



Training component of the project

“Environmentally Sound Management of Medical Wastes in India”

Endeavour of GEF, UNIDO, MoEFCC and

State Governments of Gujarat, Karnataka, Maharashtra, Odisha & Punjab

STANDARD OPERATIVE PROCEDURES FOR BIO-MEDICAL WASTE MANAGEMENT

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About the Project

With India becoming a party to the Stockholm Convention on Persistent Organic Pollutants (POPs) in May 2002 and ratifying it in January 2006, the country was obliged to comply with the requirements of the Stockholm Convention. It is in this context that the project on “Environmentally Sound Management of Medical Waste in India” (ESMWI) has been approved by Global Environment Facility (GEF) where the Ministry of Environment and Forest and Climate change, Government of India, is the national executing agency and the United Nations Industrial Development Organization (UNIDO) is the implementing agency.

The overall objective of the project is to reduce the release of unintentionally produced POPs and other globally harmful pollutants into the environment.

Objectives of SOP

Biomedical Waste Management is process dependent and not person dependent. The Standard Operative Procedure will help in uniform implementation of the Bio-Medical Waste Management Rules, 2016. Standard Operative Procedure is defined as a method for accomplishing a policy. Hence, SOPs represent the action plan for achieving the policy.

1. It is a means to standardize the practices by all health care professionals in health care facilities.
2. It is a step by step guideline.
3. It is brief and to the point.
4. It is a ready reckoner.






Introduction

Waste management rules in India are founded on the principles of “sustainable development”, “precautionary” and “polluter pays”. Under the Environment (Protection) Act, 1986, Bio-Medical Waste Management Rules, 2016, came into force from 28th March, 2016 in supersession of the Bio-Medical Waste (Management and Handling) Rules, 1998. Under the new rules, the coverage has increased and also provides for pre-treatment of lab waste, blood samples, etc. It mandates bar code system for proper control. It has simplified categorisation and authorisation which makes the implementation more easier.







Salient features of BMW Management Rules, 2016:

1. The ambit of the rules has been expanded to include vaccination camps, blood donation camps, surgical camps or any other healthcare activity
2. To phase-out the use of chlorinated plastic bags, gloves by 27th March, 2019.
3. Pre-treatment of the laboratory waste, microbiological waste, blood samples and blood bags through disinfection or sterilisation on-site
4. Provide training to all its health care workers and immunise all health workers regularly.
5. Establish a Bar-Code System for bags or containers containing bio-medical waste for disposal.
6. Report major accidents.
7. Bio-medical waste has been classified in to 4 categories instead 10 to improve the segregation of waste at source.
8. Procedure to get authorisation simplified. Automatic authorisation for bedded hospitals. The validity of authorization synchronised with validity of consent orders for Bedded HCFs. One time Authorisation for Non-bedded HCFs.
9. The new rules prescribe more stringent standards for incinerator to reduce the emission of pollutants in environment.
10. No occupier shall establish on-site treatment and disposal facility, if a service of `common bio-medical waste treatment facility is available at a distance of seventy-five kilometer.
11. Operator of a common bio-medical waste treatment and disposal facility to ensure the timely collection of bio-medical waste from the HCFs and assist the HCFs in conduct of training






Segregation – Yellow Bin (Infectious Waste)

<p>Types of Bio-Medical Waste</p>					
<p>Colour Code</p>	<p>YELLOW BIN WITH NON CHLORINATED YELLOW PLASTIC BAG ≥ 50 microns</p> 				
<p>Treatment & Disposal</p>	<p>Common Bio-Medical Waste Treatment Facility - Incineration/plasma pyrolysis Health Care Facilities where there is no access to CBWTF within 75 kms - DEEP BURIAL</p>				
<p>* Disinfection with Non- Chlorinated chemical disinfectant – 5% phenol, 5% cresol, 2-3% formaldehyde, 2% formalin, 3% hydrogen peroxide, 70% ethyl alcohol followed by cutting & shredding</p>					

Segregation - Yellow Bin

<p>Types of Bio - Medical Waste</p>	 <p>8</p>	 <p>9</p>	 <p>10</p>
	<p>Expired / discarded medicines</p>	<p>Cytotoxic drugs</p>	<p>Microbiology, Clinical laboratory, Biotechnology waste including blood bags & blood samples [Pre treat in autoclave safe plastic bag / microwave /non chlorinated chemical disinfection]</p>
<p>Colour Code</p>	<p>Yellow bin with yellow non-chlorinated plastic bag \geq 50 microns thickness</p> 	<p>Yellow bin with yellow non- chlorinated plastic bag \geq 50 microns</p> 	<p>Yellow bin with yellow non- chlorinated plastic bag \geq 50 microns</p> 
<p>Treatment & Disposal</p>	<p>CBWTF - Incineration Return back to the manufacturers [All expired/ discarded medicine from all locations in the hospital to be collected and stationed in the Pharmacy]</p>	<p>CBWTF - Incineration Return back to the manufacturers / Hazardous Waste Treatment Storage & Disposal Facility</p>	<p>CBWTF - Incineration DEEP BURIAL- HCFs where there is no access to CBWTF</p>

Segregation -Liquid Waste




Liquid Waste			
Types of Biomedical Waste	Silver X ray film developing liquid	Infectious liquid waste	Liquid chemical waste from lab (reagents, normal saline), floor washing
Sources - X-ray room, Lab, Operation theater, Casualty, Labour room		Infected secretions - sputum / faeces / urine / serum Aspirated body fluids - pleural/peritoneal / CSF/ synovial fluid	 
Treatment	Sent to registered recycling unit for silver recovery	Pre-treatment with chemical disinfection /sterilisation 	Neutralisation[^] Neutralize acids with soda ash or sodium bicarbonate. Bases can be neutralized with citric acid or ascorbic acid. Use pH paper to determine when acid or base spills have been neutralized. 
Effluent Disposal	Effluent Treatment Plant		

[^] Guide for Chemical Spill Response Planning in Laboratories. American Chemical Society's CEI/CCS Task Force on Laboratory Waste Management American Chemical Society, Washington, DC 1995. Available from : URL : www.acs.org/content/acs/en/about/governance/committees/chemicalsafety/publications/guide-for-chemical-spill-response.html

