



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 and Punjab



# TRAINING MANUAL ON BIOMEDICAL WASTE MANAGEMENT FOR WASTE HANDLERS



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# **TRAINING MANUAL ON BIOMEDICAL WASTE MANAGEMENT FOR WASTE HANDLERS**



## ACKNOWLEDGMENT

This document has been prepared for the United Nations Industrial Development Organization (UNIDO) on behalf of the Training component of the project “Environmentally Sound Management of Medical Wastes in India” by the Department of Community Medicine, M.S. Ramaiah Medical College, Bangalore.

This document has been reviewed and approved by the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India. Contributions have been provided by Pruthvish Sreekantiah, Amulya ningaiah, Mounica Chappidi, Ishfaq Nazeer Butt to produce the document and has been reviewed by C. Shivaram, Shalini Chandrashekar Nooyi and Lalitha Krishnappa.

Contributions and inputs were provided by the Central Pollution Control Board; the State Pollution Control Boards, the Health and Family Welfare Departments and participating health care facilities of the five project states – Gujarat, Karnataka, Maharashtra, Odisha and Punjab – to produce this document.

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**Edition:** First published in India: 2018



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## FOREWORD



सी.के.मिश्रा  
C.K.Mishra



सचिव  
भारत सरकार  
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय  
SECRETARY  
GOVERNMENT OF INDIA  
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE

Government of India, Ministry of Environment, Forest and Climate Change (MOEFCC) is the nodal agency for the India's environmental and forestry policies and programmes. Guided by mandates of sustainable development inclusive of Industrial growth, Govt. of India, signed the Stockholm the Convention on POPs in 2001 and ratified it in 2006. Post ratification formulated of the which Convention, identified " as per Environmentally Article 7 of Sound convention, Management National of Medical Implementation Wastes" as Plan one of (NIP) the was priority areas.

In compliance to the obligations to be met under Stockholm Convention and ensuring sustainable and a pollution free environment, MoEFCC in collaboration with United Nations Industrial Development Organization (UNIDO) has been implementing a pilot project entitled "Environmentally Sound Management of Medical Waste in India" in the five states of India viz. Gujarat, Maharashtra, Karnataka, Odisha and Punjab.

Amongst many other, two of the major objectives of the project includes capacity building in terms of skilled and trained medical professionals with knowledge and sensitivity towards safe handling, treatment and disposal of medical waste in an environmentally sound manner and; establishment of BAT and BEP across the domain of medical fraternity including the waste handlers and the Medical Waste Treatment Facility operators.

To achieve the above objectives, extensive trainings are being conducted at all levels of medical personnel including administrators, Doctors, Nurses, Para-medical Staff, Waste handlers and CTF operators. Trainings manuals and SOPs developed in 7 languages with pictorial representations for ready understanding is anticipated to enable even the root level workers and I feebly educated class to readily understand the medical waste

management protocols and practices; thereby helping in percolation knowledge to the lowest stratum and upshot of effective implementation of New BMW in Rules, 2016.

As a part of project sub-contract, the training documents and SOPs has been developed Dept. of

Community Medicines, M. S. Ramaiah Medical College in consultation with the MoEFCC, UNIDO, Central Pollution Control Board (CPCB) and the experts from Technical Working Group and Steering Committee of the project appointed by MoEFCC. These documents are first of its kind and use of these documents are recommended for a more. strengthened management of BMW with community of skilled manpower capable of replicating the knowledge further down the line.

The above objectives when accomplished will involuntarily help achieving the prime commitments of a) reduction and ultimate elimination of releases of Unintentionally Produced Persistent Organic Pollutants (UP-POPs) under Stockholm Convention and b.) ground level implementation and the Biomedical Waste Management Rules, 2016.

I congratulate M. S. Ramaiah Medical College for their endeavour in developing the training documents and SOPs and recommend the use of these documents for ESM BMW.

  
(C. K. Mishra)

Date: 25/10/2017  
Place: Delhi

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## UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

### Regional Office in India

The United Nations Industrial Development Organization (UNIDO) is mandated to promote and facilitate industrial development for poverty reduction, inclusive globalization and environmental sustainability. This is embedded in the 2030 Agenda for Sustainable Development, the transformative agenda towards the future we want, unanimously agreed upon by the leaders of 193 Member States of the United Nations in 2015. In particular, its Sustainable Development Goal (SDG) 9, calls to “build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”.

Equally, the 2013 Agenda targets good health and well-being, under SDG3 “ensure healthy lives and promote well-being for all at all ages”. Amongst others, this requires access to modern health services, provided in hospitals and other health care facilities, that as a consequence of their activities, produce a variety of wastes. These wastes need to be managed properly from source, through collection and transport to final treatment and disposal, to avoid posing threats to health and wellbeing, directly, due to infectious and/or toxic nature, or, indirectly, through the unintended creation of hazardous substances from incorrect treatment, particularly burning. The Stockholm Convention on Persistent Organic Pollutants and the Minamata Convention on Mercury, multilateral environmental agreements ratified by India, amongst others apply to the management of health care waste. UNIDO therefore implements a project with support from the Global Environment Facility (GEF) to develop scalable and replicable models for environmentally sound management of health care waste for different types of health care facilities, and demonstrate these

in collaboration with hospitals across five States (Gujarat, Karnataka, Maharashtra, Odisha and Punjab).

Environmentally sound management of health care waste starts with awareness of risks and adherence to standard operating practices by medical, nursing, administrative and general staff at all levels in the institutions. The M S Ramaiha Medical College and Hospitals in Bangalore therefore developed this set of training manuals and accompanying set of Standard Operating Practices. These are fully consistent with the National Bio-Medical Waste Management Rules of 2016. The Ministry of Environment, Forests and Climate Change (MoEFCC), Ministry of Health and Family Welfare (MoHFW), Central Pollution Control Board (CPCB) and other members of the Technical Advisory Committee all contributed to the review of these manuals.

I am pleased to recommend these manuals as the basis for practical and hands-on training for all involved in the health care waste management chain. Doing so will certainly contribute to protecting health and well-being of patients, staff, visitors and community at large, whilst also protecting the environment in a cost-effective manner.

René Van Berkel, PhD  
UNIDO Representative  
UNIDO Regional Office in India

## LIST OF ABBREVIATIONS



<b>AIDS</b>	Acquired Immunodeficiency Syndrome	<b>IV</b>	Intravenous
<b>AVaids</b>	Audio-visual aids	<b>LCD</b>	Liquid Crystal Display
<b>BAT</b>	Best Available Technology	<b>MoEFCC</b>	Ministry of Environment, Forest and Climate Change
<b>BEP</b>	Best Environmental Practices	<b>MSRMC</b>	M.S.Ramaiah Medical College
<b>BMW</b>	Bio Medical Waste	<b>NACO</b>	National AIDS Control Organisation
<b>BMWM</b>	Bio Medical Waste Management	<b>PEP</b>	Post Exposure Prophylaxis
<b>CBWTF</b>	Common Bio-medical Waste Treatment Facility	<b>POPs</b>	Persistent Organic Pollutants
<b>ESM</b>	Environmentally Sound Management	<b>PPE</b>	Personal Protective Equipment
<b>GEF</b>	Global Environment facility	<b>OPD</b>	Out patient department
<b>HCFs</b>	Health Care Facilities	<b>SOG</b>	Source of Generation
<b>HCW</b>	Healthcare Waste	<b>SIO</b>	Special Instructional Objectives
<b>HCWM</b>	Healthcare Waste Management	<b>TT</b>	Tetanus Toxoid
<b>Hep B</b>	Hepatitis B	<b>UNIDO</b>	United Nations Industrial Development Organization
<b>HIV</b>	Human Immunodeficiency Virus		



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, Government of India, is the national executing agency and the United Nations Industrial Development Organization (UNIDO) is the implementing agency.

