5	**OSPE (any one)**	**5**
	1. PPE – Donning and Doffing	
	2. Hand hygiene- method and indication	
	3. Biomedical waste management – segregation compliance	

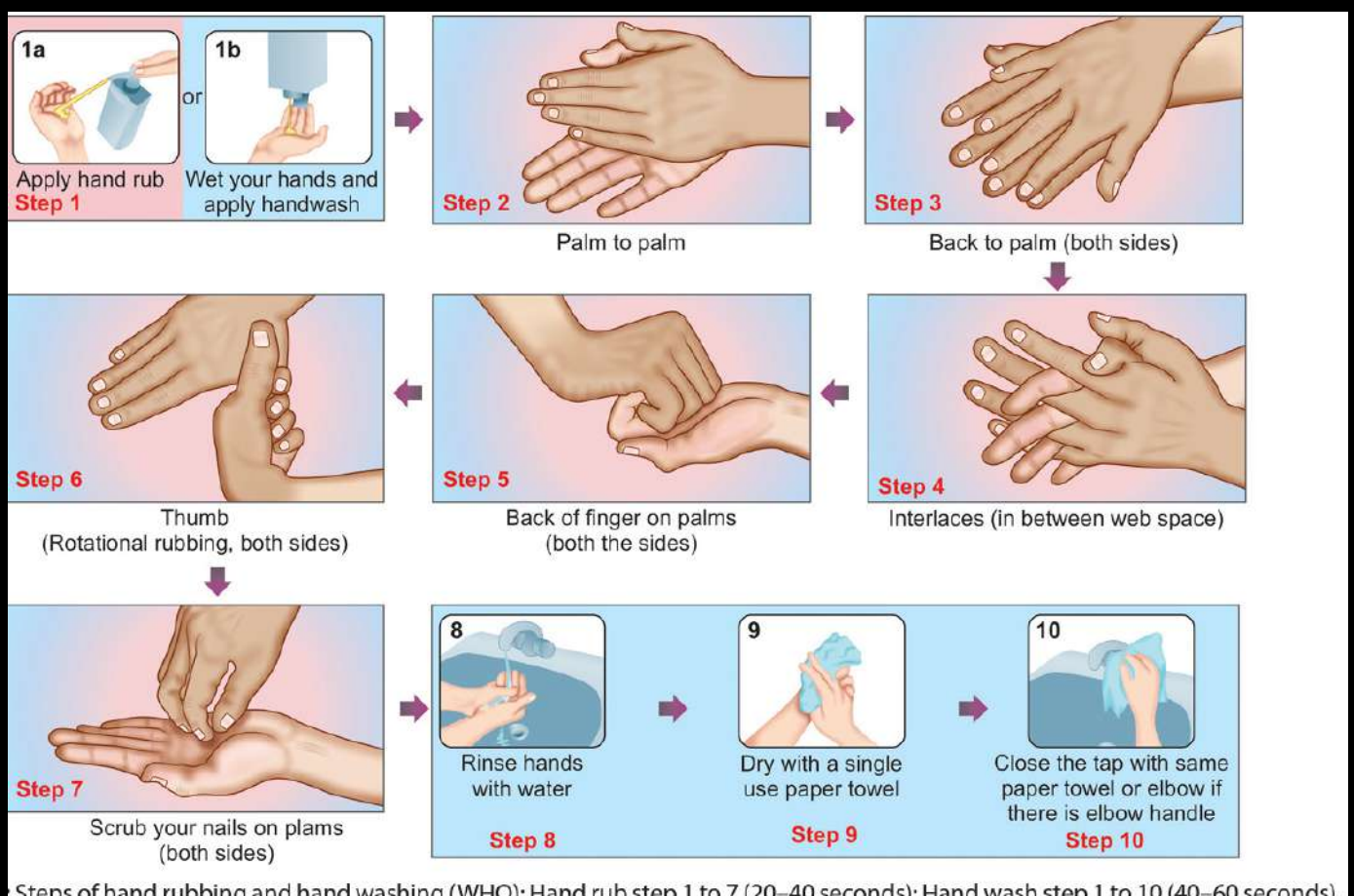
Hand hygiene

Step	Student's performance	Score	YES	NO (Score=0)
1	Removes all hand accessories (finger ring. wrist watch. etc.)	1.0		
2	Applies sufficient amount of hand rub	1.0		
3	Rubs palm to palm	1.0		
4	Rubs back of palm on Both sides (0.5 + 0.5)	1.0		
5	Rotational rubbing of left thumb clasped in right palm and vice versa; (0.5 + 0.5)	2.0		
6	Backs of fingers to opposing palms with fingers interlocked on both sides (0.5 + 0.5)	1.0		
7	Interlaces fingers in the web spaces	1.0		
8	Rubs nails on palms on Both sides (0.5 + 0.5)	1.0		
9	Completes the procedure in minimum 20 seconds only	0.5		
10	Waits till the hands are dried (in case of hand rub)	0.5		
	Total score	10	/10	

Faculty Remarks/Feedback:

Date :

Faculty Name & Signature



Steps of hand rubbing and hand washing (WHO): Hand rub step 1 to 7 (20–40 seconds); Hand wash step 1 to 10 (40–60 seconds).