Segregation of Contaminated (Recyclable) Wastes

<p>Types of Biomedical Waste</p>	<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>13 FOLEY'S CATHETER</p> </div> <div style="text-align: center;">  <p>14 UROSAC BAG</p> </div> <div style="text-align: center;">  <p>IV BOTTLE & DRIP SET</p> </div> <div style="text-align: center;">  <p>HEAVY DUTY RUBBER GLOVES & SURGICAL GLOVES</p> </div> <div style="text-align: center;">  <p>15 SYRINGE WITHOUT NEEDLE</p> </div> <div style="text-align: center;">  <p>16 VACCUTAINER</p> </div> <div style="text-align: center;">  <p>17 RYLES TUBE</p> </div> </div>
<p>Colour Code</p>	<div style="display: flex; align-items: center; justify-content: center;">  <p>RED BIN WITH RED NON CHLORINATED PLASTIC BAG \geq 50 microns</p> </div>
<p>Treatment</p>	<p style="text-align: center;">Common Bio-Medical Waste Treatment Facility - Autoclave /Microwave/Chemical disinfection followed by shredding</p> <p>HCFs where there is no access to CBWTF within 75 kms - Pre treat with chemical disinfection / sterilization (Autoclave/Microwave) and then hand it over to registered recyclers</p>

Segregation of Glassware and Metallic Body Implants

<p>Types of Biomedical Waste</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>BROKEN GLASS</p> </div> <div style="text-align: center;">  <p>BROKEN AMPOULES</p> </div> <div style="text-align: center;">  <p>EMPTY VIAL</p> </div> <div style="text-align: center;">  <p>METALLIC BODY IMPLANTS, SCREWS & PLATES</p> </div> </div>
<p>Colour Code</p>	<div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> <p>Puncture proof, leak proof container with blue marking</p> </div> </div>
<p>Treatment & Disposal</p>	<p style="text-align: center;">Common Bio-Medical Waste Treatment Facility - Autoclave - Hand it over to registered recycler</p> <p style="text-align: center;">At HCFs where there is no access to CBWTF within 75 km - Disinfection & Hand it over to registered recycler</p>

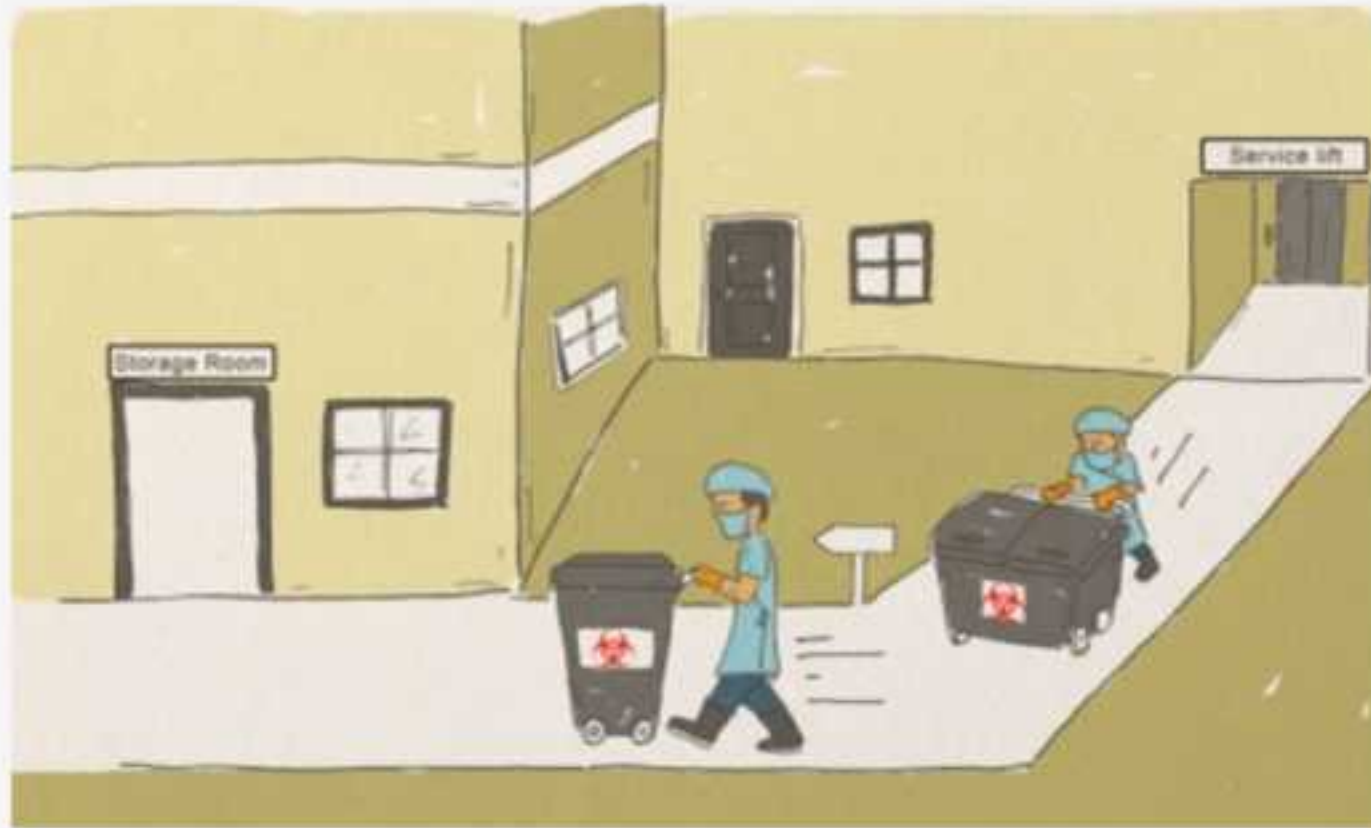
Segregation of Contaminated (Recyclable) Wastes

<p>Types of Biomedical Waste</p>	<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Scalpels</p> </div> <div style="text-align: center;">  <p>Razor blade</p> </div> <div style="text-align: center;">  <p>Suture needle</p> </div> <div style="text-align: center;">  <p>Syringe with fixed needle</p> </div> <div style="text-align: center;">  <p>Lumbar puncture needle</p> </div> <div style="text-align: center;">  <p>Needles from Syringe</p> </div> </div>
<p>Colour Code</p>	<div style="display: flex; align-items: center; justify-content: center;">  <p>White translucent Puncture Proof, Leak Proof and Tamper Proof Container</p> </div>
<p>Treatment & Disposal</p>	<p style="text-align: center;">COMMON BIO-MEDICAL WASTE TREATMENT FACILITY - Autoclave - Shredding</p> <p style="text-align: center;">*HCFs where no access to CBWTF - Chemically disinfect and then contain in SHARPS PIT</p>