The overall objective is to reduce and ultimately eliminate the releases of unintentionally produced POPs and other globally harmful pollutants into the environment.

One of the steps, in strengthening of institutional capacity for environmentally sound management of biomedical waste, in particular in large, medium and small health care facilities in five selected states namely Gujarat, Karnataka, Maharashtra, Odisha and Punjab, is by developing the following training manuals:

- 1. Standard operative procedures (SOPs)**
- 2. Trainer’s Guide**
- 3. Information book on Bio-medical waste for Administrators.**
- 4. Information book on Bio-medical waste for Doctors and Nurses, Waste Managers.**
- 5. Waste Handlers’ Training**

This Waste Handlers’ Training Manual has been structured to ensure environmentally sound management of medical waste. In this you will learn about waste, its kind, its hazards, segregation, collection and storage. It also focuses on how to protect ourselves, housekeeping and record maintenance.

This can serve as a resource material for training of waste handlers in environmentally sound management of medical waste. It also provides ways in which waste management can be practically demonstrated to ensure hands on training to the waste handlers.



### OBJECTIVE OF THE MANUAL

To help trainers to create awareness, attitude and skills in waste handlers in day to day management of medical waste in health care settings

### APPROACH

20 Lessons under 32 headings, Pictorial

### TEACHING SCHEDULE

The suggested duration of training of waste handlers should be 5 days (Monday to Friday) with 2 hours per day. Trainers can plan conducting demonstration and discussion of 4 lessons per day. The broad schedule of training should be as follows

Day	Lessons to be dealt
<b>Day 1</b>	<b>Lessons 1 - 4</b>
<b>Day 2</b>	<b>Lessons 5 - 8</b>
<b>Day 3</b>	<b>Lessons 9 - 12</b>
<b>Day 4</b>	<b>Lessons 13 - 16</b>
<b>Day 5</b>	<b>Lessons 17 - 20</b>

Alternatively if the institution is able to relieve the waste handlers for training for one and half days, 10 hour training can be tailor-made accordingly. In this context, 3 to 4 resource persons will make difference than 1 person alone.

### PROFILE OF WASTE HANDLERS

Person who is engaged in collection of waste/ transportation of waste/ disinfection of waste/ packing/ any other process

Eg. ***Ayah, Nursing aid, Attender/support staff; security staff, ambulance staff***



### Tips to create perfect learning unit

Choose the specific objectives and goals for each learning unit in advance

Create an in depth outline to highlight key topics

Avoid cognitive overload by keeping learning units short and sweet

Include an introduction and review in each learning unit

Assess your learners every step of the way

Always provide relevant feedback

Choose learning activities that serve the end goal

### Principles of adult learning

***Adults are autonomous and self-directed.***

Adults need to be free to direct their own learning. If the learning engagement is classroom-based, the facilitator must actively involve adult participants in the learning process. Specifically, they have to be sure to act as facilitators, guiding participants to their own knowledge rather than supplying them with all of the facts. They should allow the participants to assume responsibility for their learning and engage them in discussions, presentations and group-based tasks.

***Adults bring knowledge and experience to each learning activity.***

Over their lives, adults have accumulated a wealth of life experiences and knowledge. This may include family memories, work-related experiences, and previous education

***Adults need learning to be relevant and practical.***

Every day, the human brain takes in hundreds of thousands of sensory inputs. As the brain processes these inputs, it begins to sort out information it deems relevant and





important. Relevancy increases the likelihood information will be retained

### ***Adults are goal-oriented.***

Adults primarily participate in learning programs to achieve a particular goal. Therefore, they appreciate an educational program that is organized and has clearly defined learning objectives. These needs to be communicated early in the course

### ***Adults are problem-oriented and want to apply what they've learned.***

Adult learners want to apply their learning to their work or personal life immediately. Using examples to help them see the connection between classroom theories and practical application; utilizing problem-solving activities as part of the learning experience; and creating action plans together with learners are important concepts that enable life application

### ***Adults are motivated by intrinsic and extrinsic factors.***

Learning is driven by participant motivation - the more motivated someone is to participate in training, the more he or she is likely to learn and retain information. Adults are motivated by both internal and external factors

### ***Adults are pressed for time.***

In today's fast-paced world, adults have to juggle demanding jobs, family responsibilities, and community commitments. Even if they are highly motivated to learn, the pressures of life often limit the time many adults can invest in learning. Therefore, in many cases, learning must be available when it is convenient for the learner and delivered in "manageable chunks."

***Adults have different learning styles.*** A learning style refers to how a person learns, categorizes, and processes new content. Each person may have multiple preferred learning styles. In training, each of these styles should be considered when delivering content.

### **Source:**

Training Principles of Adult Learning. Solution Design Group. Adayana. [Online] [cited on 2017 May 5].

Available from:

[https://cdns3.trainingindustry.com/media/2068131/principlesofadultlearning\\_full.pdf](https://cdns3.trainingindustry.com/media/2068131/principlesofadultlearning_full.pdf)



## TIPS FOR TRAINERS



- Waste handlers play an important role in the environmentally sound management of biomedical waste.
  - This manual aids in the training of these waste handlers by the trainers in the health care facility.
  - It is suggested to plan the training schedule in a way it is divided for 5 days of a week allotting 2 hours per day (4 lessons to be dealt per day) so that the waste handlers would be able to get time for the training in the midst of their working schedule and it will be easier for trainers to organize training.
  - Attitudinal change is to be brought up in the waste handlers regarding clean practices to prevent spread of infections and injuries to the waste handlers, improve the cleanliness of surroundings and to maintain a healthy environment.
  - Environmentally sound management of biomedical waste will result in minimization of hazards.
- Segregation and containment at the source of generation, proper hand washing, use of personal protective equipment like gloves, apron, mask, boots and goggles, taking immunization against Tetanus and Hepatitis B, timely reporting of injuries and taking advice, regular health check-ups, proper management of spills are measures for robust infection control.
  - Collection and disposal of biomedical waste should not extend beyond a period of 48 hours.
  - Meticulous keeping of records is another essential step in proper management of biomedical waste.
  - All the good practices, if followed by the waste handlers, would result in environmentally sound management of biomedical waste.
  - It is suggested that local language and informal teaching and training is preferred. Use of audio-visual aids like films, PowerPoint presentation, flip charts, demonstration and field visits will be useful.



The endeavour 'Environmentally Sound Management of Medical Wastes in India' was launched by GEF / UNIDO / MoEFCC/ MSRMC

**The training component was launched on 29th November 2016 at M S Ramaiah Medical College.**

An important activity under the training component of the project is development of standard operative protocols, trainer's guide, information booklet for administrators, training manual for doctors, nurses, nodal officers and waste managers and training manual for waste handlers. All attempts have been made to make it contemporary, compliant with BMW Management rules 2016 and other relevant documents. Extensive consultations have been made during its preparation. We are happy to place 'Training manual for waste handlers' in your hands. This is a perpetual draft.

