

Section 1: Basic Issues in Infection Control

1.2 Personal Protective Equipment

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References

The primary use of personal protective equipment (PPE) is to protect healthcare workers (HCWs) and reduce opportunities for transmission of microorganisms in healthcare facilities. It does not reduce the level of hazard itself nor guarantee total protection (1). They should be used as the supplement to the administration and engineering control in the care of the infective patients.

Care should be taken in both putting on clean PPE properly and timely removal of contaminated PPE without contamination of the staff themselves and the environment.

PPE should be removed immediately after use or whenever grossly contaminated (2). The

contaminated area of PPE should be minimally touched as far as possible. The most contaminated equipment should be removed first, usually the gloves and gowns (2-3), and then the less contaminated device. Hand hygiene should be performed after gloves removal, during and after PPE removal procedure.

There is different PPE for infection control purpose, including gloves, gowns/ aprons, mask and respirator, eye protection, cap and footwear.

1 Gloves

- 1.1 Do not wear gloves routinely and indiscriminately as it gives worker a false sense of security leading to decrease in hand hygiene frequency (4).
- 1.2 Wear gloves if in contact with blood, body fluids, secretions, excretions, mucous membrane and non-intact skin, or items that are contaminated by these materials (5-8).
- 1.3 Gloves are not required for routine patient/ resident care activities in which contact is limited to touching the patient/ resident's intact skin (7, 9-11).
- 1.4 Put on gloves immediately before the task or procedure and then removed promptly after use (7, 9-11).
- 1.5 Change gloves between patients or between procedures performed on dirty and clean body sites in the same patient (4).
- 1.6 Do not wash, disinfect or reuse worn gloves (4).
- 1.7 Steps of wearing gloves (2): (Figure 1)
- 1.8 Steps of gloves removal (2): (Figure 2)

2 Gowns/ Aprons

- 2.1 Do not use gown routinely (5, 7, 11).
- 2.2 Wear gowns when:
 - 2.2.1 Anticipating contamination by blood, body fluid, secretion or excretion during procedure to protect the skin and working clothes of the healthcare workers (6, 12)
 - 2.2.2 having substantial contact, for examples, bathing, position turning with patients infected or colonized with epidemiologically important microorganisms, e.g. VRE (6).
- 2.3 Select gowns according to the amount of fluid encountered to ensure adequate protection (3).
- 2.4 Steps of wearing gown (2): Figure 3
- 2.5 Steps of gown removal (2): Figure 4
- 2.6 Discard the disposable gown and send the linen gown for laundering after each patient use (13). *Please refer to Linen Management Section of ICB Infection Control Guidelines.*
- 2.7 Aprons may be used as an alternative, when its protection is sufficient (2, 5, 12).
- 2.8 Steps for apron removal:
 - 2.8.1 Unfasten the tie at waist with ungloved/ clean hand
 - 2.8.2 Break the tie at the neck gently
 - 2.8.3 Pull away the apron from the neck, touching inside of the apron only
 - 2.8.4 Turn the apron inside out
 - 2.8.5 Fold or roll the apron into a bundle, discard it and then perform hand hygiene.

3 Respiratory Protection

3.1 Surgical mask

- 3.1.1 Wear a surgical mask when blood, body fluid, secretion or excretion splashing procedure is anticipated and when approaching within one metre of patients on droplet precaution (5-7, 12).
- 3.1.2 Steps of wearing surgical mask (2): Figure 5
- 3.1.3 Steps of mask removal (2): Figure 6

3.2 Particulate respirator

- 3.2.1 Use particulate respirator, for example, N95 respirator for Airborne Precautions which can filter out the airborne contaminants (6-7).
- 3.2.2 Do not use a respirator with exhalation valves in healthcare setting.
- 3.2.3 Staff should utilize appropriate procedure to select the appropriate respirator size and type that fits well to ensure adequate protection. The respirator wearer needs to perform the seal-check before each entry into the airborne isolation areas (14).
- 3.2.4 Wear respirator according to the manufacturers' recommendation.
- 3.2.5 Removal of a respirator:

Method of removal should be adhered to in accordance to the manufacturer's recommendation. If it is not available, the following methods can be adopted:

- a. **Touch technique:** Figure 7
- b. **Non-touch technique:** Figure 8

This technique aims at minimizing the contamination of the hands, but it needs more skills and practice is necessary. If a staff does not feel confident to adopt non-touch technique, use touch technique for removal of a respirator and then perform hand hygiene afterwards. Below is the recommended non-touch removal method for a cup-shape respirator if manufacturer's recommendation is not available:

4 Eye Protection

- 4.1 Eye protection is necessary when splashing of blood, body fluid, secretion or excretion is likely (6-7, 12).
- 4.2 It should be comfortable and allow for sufficient peripheral vision (15). Appropriately fitted, indirectly-vented or non-vented goggles with anti-fog coating are preferred for infection control purpose. Goggles must fit snugly, particularly from the corners of the eye across the brow (Figure 9). While highly effective as eye protection, goggles do not provide splash or spray protection to other parts of the face (15).
- 4.3 To provide further protection to other facial areas, use face shields as alternative to goggles. A face shield should have crown and chin protection and wrap around the face to the point of the ear, which reduces the likelihood that a splash could go around the edge of the shield and reach the eyes. Disposable face shields with light weight films attaching to a surgical mask or fit loosely around the face should not be relied upon as optimal protection.
- 4.4 Removal of eye protection (2): Figure 10

5 Cap

- 5.1 Use a disposable, waterproof cap of an appropriate size which completely covers the hair when splashes of blood and body fluids are expected (13).
- 5.2 Removal of a cap: Slide fingers of the ungloved hands into the inside of the cap near earlobes of head, lift the cap up, fold it inside out, discard it and then perform hand hygiene.

6 Footwear

- 6.1 Use boots when gross foot contamination by blood or body fluid is anticipated (16), for examples, during the orthopaedic surgery (17).

7 Removing PPE

- 7.1 Careful gowning down is crucial in avoiding contamination. Do not gown down together in close proximity to another person.
- 7.2 Remove PPE in a manner that prevents self-contamination or self-inoculation with contaminated PPE or hands.
- 7.3 Remove PPE either in the anteroom or if there is no anteroom make sure that neither the environment outside the isolation room/ area nor other persons can get contaminated.
- 7.4 Suggested sequence of PPE removal :
1. Remove gloves
 2. Perform hand hygiene
 3. Remove gown
 4. Perform hand hygiene
 5. Remove disposable cap and eye protection
 6. Perform hand hygiene (optional)
 7. Remove mask/ respirator
 8. Perform hand hygiene

Rationale:

- ✧ Keep mucosal protection intact throughout

✚ (Footnote: *The sequence may vary slightly according to local practice without jeopardising the general infection control principles.*)

Figure 1: Steps of Wearing Gloves

1. Gloves should be donned the last after other PPE when indicated.
2. Tuck the gown cuffs securely under each glove if gown is worn.

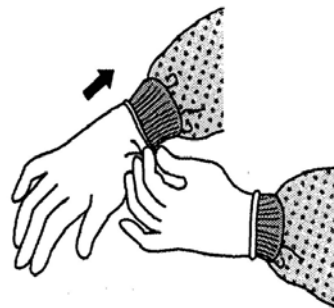


Figure 2: Steps of Gloves Removal

1. Grasp outside of glove with opposite gloved hand and then peel off.
2. Hold removed glove in gloved hand.
3. Slide fingers of ungloved hand under remaining glove at wrist.
4. Peel glove off over first glove.
5. Discard gloves in waste container.
6. Perform hand hygiene.

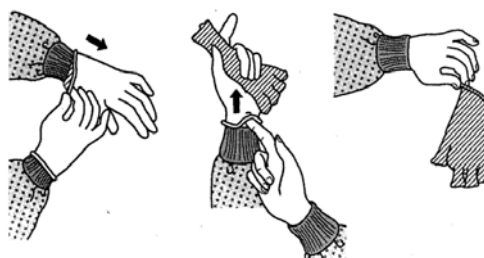


Figure 3: Steps of Wearing Gown

1. Fully cover torso from neck to knees, arms to end of wrist, and wrap around the back.
2. Fasten in back of neck and waist.