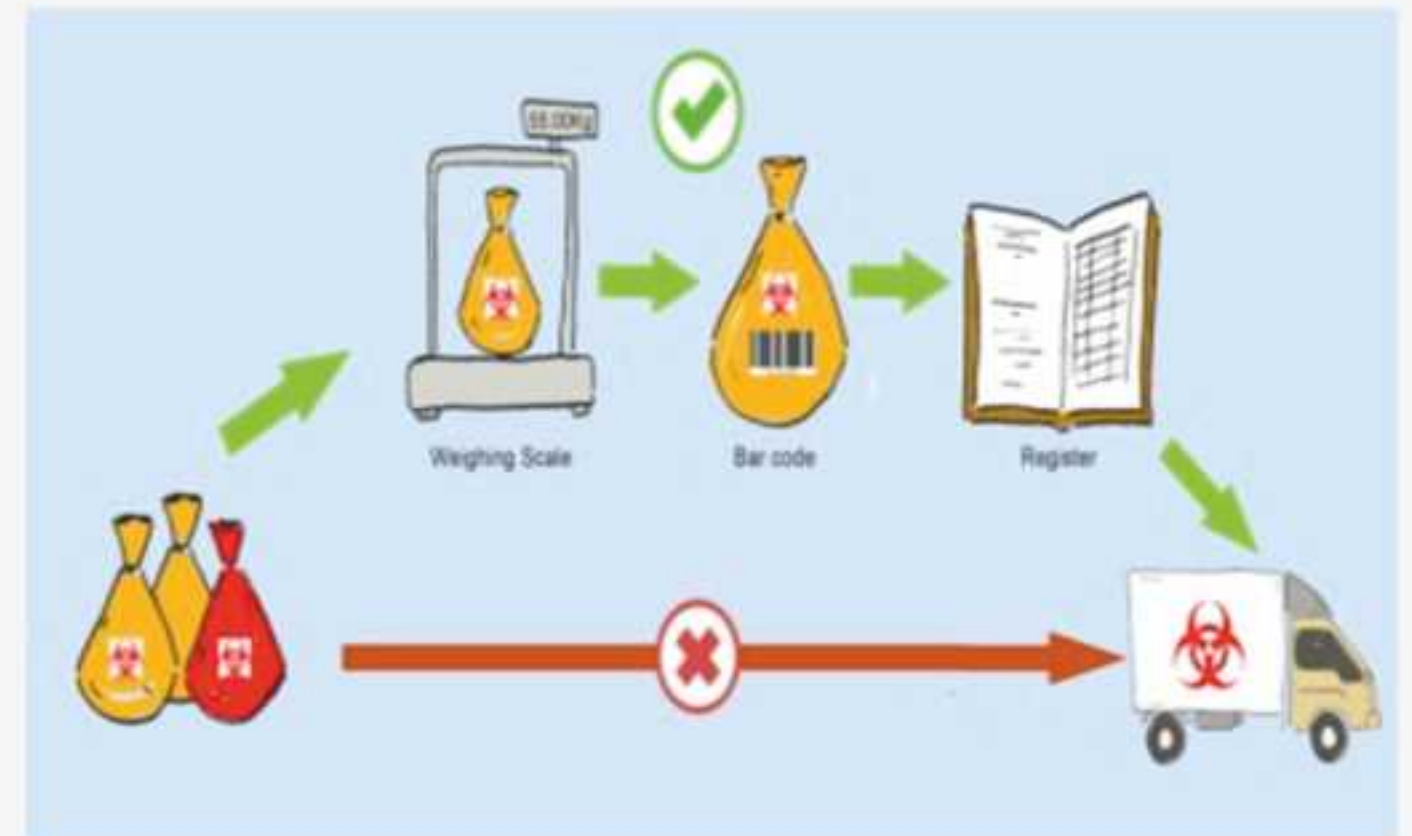
Collection & Transportation of Biomedical Medical waste within the Health Care Facility (HCF)

1. Collection & transportation of waste to be done preferably during non-peak hours of the hospital or every shift.
2. Frequency of collection of waste to be determined based on the requirement of the HCF-(daily / once in every shift)
3. Personal Protection Equipment (PPE) to be worn during collection & transportation.
4. Plastic bag should only be $\frac{3}{4}$ th filled and tightly tied and tagged (from where it was collected- eg: ward/OPD/OT).
5. Predefined route chart should be followed for on-site transportation
6. Closed trolleys with bio-hazard symbol should be used.
7. The biomedical waste is to be weighed, bar coded and the number of bags and the corresponding weight should be documented in a record.
8. Trolleys should be cleaned daily.

Collection & Transportation of Biomedical Medical waste within the Health Care Facility (HCF)



On-site transportation of segregated Bio-Medical Waste to the temporary waste storage room

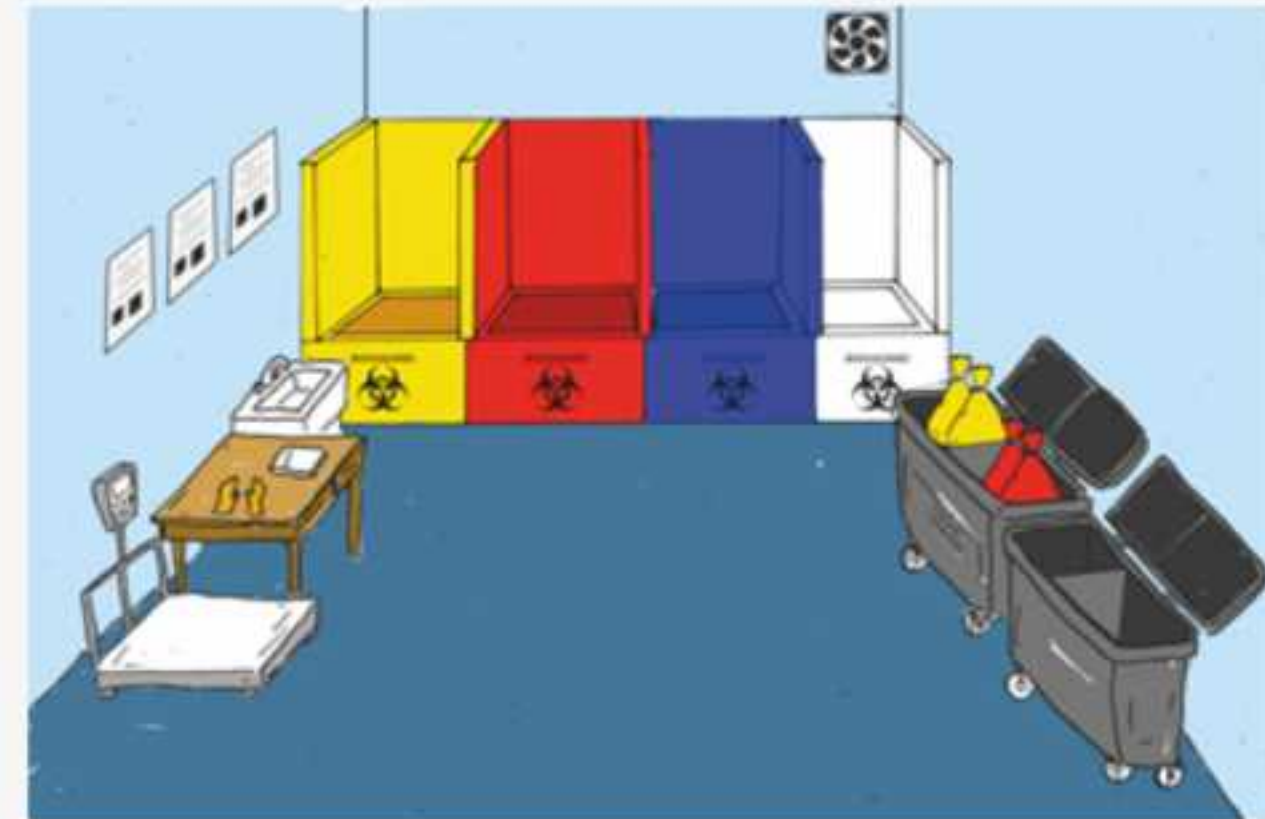


Process of weighing, bar coding, maintenance of record and off-site transportation of Bio-Medical Wastes from Health Care Facility