**A word about these documents and Bio-medical Waste Management Rules**

For public health three approaches are defined namely education and training, service and legislation. BMW management rules 2016 is the means to an end for developing safe and sound BMW management systems in healthcare settings.

Major changes have happened since last 25 years regarding creating safe and sound biomedical waste management system in the country. These attempts were augured with enactment of BMW rules 1998. Extensive debate has been a result of amendments in 2000 and 2002 and the revised BMW management rules 2016. The revised rule is a masterpiece

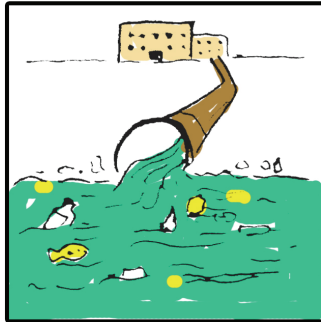
to provide all clarifications sought by various stakeholders. The documents developed in the training component of the project 'Environmentally Sound Management of Medical Wastes in India' has kept the BMW rules 2016 and also Biomedical Waste Management (Amendment) Rules 2018 which came into force in March 2018 as focal point



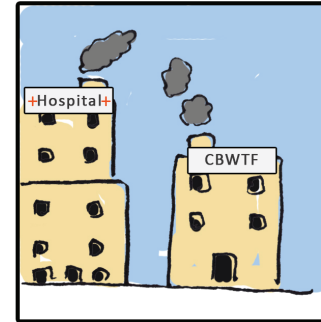
# LESSONS

# LESSON 1:

# HAZARDS OF WASTE



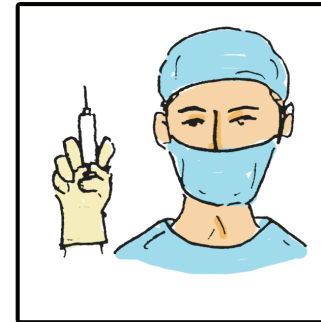
Water Pollution



Air Pollution



HIV/AIDS



Hepatitis-B,C



Wound Infection



Sharps Injury

## LESSON 1:

# HAZARDS OF WASTE



### Introduction

Waste if not properly managed is harmful to health and environment.

### How to teach?

- Pose questions in the beginning to know their level of knowledge
- Discussion to make them have a clear view of all the hazards of waste

### Talking points:

- Is Bio-medical waste harmful?
  - Yes, if the hazardous waste is not properly managed.
- Why?
  - Because it has sharps waste, infectious waste, chemical and pharmaceutical waste, and radioactive waste which are harmful

- Who are at risk?
  - Doctors, nurses, hospital maintenance personnel, patients, visitors, cleaners, people who work in laundries, porters, workers transporting waste and also general public.
- What are the hazards?
  - Needle-stick injuries, cuts from other sharps not properly disposed, blast injury, exposure to radioactive materials, infections (Hepatitis B, C, HIV/AIDS), environmental pollution (soil, water and air), fires, public nuisance.

.....  
Mention all the hazardous waste you come across in your health care facility and the probable harm it can result in.

***Environmentally sound management of waste will minimize the hazards***

# LESSON 2: TYPES OF BIOMEDICAL WASTE



**Red – Recyclable  
Plastic waste**



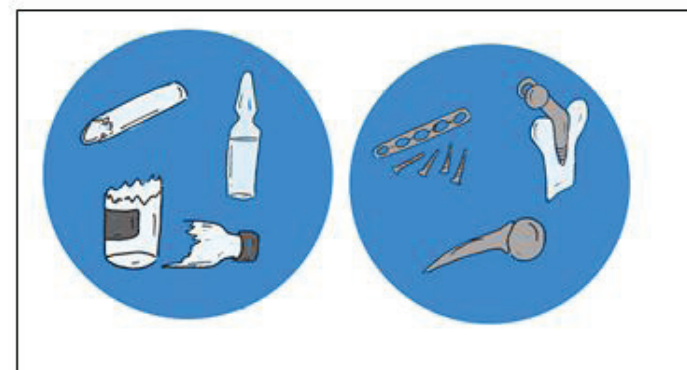
**Yellow - Infectious  
waste**



**White – Waste Sharps**



**Blue – Glass &  
Metallic implants**



# LESSON 2: TYPES OF BIOMEDICAL WASTE



## Introduction

It is important to know different kinds of waste. This helps to classify which is harmful and which is not, so that correct method of management can be followed.

## How to teach?

- To have one example from each kind of waste.
- To walk through the health care facility to create an idea regarding kinds of waste generated.

## Talking points:

- What is waste?
  - Any item for which the immediate owner can find no particular use.
- What is biomedical waste?
  - any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps

## Types of Waste:

- Sharps waste: Needles, syringes with fixed needles, infusion sets with needle, scalpels, knives, blades, broken glass.
- Infectious waste: Bandages, cotton pads, plaster pieces contaminated with blood and other body fluids, laboratory cultures, waste including excreta and other materials that have been in contact with infected patients.
- Pathological waste: Human tissues, organs or fluids, body parts, foetuses, placenta
- Pharmaceutical waste, cytotoxic waste: Expired or no longer needed drugs
- Chemical waste: Laboratory reagents, disinfectants that are expired
- Radioactive waste: unused liquids from radiotherapy or laboratory research
- General waste: food waste and others.

List various kinds of waste generated in your health care facility each on a separate card