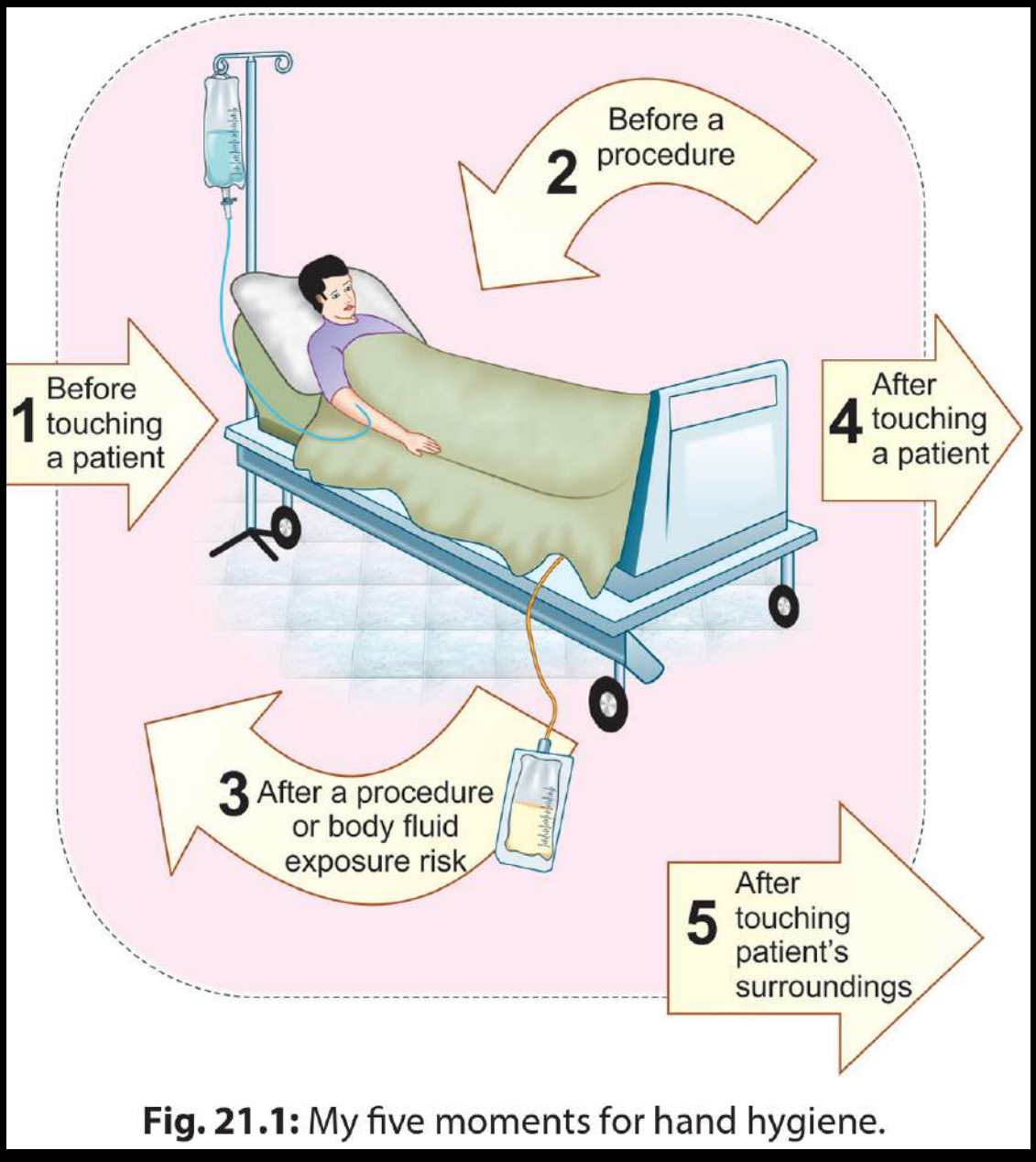


Fig. 21.1: My five moments for hand hygiene.

Hand rub

- alcohol based : 70-80% ethyl alcohol
- Chlorhexidine based :0.5-4%
- Duration of contact: 20-30 sec

Hand wash

- Antimicrobial soaps: 4% chlorhexidine
- If not available,normal soap & water.
- Duration of contact : 40-60 sec

  - hand hygiene before & after glove use.
  - no hand hygiene over gloved hand

Sequential Donning (wearing) of PPE

Student's performance	Score	YES	NO (Score=0)
Performs proper hand hygiene	1.0		
Wears the gown first in sequence	1.0		
Wears the mask second in sequence	1.0		
Ties the upper strap first and then the lower strap	2.0		
Presses on the nasal bridge part of the mask to seal tightly	1.0		
Wears the goggles third in sequence	1.0		
Wears the gloves last in sequence	1.0		
Wears by touching and pulling only the edge of the cuff	1.0		
avoids touching the forearm skin	1.0		
Total score	10	/10	
Faculty Remarks/Feedback:			
Date : Faculty Name & Signature			

Donning (wearing): Gown first → Mask or respirator → Goggles or face shield → Gloves

Doffing (removing): Gloves first → Face shield or goggles → Gown → Mask or respirator.