Temporary Waste Storage Room in the Health Care Facility

The temporary waste storage room should be designed in the following way:

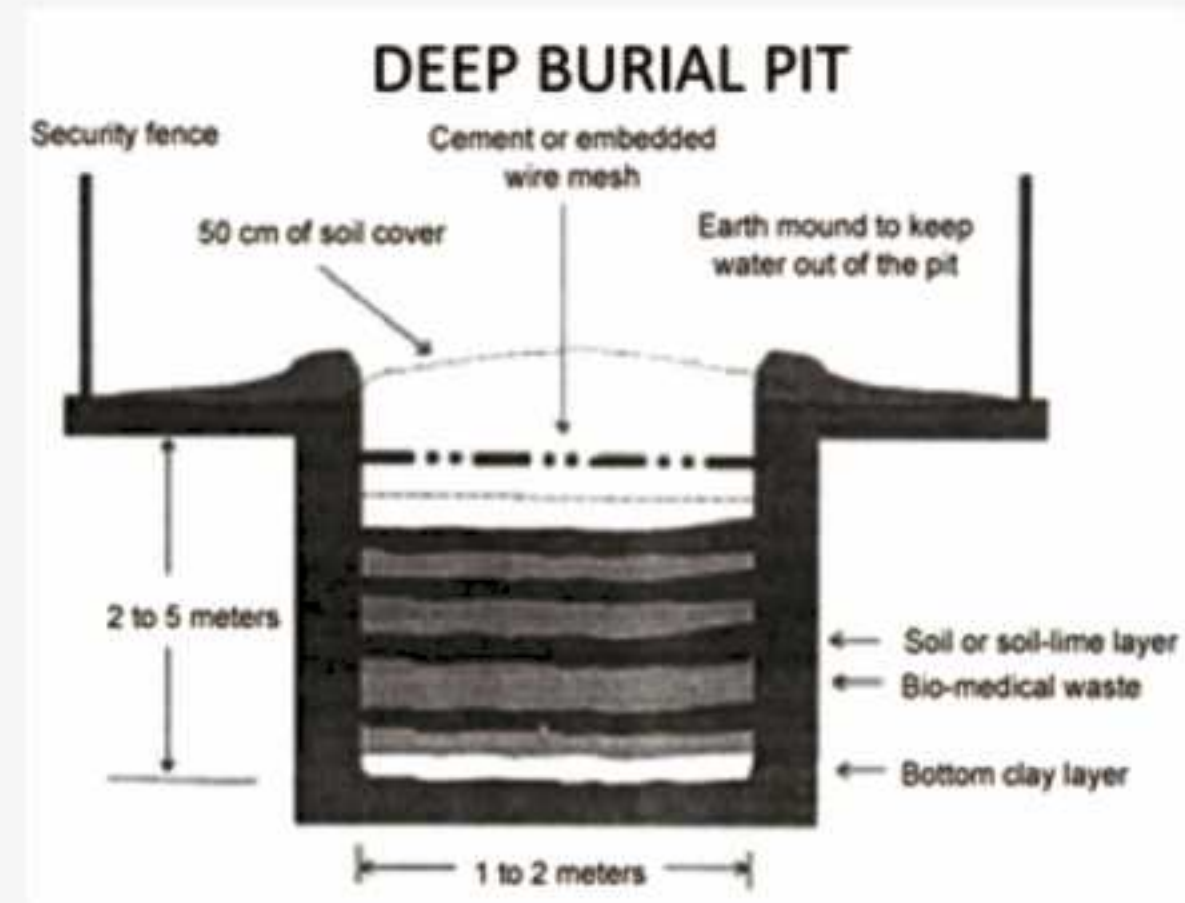
- Display board at the entrance -Name of the CBWTF and address, validity of authorisation and bio-hazard logo
- Be located such that it is accessible for easy transportation of waste to common bio-medical waste treatment vehicle
- Be secured with lock and key with proper signage
- It should be away from patient care
- Have four big partitions with colour coding & biohazard symbol
- Have non porous floor that is easy to clean
- Be protected from rain and sunlight
- Have good lighting and ventilation
- Should be inaccessible to stray animals and unauthorized person
- Should have adequate water supply to clean the room
- Should have adequate drainage facility for washing and cleaning purposes
- The outlet of the floor washing of room shall have discharge into ETP
- Should have provision for cleaning of the equipment's, protective clothing, waste bins
- Should have a weighing scale to weigh the waste
- Transporting trolleys should be located conveniently close to the storage room
- **CAUTION - BIOMEDICAL WASTE STORAGE AREAS - NO ENTRY WITHOUT PERMISSION**