***Waste is not useful, but harmful if not properly managed***

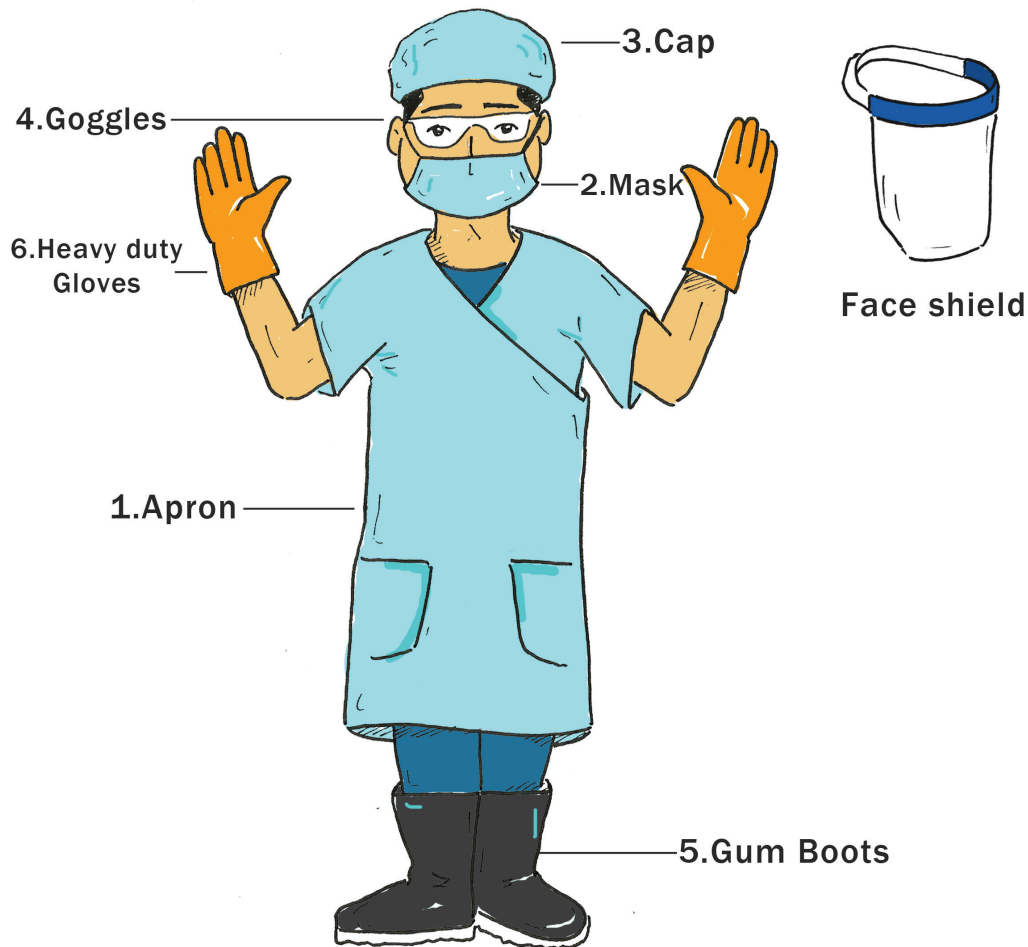


# LESSON 3:

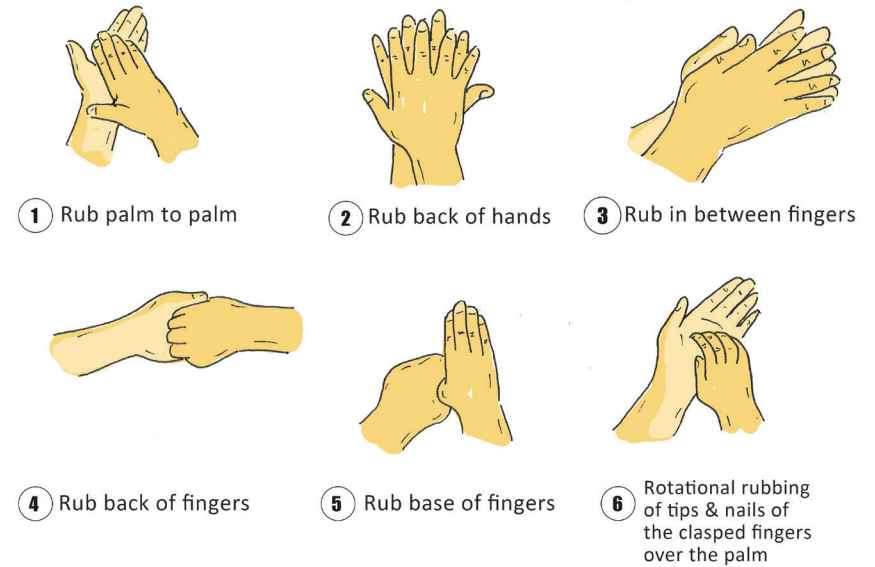
# PREVENTING INFECTIONS



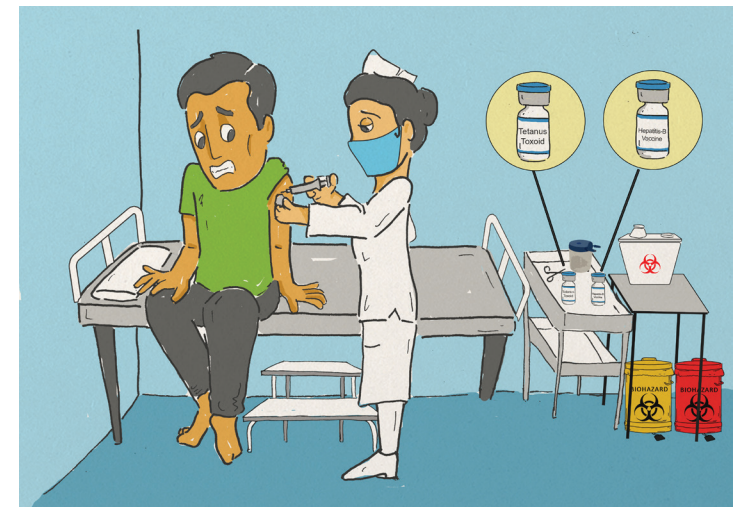
## PERSONAL PROTECTIVE EQUIPMENT



## HANDWASHING



## PROTECTIVE IMMUNIZATION





## LESSON 3:

# PREVENTING INFECTIONS



### Introduction

So far, we have come to know that biomedical waste is harmful and can cause infections. We can prevent these infections.

### How to teach?

- Sitting in an informal environment with flip cards/ placards mentioning the mandatory precautions to prevent infections.
- Discussion with active involvement of waste handlers in local language.

### Talking points:

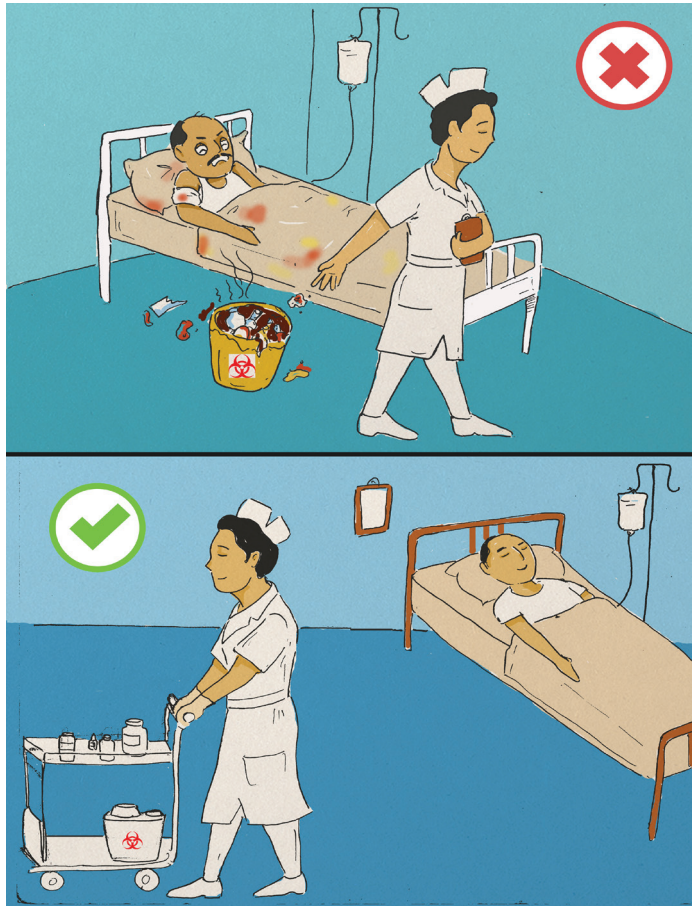
- What is the problem?
  - If we handle infected waste with bare hands, it can result in infections like Hepatitis B, C, HIV/ AIDS, cholera, typhoid, dysentery, staphylococcal, streptococcal and candida infections; and a wide range of other infections from organisms in blood, faeces, vomit, body fluids and secretions; and injuries from sharp waste.