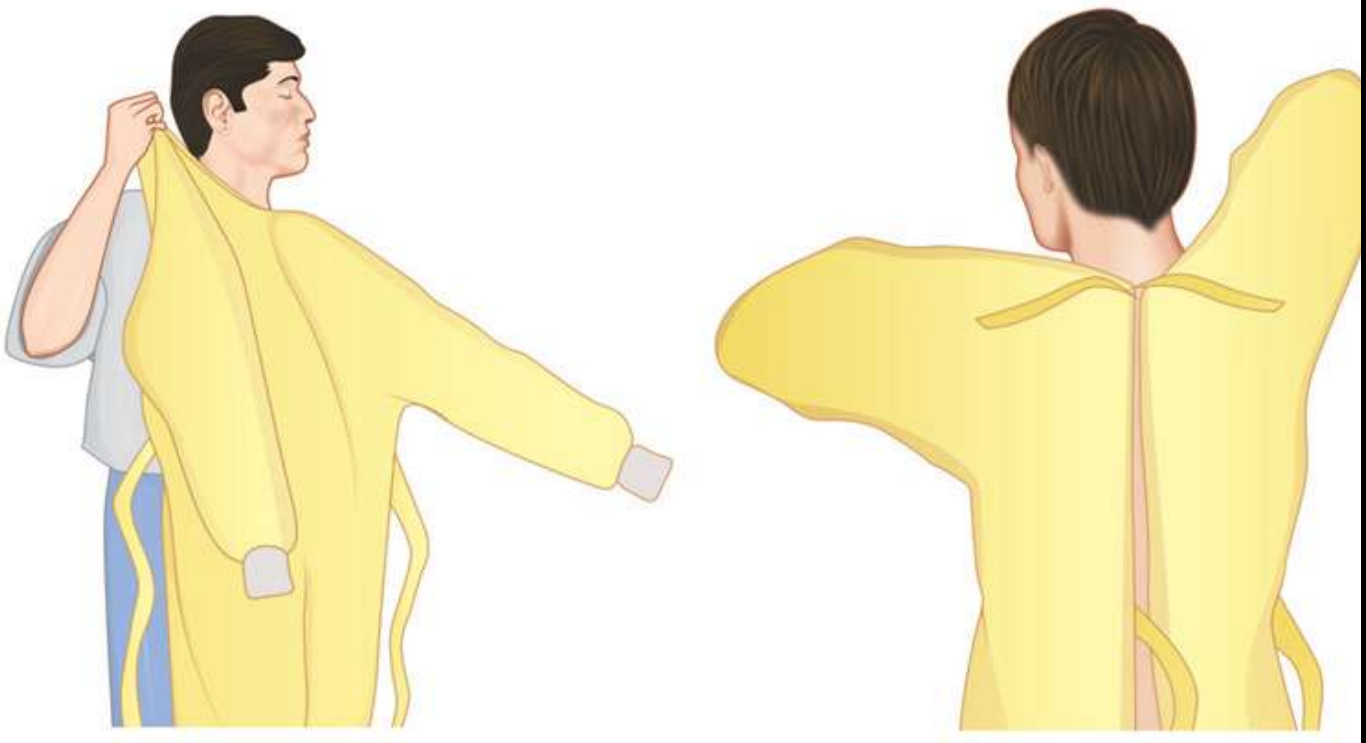


Fig. 21.8: Steps of gown donning (wearing).
Fully cover torso from neck to knees, arms to end of wrists, a
wrap around the back. Fasten it in the back of neck and waist.

Fig. 21.6: Steps of mask donning (wearing).

- Pull the straps tight and pull the mask to below chin and then apply knots.
- Press on the nasal bridge part of the mask to seal tightly and for N95 respirator, perform fit check.

- **Fit checking:** After wearing the N95 respirator, the HCW must perform a fit check to ensure if it is properly fitted. No clinical activity should be undertaken until a satisfactory fit check has been achieved. It includes the following steps