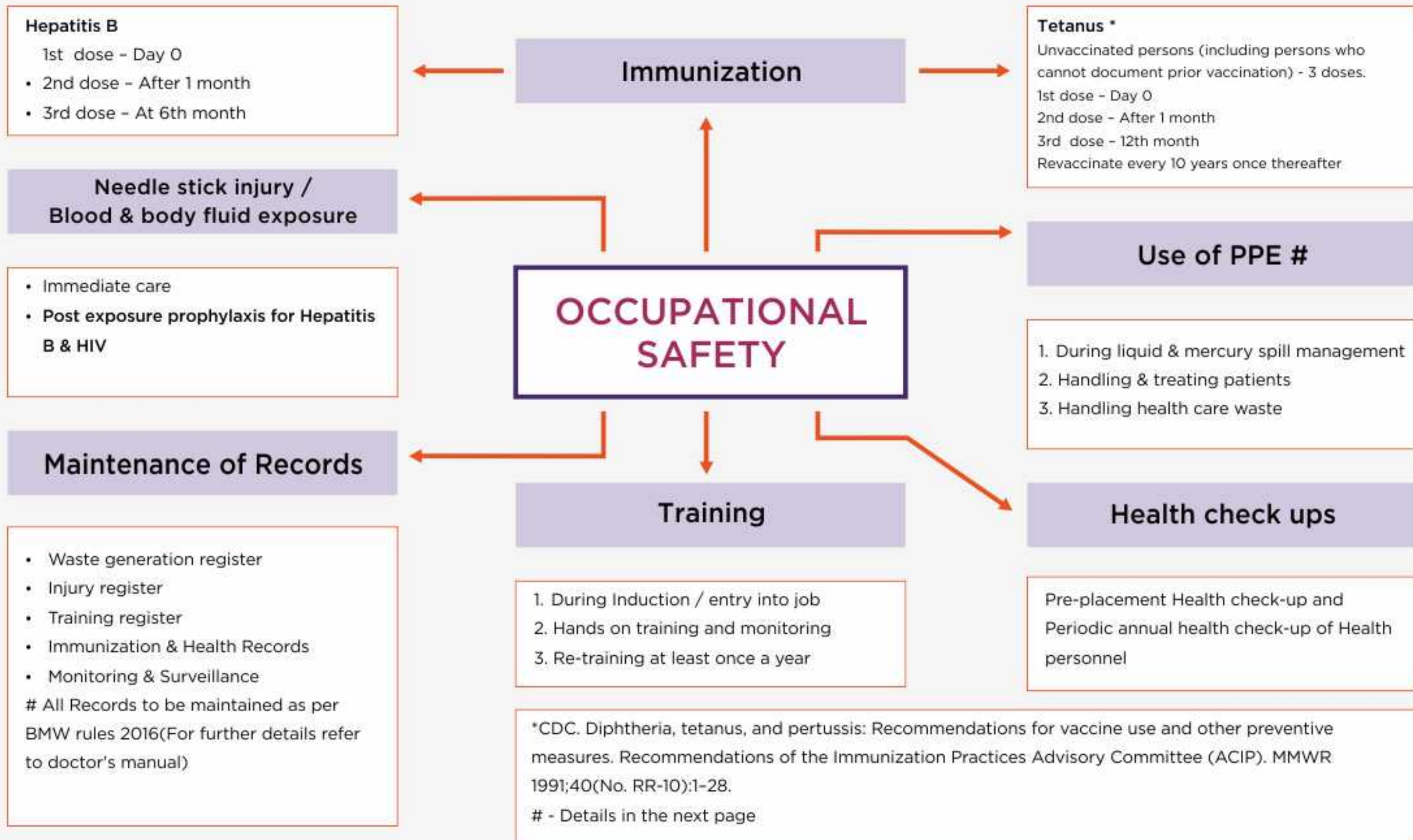
DEEP BURIAL

1. The site should be relatively impermeable and no shallow well should be close to the site
2. The ground water table level should be a minimum of 6-7 metres below the ground level
3. Should be at a distance of at least 15 metres from habitation so as to ensure that no contamination of any surface water or ground water occurs
4. The area should not be prone to flooding or erosion
5. Should not be accessible to stray animals or unauthorised person and covers of galvanised iron/wire meshes may be used
6. Should be dug about 2 m deep below the ground level
7. Burial must be performed under close and dedicated supervision
8. Every time the wastes is added to the pit, a layer of 10cm of soil should be added to cover the wastes
9. The pit should be half filled with waste, then covered with lime within 50cm of the surface before filling the rest of the pit with soil.
10. The HCFs should maintain a record of all pits for deep burial

Note : As pr CBWTF , Deep burial is permitted only in places where there is no CBWTF within 75kms.



OCCUPATIONAL SAFETY



Personal Protective Equipment (PPE) for Waste Handlers



Order of wearing the PPE

1. Apron
2. Mask
3. Head cover
4. Goggles / Face Shield
5. Gum boots
6. Heavy Duty Gloves

Note :

Gum boots – for the waste handler

Face shield – during splash of body fluids, chemicals and aerosols

Note : Details of the material of the gloves given in the Information book on biomedical waste for administrators/doctors and nurses

PERSONAL PROTECTIVE EQUIPMENT - WHEN TO USE ?

Procedure	Glove	Gown	Mask	Goggles
Taking BP	–	–	–	–
Temperature, pulse, Counting respiration	–	–	–	–
IM injection	–	–	–	–
Starting IV line or taking blood or IV injection	√	–	–	–
Controlling minor bleeding	√	–	–	–
Cleaning an incontinent patient with diarrhoea	√	√	–	–
Handling soiled laundry	√	√	√	–
Cleaning contaminated instruments	√	√	√	–
Controlling massive bleeding	√	√	√	√
Irrigating a wound	√	√	√	√
Conducting Delivery	√	√	√	√
Intubation	√	√	√	√
Suctioning	√	√	√	√
Liquid spill management	√	√	√	√
Mercury spill management	√	√	√	√
Handling waste(support staff)	√	√	√	√

*Gum boots - for the waste handler | #Face shield - during splash of body fluids, chemicals and aerosols

Spill Management (Blood or Body fluids)

(Spill management should be done by /under close supervision of trained person)

Contents of Spill kit

1. Personal Protective Equipment (PPE) –
 - a. Rubber gloves
 - b. Safety goggles / Face shield
 - c. Mask
 - d. Apron
 - e. Disposable shoe cover
2. Old news paper / blotting paper / absorbant material
3. A labeled bottle of chemical disinfectant
4. Mop cloth
5. Yellow and Red plastic bags with bio - hazard logo for waste collection

NOTE: Spill kit should be placed at all necessary locations
eg: Nursing stations, OT, Labour ward, Casualty .



Spills Management (Blood or Body Fluids)

Steps in management of spills:

Step 1: Use stop/caution board. Cordon the area

Step 2: Open the spill kit

Step 3: Wear gloves and other PPE as appropriate

Step 4: Place an old news paper or blotting paper to absorb the spill and discard it into yellow bin

Step 5: Cover the spill area with equal volume of disinfectant and leave it for 20 minutes

Step 6: Clean the spill area with paper towels / old newspaper and discard it into yellow bin

Step 7: After the decontamination procedure, Wash / clean the area with detergent

Step 8: Remove the gloves and discard into Red bin. Discard the Gown, mask and shoe cover into Yellow bin

Step 9: Wash the hands with soap and water

Step 10: Re arrange the spill kit with required contents for next use.



MANAGEMENT OF MERCURY SPILL

Management of Mercury spill to be done by a trained person

Mercury hazardous chemical used in different instruments like thermometers and sphygmomanometer within health facilities, is a neurotoxin and can contaminate air and water in minute quantities.

Note: Mercury spillage collection kit should be kept at all nursing stations of wards in HCFs to allow rapid access to use the same in the event of mercury spillage.



Don'ts during management of mercury spill

1. Do not touch the mercury with bare hands
2. Do not throw the mercury in waste bins or drain.
3. Do not use a broom or a vacuum cleaner for cleaning of Mercury.