- What are the solutions?
  - Segregation and containment at the point of generation.
  - Proper treatment and disposal of waste.
  - Proper hand washing.
  - Use of PPE: gloves, apron, mask, boots and goggles/ shield.
  - Taking immunization against Tetanus and Hepatitis B.
  - Timely reporting of injuries and taking advice.
  - Health check-ups at the time of induction and once a year
  - Proper management of liquid waste spills.

Recollect and assess yourselves as how many of the above discussed precautions you have been following while handling waste generated in your health care facility and discuss with waste handlers.

***Robust infection control and practice of universal precautions will isolate microorganisms and thus constitute a barrier for transmission of infections***

# LESSON 4: SEGREGATION OF BIOMEDICAL WASTE



Yellow

Red

SEGREGATION

COLLECTION

TRANSPORTATION

STORAGE

FINAL TREATMENT AND DISPOSAL

White

Blue

# LESSON 4: SEGREGATION OF BIOMEDICAL WASTE



## Introduction

If we separate waste according to different types at the source of generation, it will help in its handling and management. This “segregation” is the first step in life cycle approach

## How to teach?

- Hands on experience in segregating the waste and discussion in local language to clarify any queries.

## Talking points:

- What is segregation?
  - Separating different types of waste at the point of generation and keeping them isolated from each other.
- What is containment?
  - After segregating, the wastes should be kept in the respective colour coded containers.
- Why segregation and containment?
  - About 10 - 15% of the waste generated is infected/hazardous and it should not be mixed with the non-

infected waste. If this mixture happens, entire waste becomes infected. Segregation and containment help avoid this and limit infections.

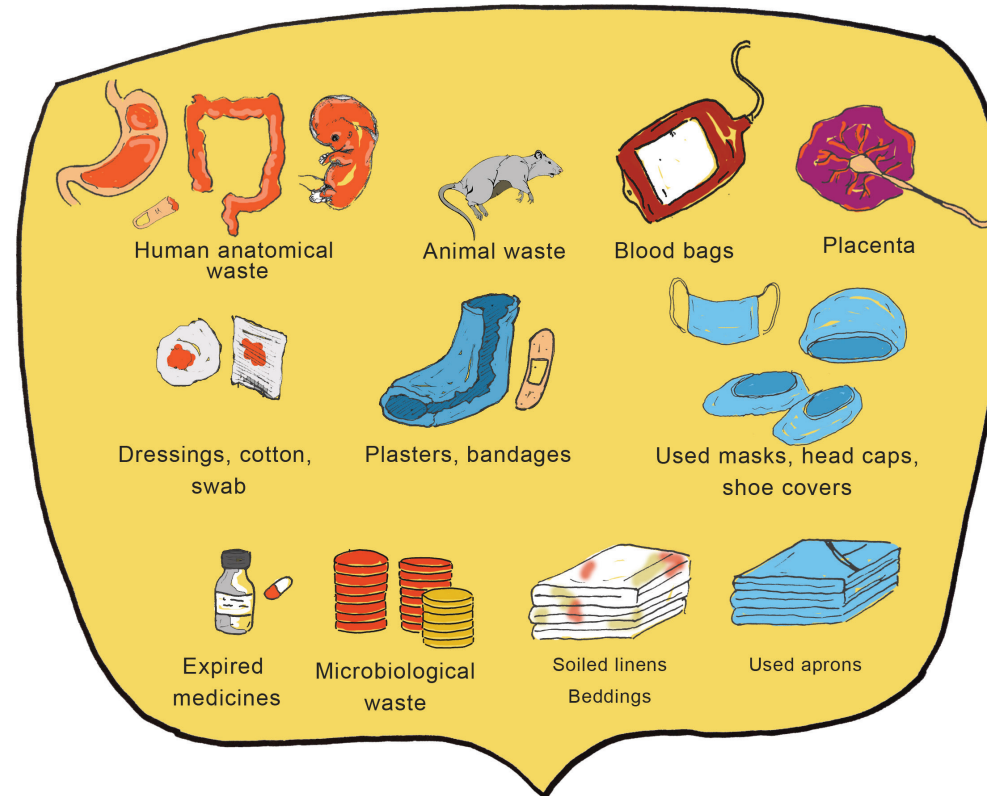
- Advantages of segregation:
  - Reduction in quantum and cost of management of infected waste.
  - Management of general waste separately.
  - Improving the order and cleanliness of hospital surroundings.
  - Infected waste is kept away from contact.
  - Reduces treatment cost and minimizes impact on environment

Visit all the places in your health care facility and identify areas where proper segregation of waste is not followed and then discuss with the segregation.

***Majority of bio-medical waste management is done if the waste is properly segregated at the point of generation by the generator of the waste.***

# LESSON 4A:

# SEGREGATION - YELLOW



**Yellow**  
bin with  
non-chlorinated  
Yellow bag



Yellow

SEGREGATION

COLLECTION

TRANSPORTATION

STORAGE

FINAL TREATMENT AND DISPOSAL

## LESSON 4A:

# SEGREGATION - YELLOW



### Introduction

Now let us learn what all waste materials should be put in yellow bin.

### How to teach?

- Use the cards with names of all types of waste written on them during the lesson of waste and its kinds.
- Pick the cards with name of the waste that is to be contained in yellow coloured containers and place them in the yellow coloured (non-chlorinated, bar coded, >50  $\mu$  thickness) plastic bag and close the bag once it is filled up to 3/4th or daily.
- Training can be made innovative. We can keep coloured bins and suggest participants to select the right bin for each type of waste. Alternatively, a set of 4 flags of different colours (yellow, red, white and blue) can be given to each participant and they can be suggested to select the right bin by showing the right coloured flag. This way even large number of participants can be involved together.

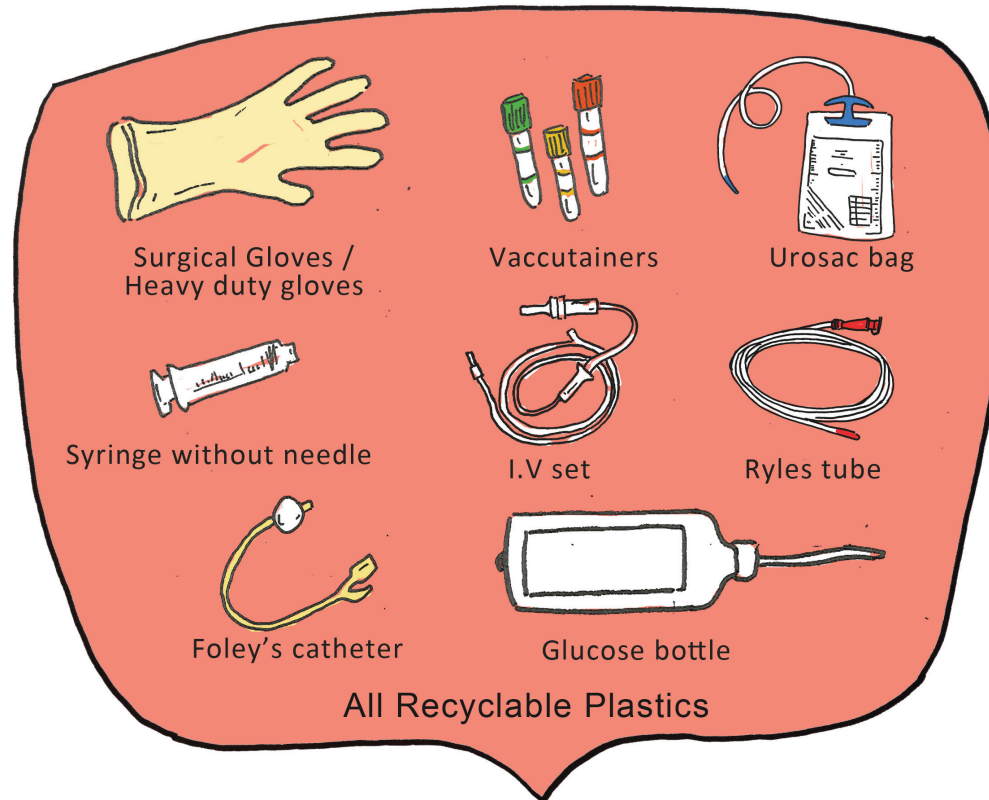
### Talking points:

- Following are the types of waste that are to be segregated into yellow coloured container with yellow coloured non-chlorinated plastic bag:
- Human tissues, organs, body parts, fetus and placenta.
- Animal carcasses, body parts, organs and tissues.
- Dressings, cotton swabs, plaster casts contaminated with blood, body fluids and bags containing blood and blood components.
- Expired or discarded medicines.
- Chemical waste: used chemicals, used or discarded disinfectants
- Microbiology, biotechnology and other clinical laboratory waste: Blood bags, lab cultures, dishes and devices used for cultures, stocks or specimens of microorganisms, live or attenuated vaccines (on-site pre-treated with non-chlorinated disinfectant/ autoclave/ microwave to log 4 or log 6 in order to reduce the volume of waste) in order to reduce impact on the community if such waste is disposed of improperly.
- Discarded linen, mattresses, beddings contaminated with blood or body fluids should be label as yellow or place it to yellow bin

***All the infected waste primarily into yellow coloured container with yellow coloured non-chlorinated plastic bag***

# LESSON 4B:

# SEGREGATION - RED



**Red**  
bin with  
non-chlorinated  
Red bag



Red







### Introduction

Now let us learn what all waste materials should be put in red bin.

### How to teach?

- Use the cards with names of all types of waste written on them during the lesson of waste and its kinds.
- Pick the cards with name of the waste that is to be contained in red coloured containers and place them in the red coloured (non-chlorinated, bar coded, >50  $\mu$  thickness) plastic bag and close the bag once it is filled up to 3/4th or daily.
- Training can be made innovative. We can keep coloured bins and suggest participants to select the right bin for each type of waste. Alternatively, a set of 4 flags of different colours (yellow, red, white and blue) can be given to each participant and they can be suggested to select the right bin by showing the right coloured flag. This way even large number of participants can be involved together.

### Talking points:

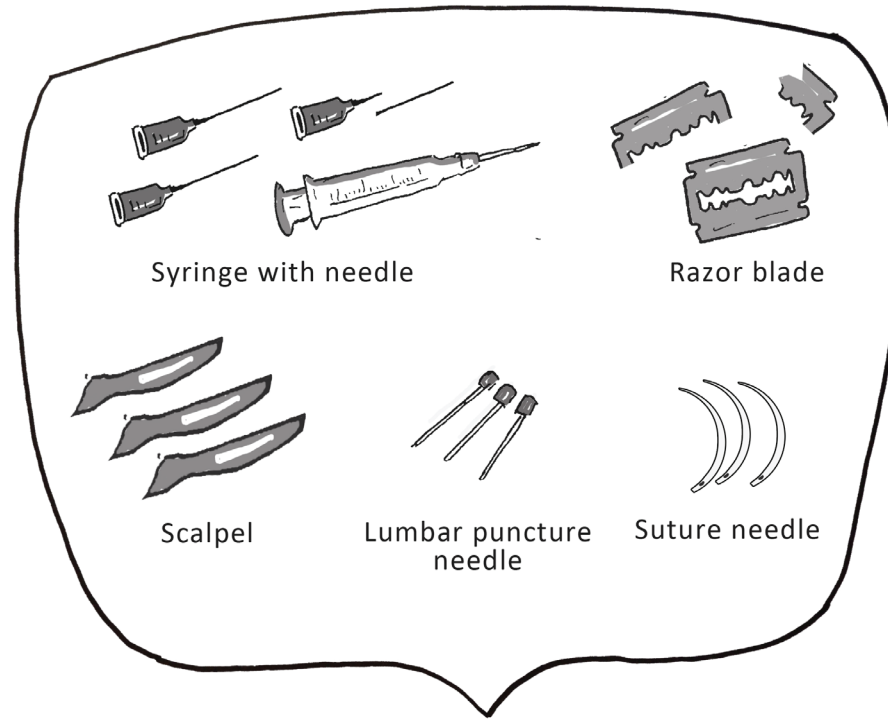
Following are the types of waste that are to be segregated into red coloured container with red coloured non-chlorinated plastic bag: Recyclable waste:

- Wastes generated from disposable items such as tubing, bottles, IV tubes and sets, catheters, urine bags
- Syringes without needles
- Vacutainers with their needles cut
- Gloves

***All the recyclable waste primarily into red coloured container with red coloured non-chlorinated plastic bag***

# LESSON 4C:

# SEGREGATION - WHITE



Syringe with needle

Razor blade

Scalpel

Lumbar puncture needle

Suture needle

**White**  
translucent, puncture proof, tamper proof and leak proof container



SEGREGATION

COLLECTION

TRANSPORTATION

STORAGE

FINAL TREATMENT AND DISPOSAL

White



## LESSON 4C:

# SEGREGATION - WHITE



### Introduction

Now let us learn what all waste materials should be put in white puncture proof container.

### How to teach?

- Use the cards with names of all types of waste written on them during the lesson of waste and its kinds.
- Pick the cards with name of the waste that is to be contained in white translucent, puncture proof, tamper proof and leak proof container and close once it is filled up to 3/4th or daily.
- Training can be made innovative. We can keep coloured bins and suggest participants to select the right bin for each type of waste. Alternatively, a set of 4 flags of different colours (yellow, red, white and blue) can be given to each participant and they can be suggested to select the right bin by showing the right coloured flag. This way even large number of participants can be involved together.

### Talking points:

Following are the types of waste that are to be segregated into white puncture proof, tamper proof and leak proof container:

### ***Waste sharps including metals:***

- Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, metal caps of the vials or any other contaminated sharp objects that may cause puncture and cuts.
- Both used, discarded and contaminated metal sharps.

***All sharp waste into white (translucent) puncture proof container***

# LESSON 4D:

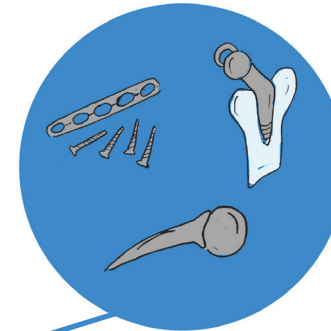
# SEGREGATION - BLUE



Broken bottles, test tubes,  
ampoules



Metallic body  
implants



**Blue**  
Puncture proof,  
Leak proof box/  
containers with blue  
colored marking

SEGREGATION

COLLECTION

TRANSPORTATION

STORAGE

FINAL TREATMENT AND DISPOSAL

Blue



### Introduction

Now let us learn what all waste materials should be put in Puncture proof and leak proof box / container with blue marking.