  - **Sealing:** The respirator is compressed to ensure a seal across the face, cheeks and the nasal bridge
  - **The positive pressure seal** of the respirator is checked by gently exhaling. If air escapes, the respirator needs to be adjusted
  - **The negative pressure seal** of the respirator is checked by gently inhaling. If the respirator is not drawn in towards the face, or air leaks around the face seal, the respirator is readjusted.

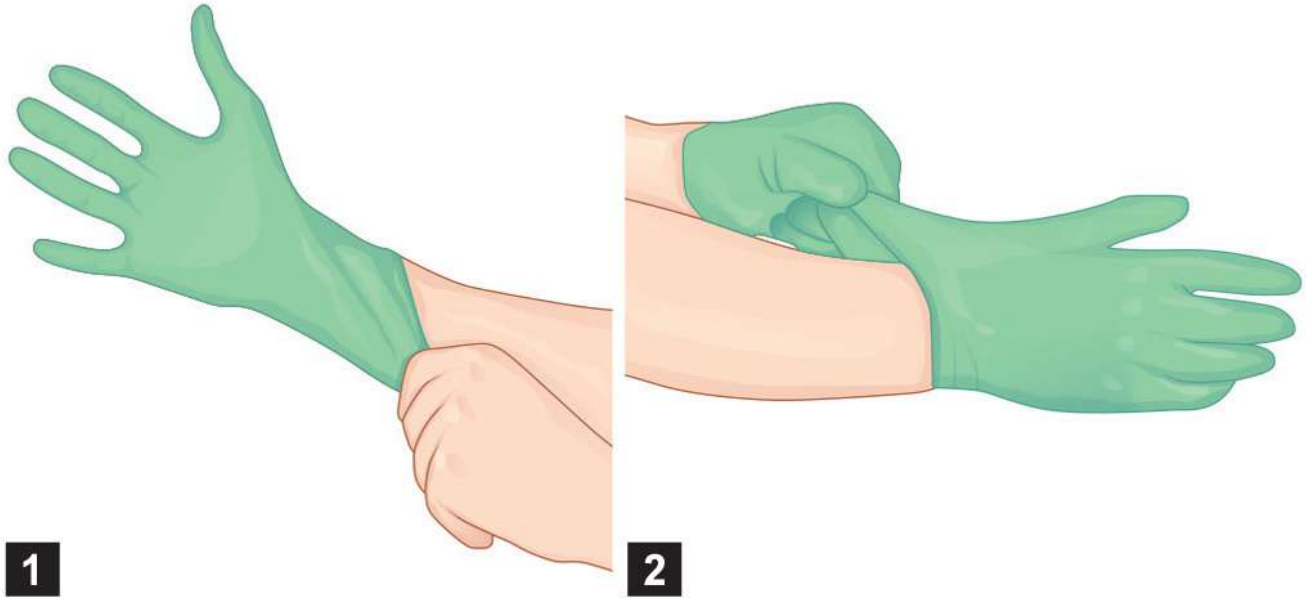


Fig. 21.4: Steps of gloves donning (wearing).