CONTENTS OF MERCURY SPILL KIT

Procedure of management of mercury spill

- Step 1: Put a caution board and cordon off the area
- Step 2: Remove all jewellery from hands and wrist so that mercury does not react with the precious metals
- Step 3: Wear personal protective gears – Gown, Cap, Mask, Goggles and gloves in that order
- Step 4: Collect mercury droplets together by using two cardboard pieces/ X-ray films/using a filler / duct tape/syringe
- Step 5: Drop the collected mercury into a bottle half filled with water and tightly cover the lid of the bottle
- Step 6: Label the contents of the bottle with date
- Step 7: Send the bottle containing mercury back to manufacturer for recovery/ send it to Hazardous Treatment, Storage and Disposal Facility
- Step 8: Cover the spill area with 10% sodium thiosulphate solution and clean the area with mop
- Step 9: Remove all the personal protection equipment and place it in separate plastic bag



NEEDLE STICK INJURY/ACCIDENTAL EXPOSURE TO BODY FLUIDS

Don't Panic

FOR THE EYE

1. Irrigate exposed eye immediately with water or saline
2. Sit in a chair, tilt the head back and ask a colleague to gently pour water or normal saline
3. If wearing contact lens, leave them in place while irrigating, as they form a barrier over the eye and will help protect it.
4. Once the eye is cleaned, remove the contact lens and clean them in the normal manner. This will make them safe to wear again.
5. Repeat irrigation after removing contact lens.
6. Do not use soap or disinfectant for the eyes.

FOR MOUTH

1. Spit the fluid immediately
2. Rinse the mouth thoroughly, using water or saline and spit again
3. Repeat this process several times
4. Do not use soap or disinfectant in the mouth

TO UNBROKEN SKIN

1. Wash the exposed area immediately with running water
2. Do not put finger into the mouth
3. Do not squeeze
4. Do not use antiseptics

1. Report the incident to the area supervisor/infection control nurse.
2. Supervisor/ infection control nurse should document the injury/incident in the injury register.
3. If injury is due to unused syringe, no further action needs to be taken.
4. If it is due to used syringe/sharp instruments, samples from Health care worker and also from the source for HIV, HBsAg and anti HBsAb should be taken and sent to the lab.
5. Refer to the Nodal person for counselling and action to be taken for PEP.

POST EXPOSURE PROPHYLAXIS FOR HEPATITIS B EVENT IN AN ACCIDENTAL EXPOSURE

(Percutaneous and mucosal exposure to blood and body fluids)

Health-care personnel status	Post-exposure testing		Post-exposure prophylaxis		Post-vaccination serologic testing [†]
	Source patient (HBsAg)	HCP testing (anti-HBs)	HBIG*	Vaccination	
Response unknown after 3 doses	Positive/unknown	<10mIU/mL**	HBIG x1	Initiate revaccination	Yes
	Negative	<10mIU/mL	None		
	Any result	≥10mIU/mL	No action needed		
Unvaccinated/incompletely vaccinated or vaccine refusers	Positive/unknown	—**	HBIG x1	Complete vaccination	Yes
	Negative	—	None	Complete vaccination	Yes

Abbreviations: HCP = health-care personnel; HBsAg = hepatitis B surface antigen; anti-HBs = antibody to hepatitis B surface antigen; HBIG = hepatitis B immune globulin.

- * HBIG should be administered intramuscularly as soon as possible after exposure when indicated. The effectiveness of HBIG when administered >7 days after percutaneous, mucosal, or nonintact skin exposures is unknown. **HBIG dosage is 0.06 mL/kg.**
- Should be performed 1-2 months after the last dose of the HepB vaccine series (and 4-6 months after administration of HBIG to avoid detection of passively administered anti-HBs) using a quantitative method that allows detection of the protective concentration of anti-HBs (≥10 mIU/mL).
- A responder is defined as a person with anti-HBs ≥10 mIU/mL after ≥3 doses of HepB vaccine.
- A nonresponder is defined as a person with anti-HBs <10 mIU/mL after ≥6 doses of HepB vaccine.

** HCP who have anti-HBs <10mIU/mL, or who are unvaccinated or incompletely vaccinated, and sustain an exposure to a source patient who is HBsAg-positive or has unknown HBsAg status, should undergo baseline testing for HBV infection as soon as possible after exposure, and follow-up testing approximately 6 months later. Initial baseline tests consist of total anti-HBc; testing at approximately 6 months consists of HBsAg and total anti-HBc.

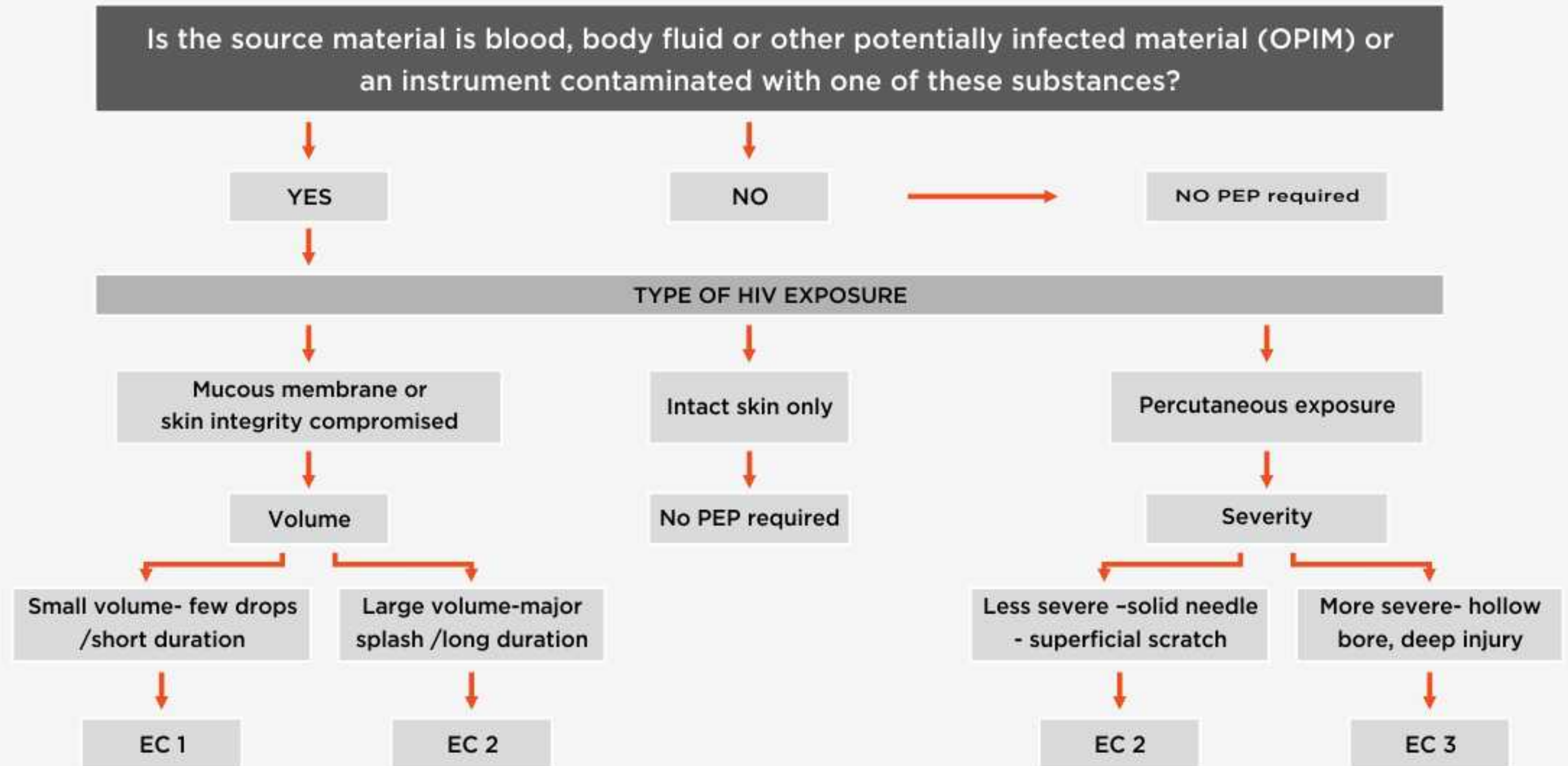
Source : CDC Guidance for Evaluating Health-Care Personnel for Hepatitis B Virus Protection and for Administering Post exposure Management. Recommendations and Reports. December 20, 2013

