the battery, blower/filtration, or hood/helmet in liquid.
- Do NOT clean filters/cartridges.
- Dispose of filters/cartridges after service life has expired.



7. Change of HEPA filter:

- The shelf life of 3M™ Filters:

According to 3M, 2016 the filters will be changed AFTER SIX MONTHS from opening their package even if they have not been used.

- Replace the HEPA Filters also, when:

- It becomes difficult to breathe comfortably.
- When airflow test fail, consider filter change.
- The filter become dirty or physical damage occurs

- Precautions during filter change:

- This should be in a secure area to minimize risk of transmission to others.
- Take precautions to protect yourself and the environment.
- Wear full personal protective equipment.
- Remove the filter gently and dispose it directly into designated waste container.
- Clean and disinfect the area after the end.
- Always follow the manufacturer's instructions.

Instructions for using PAPR:

8. Sequence for putting on personal protective equipment (PPE) & PAPR:

1) Preparation of the PAPR:

Hand hygiene, Gloves, Clean PAPR with Wipes, Discard gloves, and Hand hygiene.

2) Putting on the PAPR

3) Gown

4) Gloves



Instructions for using PAPR:

9. Sequence for Remove Personal Protective Equipment (PPE) & PAPR

1. Inside room - clean PAPR (Clean Hood, helmet, or headpiece with Wipes).
2. Remove gloves and gown
3. Hand hygiene
4. Exit room & re-glove
5. Remove & clean PAPR
 - Tilt the head slightly forward, remove the PAPR hood.
 - Using alcohol-based wipe, **clean the PAPR beginning with the inside of the Hood.**
6. Discard gloves & hand hygiene

References

- BICSL Guidelines 2023
- CDC Guidelines
- GCC
- JCI / Saudi Arabia Infection Prevention and Control Diploma Course.



Thank You
Any Question?