1. Donning of the first glove: Wear by touching and pulling only the edge of the cuff.
2. Donning of the second glove: Avoid touching the forearm skin by pulling external surface of second glove by the finger of gloved hand.

Checklist for Assessment of Certification Skill

Sequential Doffing (removal) of PPE

Student's performance		Score	YES	NO (Score=0)
Removes the gloves first		0.5		
Glove:1	Removes first glove by using the other gloved hand, grasps the palm area of the first glove & peels it off.	1.0		
Glove:2	a) Holds the removed glove in the other gloved hand (0.5) and b) slides fingers of the ungloved hand under the other glove at wrist and peels off second glove over first glove.(0.5)	1.0		
Discards the gloves into red bin		0.5		
Performs hand hygiene after gloves removal		0.5		
Removes goggles second in sequence		0.5		
Removes goggles by touching the sides only		1.0		
Discards goggles into red bin		0.5		
Removes gown third in sequence		0.5		
Discards the gown into yellow bin		0.5		
Performs hand hygiene after removal		0.5		
Takes off mask fourth in sequence		0.5		
Unties the lower knot first, then the upper knot		1.0		
removes the mask by holding its straps, without touching the front		0.5		
Discards the mask into yellow bin		0.5		
Performs hand hygiene at the last after removal of all PPE		0.5		
	Total score	10	/10	

Faculty Remarks/Feedback:

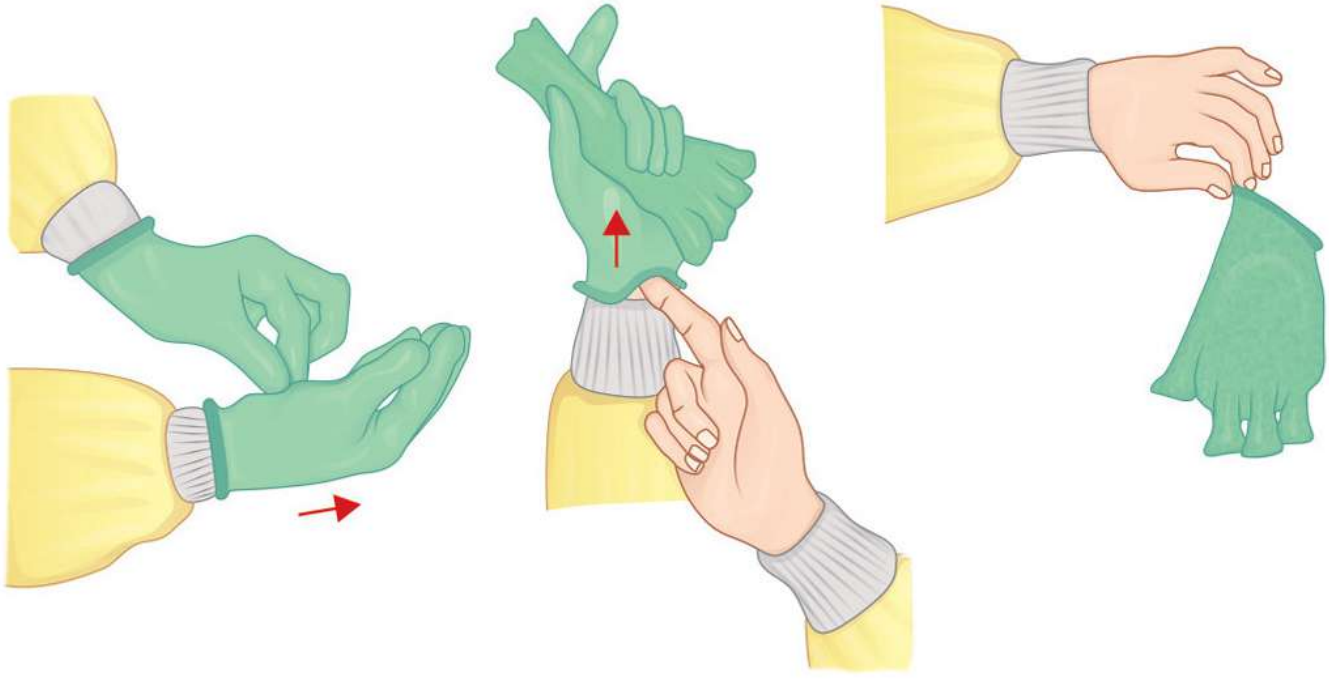


Fig. 21.5: Steps of gloves removal (doffing).

Do not touch the outside of the gloves (contaminated)

- Using a gloved hand, grasp the palm area of the other gloved hand peel off first glove.
- Hold removed glove in gloved hand slide fingers of ungloved hand under the other glove at wrist and peel off second glove over first glove.
- First glove will remain inside the pouch of the second glove.
- Perform hand hygiene after removal.

Fig. 21.9: Steps of gown removal (doffing).

Do not touch front part of the gown

- Unfasten gown ties, taking care that sleeves don't touch the body when reaching for ties.
- Pull the gown away from neck and shoulders, touching inside of gown only.
- Turn gown inside out and roll into a bundle and discard.
- Perform hand hygiene after removal.

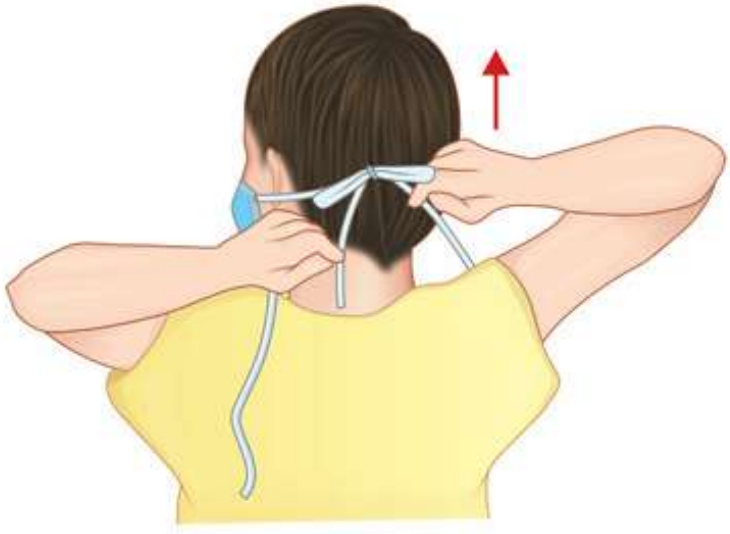


Fig. 21.7: Steps of mask removal (doffing).

- Do not touch front part of the mask.
- Untie the lower knot first, then the upper knot and remove the mask by holding its straps, without touching the front; hand wash after removal.

- Discard into appropriate BMW bins:
  - Yellow bag: Gown/coverall, mask/respirator, shoe cover and cap
  - Red bag: Plastic apron, goggles/face shield, gloves.

Steps of BMW Management

The management of BMW can overall be summarized into six simple steps.

1. Waste segregation (at the point of generation) into color-coded containers
2. Pre-treatment for laboratory liquid waste
3. Transport of waste from generation site to central storage area of the hospital
4. Transport of waste from central storage area to common bio-medical waste treatment facility (CBMWTF)
5. Treatment and/or disposal (within 48 hours of generation).

- Yellow bag—for infectious non-plastic waste
- Red bag—for infectious plastic waste
- White or translucent sharp container (puncture-proof box)—for metal sharps
- Blue container (puncture-proof box)—for broken glass items and metal implants.