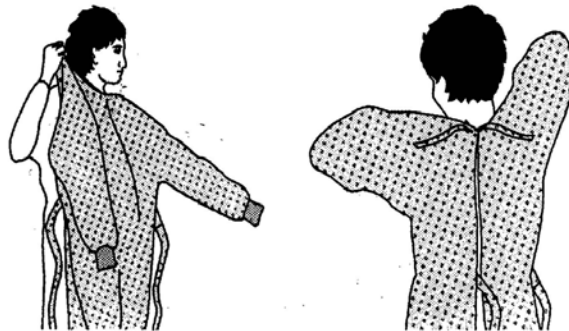


Figure 4: Steps of Gown removal

1. Unfasten ties.
2. Pull away from neck and shoulders, touching inside of gown only.
3. Turn gown inside out.
4. Fold or roll into a bundle and discard.
5. Perform hand hygiene.

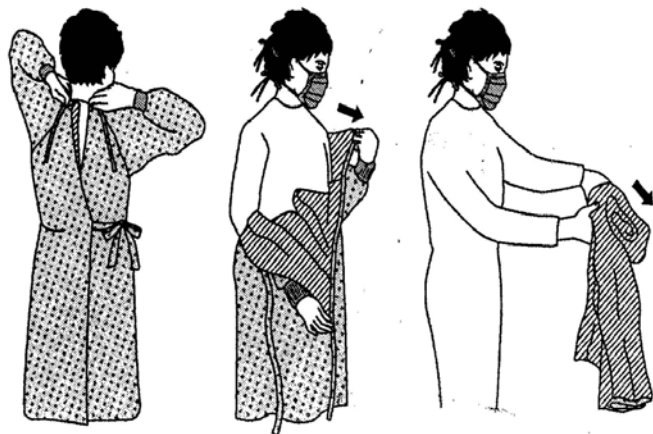


Figure 5: Steps of Wearing Surgical Mask

1. Secure ties of elastic bands at middle of head and neck.
2. Fit flexible band to nose bridge.
3. Fit snugly to face and below chin.
4. Seal the face completely at all times.



Figure 6: Steps of Mask Removal

Tie type: Unfasten the bottom tie with clean hand, and then the top tie. Discard the mask and perform hand hygiene.

Earloop type: Loosen both loops together, remove and discard the mask. Perform hand hygiene afterwards.

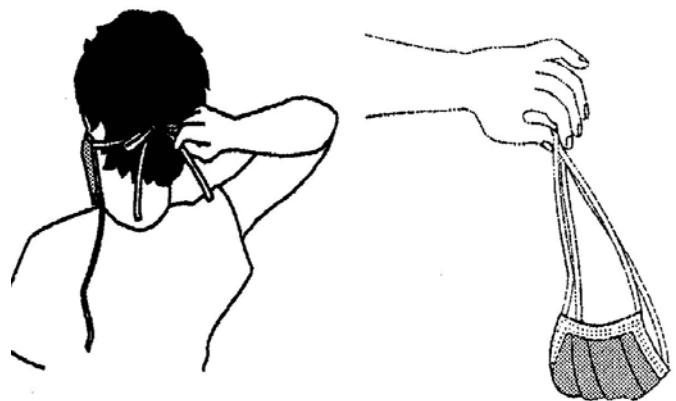


Figure 7: Steps of Respirator Removal by Touch Technique

1. Hold the respirator by one hand.
2. Remove the tie one by one by another hand.
3. Remove and discard the respirator.
4. Perform hand hygiene.



Figure 8: Steps of Respirator Removal by Non-touch technique

1. Grasp the bottom tie with **both** hands.
2. Stretch the bottom tie apart to the sides and maintain the tension of the tie.
3. Pull the bottom tie from the neck by holding the tension, across the head to the front.
4. Pull the bottom tie by downward force and hold it by one hand.
5. Use another hand to remove the top tie till it is parallel to the bottom tie.
6. Remove the respirator by holding the two parallel ties.
7. Discard the respirator and perform hand hygiene.