/ 62(RR10);1-19

Post Exposure Prophylaxis for HIV in an Accidental exposure

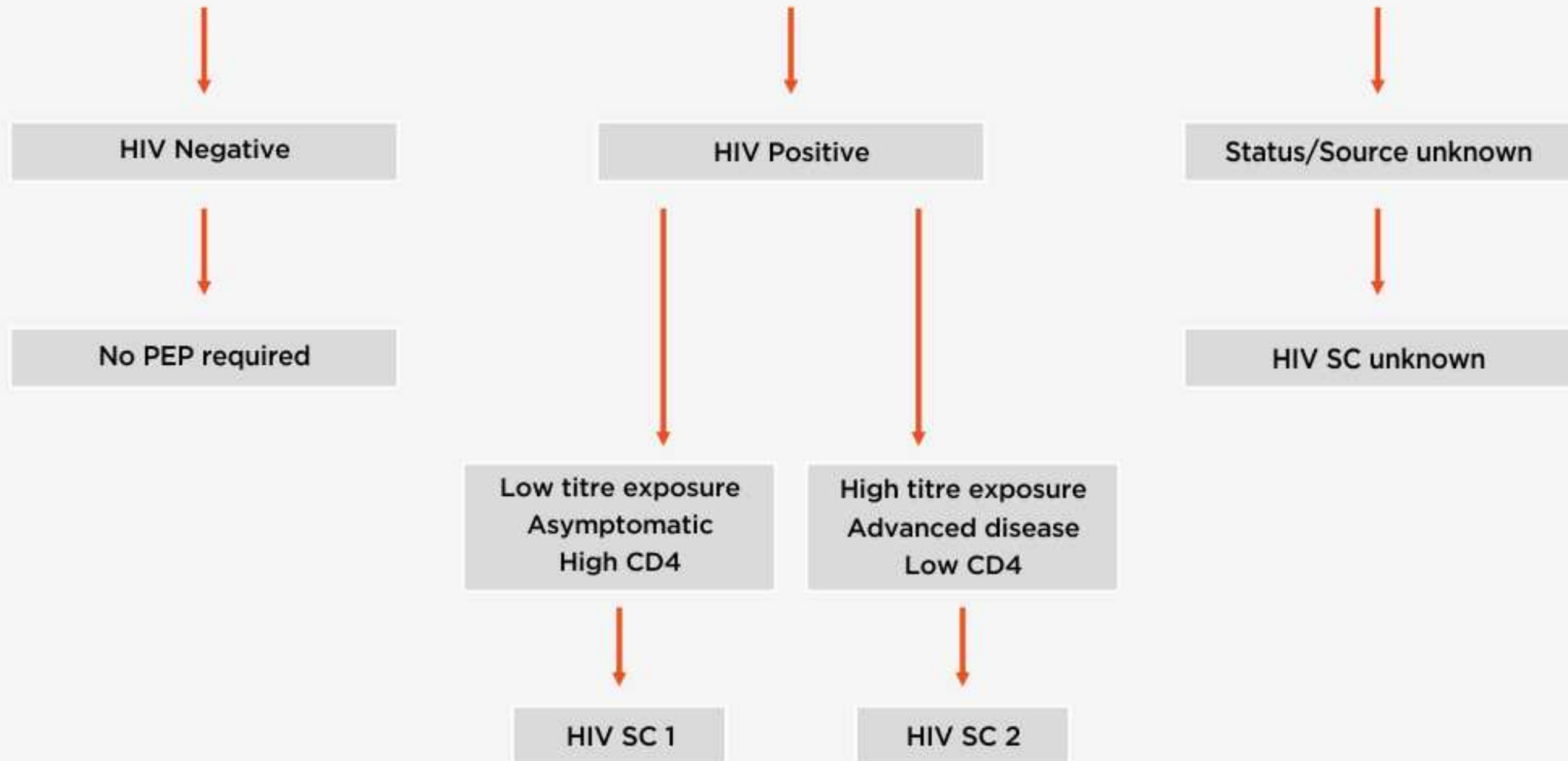
Ascertain HIV exposure code (EC) and status code (SC) & determine the PEP requirement

HIV Exposure Code (EC)



HIV Source Code (SC)

HIV Status of Exposure Source



Post Exposure Prophylaxis Recommendations

Tenofovir 300 mg + Lamivudine 300 mg + Efavirenz 600 mg once daily for 28 days

Exposure Codes	HIV Source Code	PEP Recommendations
1	1	Not warranted
1	2	Recommended
2	1	
2	2	
3	1 or 2	
2/3	Unknown	Consider PEP, if HIV prevalence is high in the given population & risk categorisation

- ❖ PEP needs to be given within 72 hours of exposure
- ❖ First dose should be administered as soon as possible, preferably within 2 hours of exposure and the subsequent dose to be taken at bed time with clear instruction to take it 2- 3 hours after dinner & to avoid fatty food in dinner
- ❖ In case of intolerance to Efavirenz , regimen containing Tenofovir + Lamivudine + Protease Inhibitor -(Atazanavir + ritonavir / Lopinavir + ritonavir)
- ❖ In case of exposure where source is on Anti-Retroviral Treatment, PEP should be started immediately.