Category	Type of waste	Type of Bag/container	Treatment/disposal options
Yellow 	A. Human anatomical waste	Yellow colored non-chlorinated plastic bags	Incineration/plasma pyrolysis/deep burial
	B. Animal anatomical waste		
	C. Soiled waste		Incineration/plasma pyrolysis/ deep burial/autoclaving or hydroclaving + shredding/mutilation
	D. Expired/discarded medicines—pharmaceutical waste, cytotoxic drugs	Yellow colored containers/non-chlorinated plastic bags with cytotoxic label	Sent back to manufacturer/ CBMWTF for incineration (cytotoxic drugs at temperature >1200°C)
	E. Chemical solid waste	Yellow colored containers/ nonchlorinated plastic bags	Incineration or plasma pyrolysis or encapsulation
	F. Chemical liquid waste such as discarded disinfectants, infected body fluids and secretions, liquid from house-keeping related activities	To be discharged into separate collection system, which leads to effluent treatment system Not to be discarded into yellow bag	Pre-treated[1] before mixing with other wastewater
	G. Discarded linen waste contaminated with blood/body fluids, mask, cap, gown and shoe cover	Non-chlorinated yellow plastic bags/suitable packing material	Non-chlorinated chemical disinfection[2] followed by incineration/plasma pyrolysis
	H. Microbiology, other clinical laboratory waste, blood bags, live attenuated vaccines	Autoclave safe plastic bag/ container	Pre-treat to sterilize with non-chlorinated chemicals[2] on-site as per NACO/ WHO guidelines (Blue book 2014) + incineration
Red 	**Infectious plastic waste** Disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles and fixed needle syringes) and vacutainer with their needles cut), gloves, plastic apron and goggles	Red colored non-chlorinated plastic bags or containers	• Autoclaving/microwaving/ hydroclaving + shredding • Mutilation/sterilization+ shredding Treated waste sent to authorized recyclers or for energy recovery
White (Translucent) 	**Waste sharps including metal sharps** Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp (used or discarded)	Puncture-proof, leak-proof, tamper-proof containers	Autoclaving/dry heat sterilization followed by: • Shredding or mutilation or encapsulation in metal container or cement concrete or • Sanitary landfill or • Designated concrete waste sharp pit
Blue 	a. **Glasswares:** Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes, microscope slides b. **Metallic body implants** Dental implants, other body implants and plates	Puncture proof and leak-proof container	Disinfection can be carried out by: • Soaking the washed glass waste after cleaning with detergent and sodium hypochlorite treatment (1–2%) or • Autoclaving/microwaving/ hydroclaving and then it is sent for recycling

The following general principles need to be followed during segregation, transport and storage of BMW.

- **Waste receptacles:** The waste receptacles should have the following properties
  - **Plastic bags** must be labelled with biohazard logos (Fig. 24.1) and should be non-inflammable, autoclave stable and non-chlorinated with a thickness of ≥50 μm
  - **Containers** should have well-fitting lids, either removable by hand or preferably operated by a foot pedal
  - **Sharp box** should be puncture-proof, leak-proof and tamper-proof impermeable container.
- **Importance of segregation**: Segregation is the most crucial step in BMW management. Wrong segregation may lead to serious consequences such as:
  - Needle stick injury transmitting hepatitis B or HIV (if sharp items are segregated in to yellow or red bags)
  - Production of carcinogens (if plastic items are wrongly segregated into yellow bag and subjected to incineration, leads to production of carcinogenic furans).
- **Securement:** All the bags used for waste collection need to be sealed once they are filled to 3/4th of their capacity
- **Labelling:** Bags and containers should be labelled properly with the date and place
- **Pre-treatment:** The laboratory liquid waste should always be pre-treated either with chemical (1–2% hypochlorite) or autoclave before segregating into appropriate containers

- **Transport:** The waste should be transported within 24 hours by **dedicated trolley** to the central BMW storage facility of the hospital. Separate routes should be used for transport to prevent exposure to staff and patients and to minimize the passage of loaded carts through patient care and other clean areas. Interim storage of the waste at ward is strongly discouraged
- **Central storage area:** This is a temporary storage facility present within a hospital where different types of waste should be brought for safe retention until it is treated or collected for transport to CBMWTF
- **PPE:** HCWs handling BMW during transport or in the storage area should wear appropriate personal protective equipment (PPE) such as heavy duty gloves, 3-ply mask, gowns and gumboots.

Treatment and Disposal Methods

As per the mandate of the BMWM rules, 2016, the final disposal and recycling must be performed at common bio-medical waste treatment facility (CBMWTF). Only when there is no CBMWTF within 75 km, the hospital can create its own the disposal facility. The following are the methods used for treatment/disposal of BMW.