### How to teach?

- Use the cards with names of all types of waste written on them during the lesson of waste and its kinds.
- Pick the cards with name of the waste that is to be contained in Puncture proof, Leak proof box / container with blue marking.
- Training can be made innovative. We can keep coloured bins and suggest participants to select the right bin for each type of waste. Alternatively, a set of 4 flags of different colours (yellow, red, white and blue) can be given to each participant and they can be suggested to select the right bin by showing the right coloured

flag. This way even large number of participants can be involved together.

### Talking points:

Following are the types of waste that are to be segregated in Puncture proof , Leak proof Box/ Container with blue colored marking:

- Glassware: Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.
- Metallic body implants.

***All glassware and metallic body implants into Puncture proof , Leak proof Box/ Container with blue colored marking***

## LESSON 5:

# COLLECTION



SEGREGATION

COLLECTION

TRANSPORTATION

STORAGE

FINAL TREATMENT AND DISPOSAL



### Introduction

Next step in life cycle approach is collection of waste from the source of generation. Let us learn about this.

### How to teach?

- Demonstration regarding proper collection of waste from source of generation.

### Talking points:

- Segregated waste should be collected at periodic intervals (twice a day/ every shift) – or earlier if it is three-fourth full.
- Proper evacuation of containers.
- Waste should be collected along with the coloured non-chlorinated plastic bags from the containers.

- Barcode strip to be stuck to bags
- The containers should always be covered and preferably foot operated bins.
- Personnel who work for collection of waste need to
  - Wear heavy duty rubber gloves, mask, apron, boots etc.
  - Wash hands thoroughly after handling the waste.
  - Be immunized against Tetanus, Hepatitis B.
  - Undergo medical examination once a year.
  - Report any illness/ injury (minor/ major) to the management of health facility.

In your health care facility, notice if good practices of waste collection are being practiced.

***Stringent measures of wearing PPE should be followed by waste handlers when collecting the waste from the source of generation***



**LESSON 6:**

**TRANSPORTATION OF BIOMEDICAL WASTE  
(INTRAMURAL-WITHIN HEALTHCARE FACILITY)**



## LESSON 6:

# TRANSPORTATION OF BIOMEDICAL WASTE (INTRAMURAL-WITHIN HEALTHCARE FACILITY)



### Introduction

Transportation is important step in life cycle approach in Bio-medical waste management. Transportation inside health care setting will be discussed in this lesson.

### How to teach?

- Tutorials, which encourage easy exchange of ideas and provide conducive environment for easy understanding and skill development on the concerned topic. It should be in locally spoken language to be useful.
- Audio visual Aids like Flipcharts, posters, computers with or without LCD projectors, etc, can be used for more effective learning.

### Talking points:

- Collection of waste in a closed trolley which has suitable markings depicting the category of waste going into it.
- Trolleys should be properly designed avoiding unnecessary spillage of contents and be of relatively smaller dimensions for easy mobility.
- As far as possible avoid contact with waste.
- Use of PPE (gowns, masks, aprons, boots) at all times

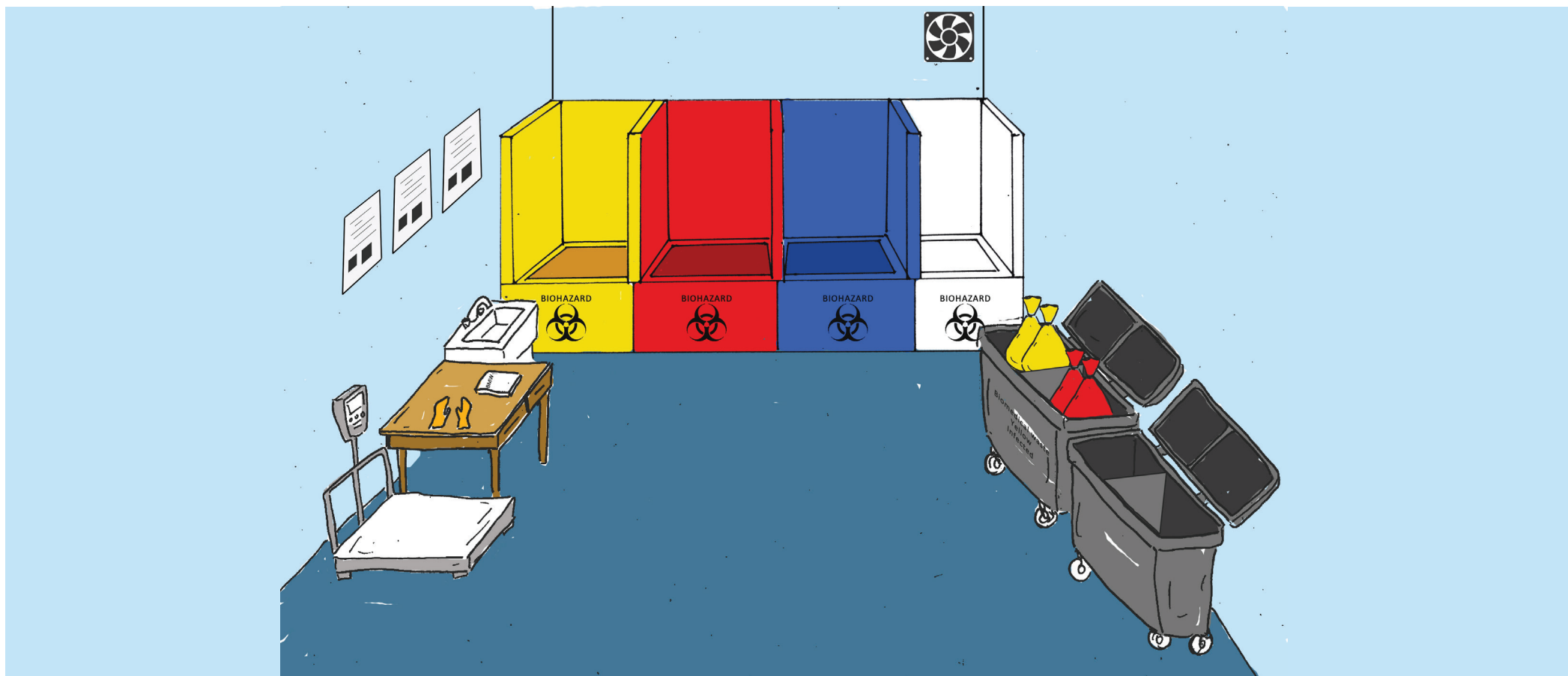
should be encouraged even when moving trolleys. Risk of spillage necessitates wearing of eye and face protection as well.

- Separate service lifts and ramps for waste trolleys.
- Hand wash before and after waste handling.
- Immunization against Hepatitis-B and Tetanus.
- Reporting of injury and its management.
- Collection and storage should be meticulous and use of small mobile garbage trolleys reduces manual handling and lifting of waste.
- Infectious biomedical waste to be treated and disposed off within 48 hrs.
- Precautions while transporting waste
  - Use of closed trolleys
  - Transportation receptacle must match segregation categories
  - Use of PPE including face masks and eye protection.