Figure 9: Steps of Wearing Protective Eyewear

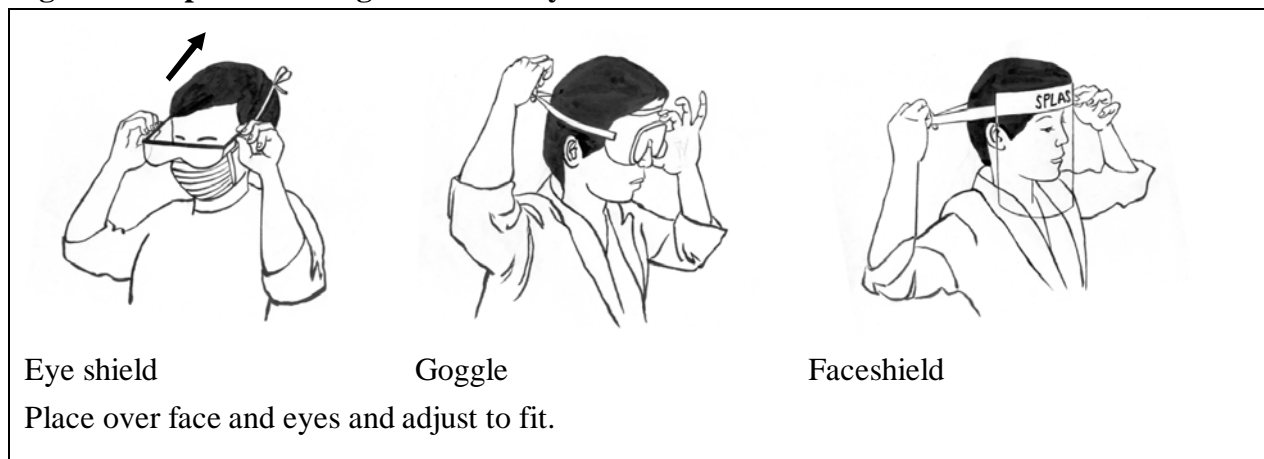
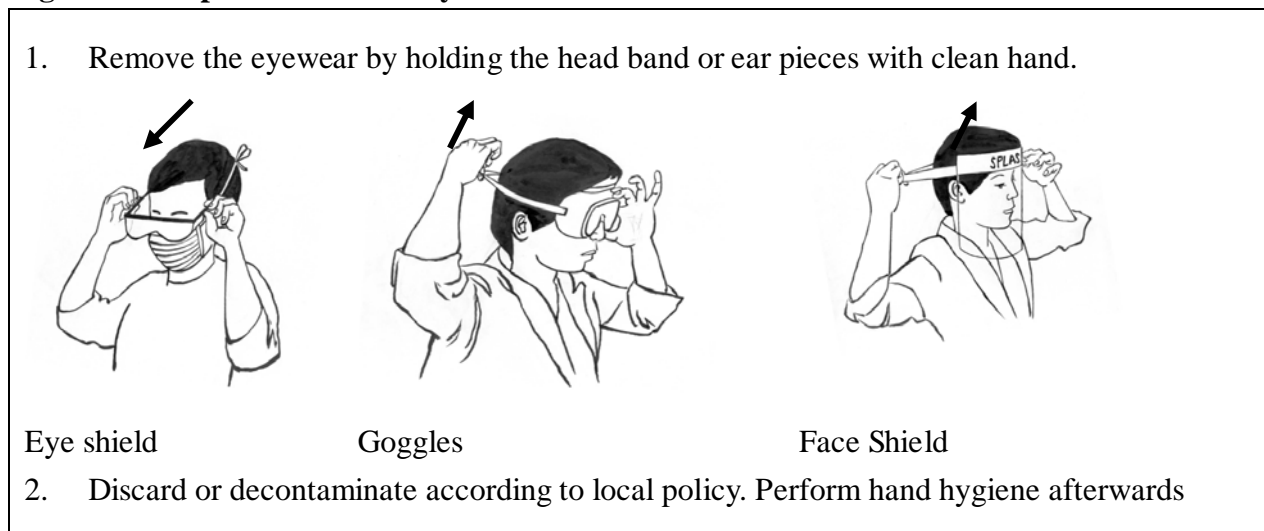


Figure 10: Steps of Protective Eyewear Removal



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