Recommended follow up laboratory tests	Timing	In persons taking Standard PEP
	Weeks 2 and 4	Complete Blood count (AZT patients)
	Weeks 6	HIV-Ab
	Weeks 12	HIV-Ab
	Weeks 24	HIV-Ab

Source : Revised Guidelines for Post exposure prophylaxis for HIV- NACO ;2014

INVESTIGATION AND FOLLOW UP SCHEDULE FOR INJURIES

Details	
Date	
Name	
Age	
Sex	
Time of injury	
Time of reporting	
Work area where exposure occurred	
Nature of injury	
How did it happen	
Patients HIV Status	
Patients HbsAg Status	
Type of exposure (blood filled device, body or blood fluid exposure, body part exposed, type of device)	
Investigations done - HIV , HBsAg, HCV	
Time of PEP given	
Follow up dates for treating and testing	

DOCUMENTATION OF BMW AT VARIOUS LOCATIONS

Bio-Medical Waste Generation Register at Point of Generation

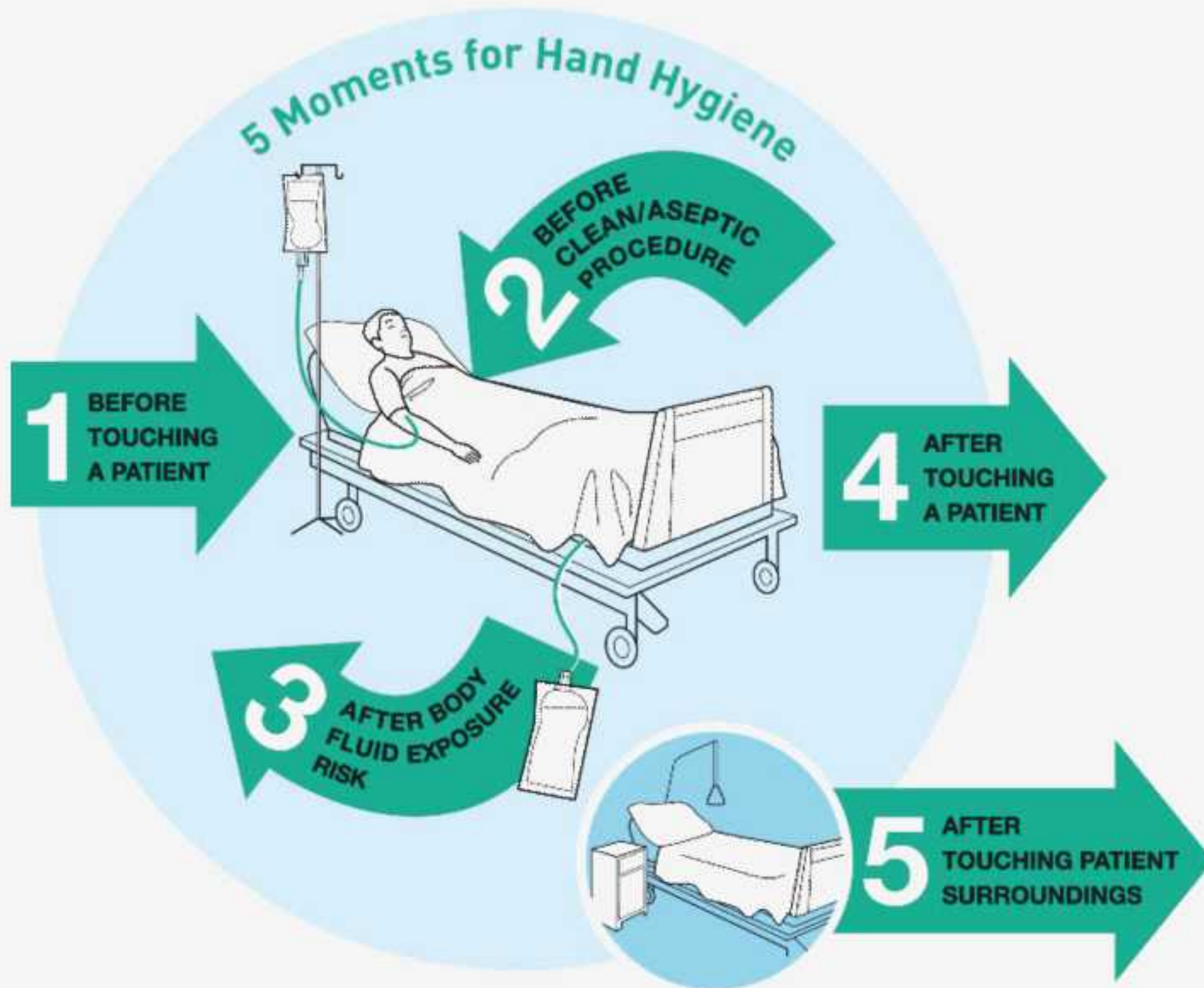
Sl. No.	Date	Time	Location	Yellow Bag		Red Bag		Sharps container		"Puncture proof leak proof container with blue marking"		Sign of ward sister	Sign of house keeping staff
				Number	Weight(kg)	Number	Weight(kg)	Number	Weight(kg)	Number	Weight(kg)		

Bio-Medical Waste Generation Register at Temporary Waste Storage Room

Sl. No.	Date	Time	Location	Yellow Bag		Red Bag		Sharps container		"Puncture proof leak proof container with blue marking"		Sign of ward sister	Sign of house keeping staff
				Number	Weight(kg)	Number	Weight(kg)	Number	Weight(kg)	Number	Weight(kg)		

Records for Autoclave

Parameters	Date	Time	Batch number	Initials of responsible authority
Pressure				
Temperature				
Time				
Validation test for sterilization				



5 moments for Hand Hygiene

SOURCE: 'My 5 moments for Hand Hygiene'. (Accessed on 23 December 2017). Available from :
URL : <http://www.who.int/gpsc/5may/background/5moments/en/index.html>

Hand Washing Techniques

0 Duration of the handwash (steps 2-7): 15-20 seconds

1 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;



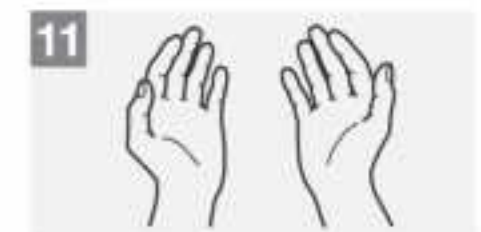
Rinse hands with water;



Dry hands thoroughly with a single use towel;



Use towel to turn off faucet;



Your hands are now safe.

SOURCE: WHO guidelines on hand hygiene in health care. How to wash hands. (Accessed on 23 December 2017). Available from URL: http://www.who.int/gpsc/WHO_HH.pdf



World Health Organization

Patient Safety

A World Alliance for Safer Health Care

SAVE LIVES

Clean Your Hands

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