***Transporting biomedical waste as per guidelines and avoiding spillage while transporting waste with minimal handling of waste would go a long way to protect all stakeholders and the community.***

# LESSON 7:

# STORAGE



SEGREGATION

COLLECTION

TRANSPORTATION

**STORAGE**

FINAL TREATMENT AND DISPOSAL





### Introduction

Following the collection of waste from source of generation and intramural transportation, storage is the next step in biomedical waste management. Let us learn about this.

### How to teach?

- Visit the waste storage place of your health care facility followed by a discussion.

### Talking points:

- Waste should be stored in an area/ room where waste can be accumulated and bagged for dispatch to place of treatment.
- Separate areas within the storage area for different types of bio-medical waste should be available
- Dedicated storage area should be secured with lock and key

- Storage area should be accessible only to authorized personnel (with access only to the employees handling waste)
- Personnel who work for storage of waste also need to
  - Wear heavy duty rubber gloves, mask, apron, boots etc.
  - Wash hands thoroughly after handling the waste.
  - Be immunized against Tetanus, Hepatitis B.
  - Undergo medical examination once a year.
  - Report any illness/ injury (minor/ major) to the management of health facility.

In your health care facility, notice if good practices of storage of waste are being practiced.

***No untreated human anatomical waste, animal anatomical waste, soiled waste and biotechnology waste shall be stored beyond 48 hours***

# LESSON 8:

# HAND WASHING



## Steps of Hand rub



1 Rub palm to palm



2 Rub back of hands



3 Rub in between fingers



4 Rub back of fingers

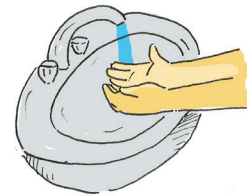


5 Rub base of fingers



6 Rotational rubbing of tips & nails of the clasped fingers over the palm

## Steps of Hand washing



Wet with warm water



Apply liquid soap



1 Rub palm to palm



2 Rub back of hands



3 Rub in between fingers



4 Rub back of fingers



5 Rub base of fingers



6 Rotational rubbing of tips & nails of the clasped fingers over the palm



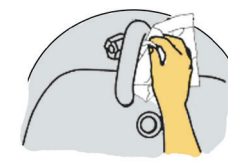
Rub wrist



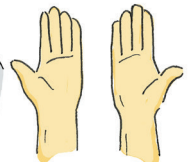
Rinse with running water



Wipe dry



Use towel to turn off faucet



Clean hands

## LESSON 8:

# HAND WASHING



### Introduction

Hand washing is more important than physical examination. It protects us to prevent transfer of infection from man to man; material to man; man, to materials.

Just lathering your hands with soap- rubbing them vigorously for 20 seconds and rinsing is not the most effective way to clean them. Experts now say, 6 step hand hygiene technique recommended by World Health Organization is far more superior.

### How to teach?

- Sitting in an informal setting with placard/ flipchart showing steps of hand hygiene in local language
- Demonstration of the steps of hand hygiene in local language

### Talking points:

- Why should we practice hand washing/ importance of hand hygiene?
  - Hand washing helps to kill germs which may cause disease and harm
- Hand washing with soap and water to be done when hands are soiled with blood or other body fluids or after using toilet. Alcohol based hand sanitizer is the preferred way for routine antisepsis

- When should we wash our hands?
  - After contact with body fluids or excretions, wound dressing, after blowing nose and before having food
  - Moving from contaminated body site to another body part/ patient
  - After contact with soiled equipment like bedpan, lab equipment with specimen
  - After handling any waste
- Use clean running water, soap, necessary antiseptics and hand drying equipment
- Glove use is not a substitute for hand washing – always clean your hands after removing gloves, dirty gloves can soil hands

***Proper hand washing is one of the most important things to help prevent and control the spread of many diseases from one person to another 'CLEAN HANDS SAVE LIVES'***

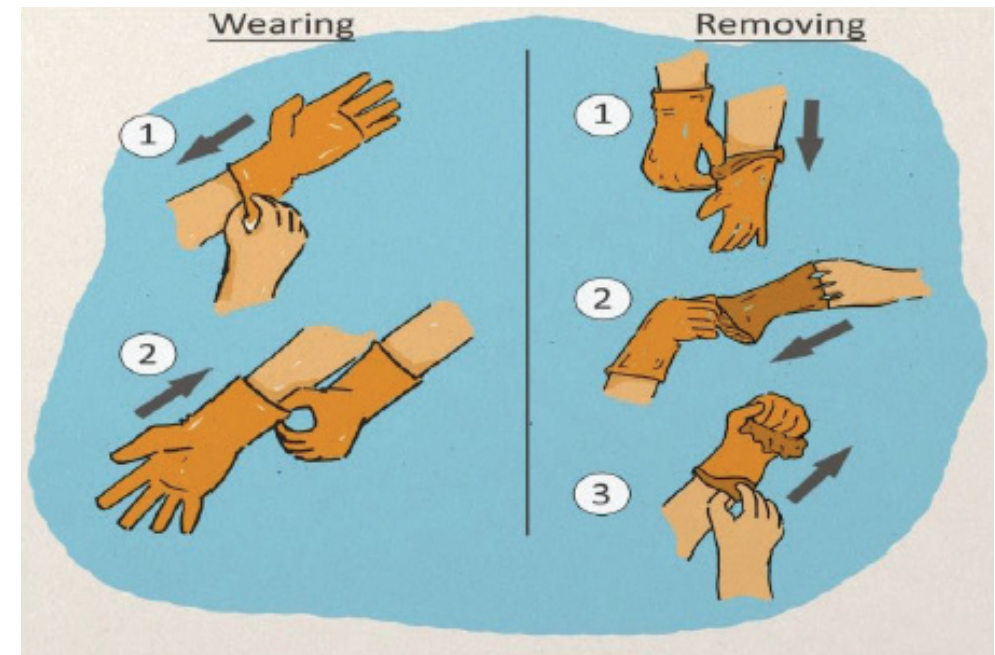
# LESSON 9: HOW TO PROTECT OURSELVES?



## LESSON 9A: USE OF PERSONAL PROTECTIVE EQUIPMENTS (PPE)



### Correct method of wearing and removing the gloves



Wear the PPE in the following order:

- Disposable impermeable preferably a long-sleeved apron
- Mask, goggles/ face shield
- Gum boots
- Rubber/ nitrile gloves

## LESSON 9A: USE OF PERSONAL PROTECTIVE EQUIPMENTS (PPE)



### Introduction

It is important that we protect ourselves from infection. Use of gloves, mask, cap, apron, boots, goggles/shield help us protect ourselves.

### How to teach?

- Sitting in an informal setting with all personal protective equipment and demonstrate correct method of using and removing each one
- Discussion in local language
- An exercise by developing patient scenarios and use of PPE

### Talking points:

- Importance of using PPE – to protect ourselves and patients from the hazards of waste handling
- Correct method of wearing gloves
  - Wash hands and dry them

- Pick up the glove by its cuff
- Wear the first glove. Repeat for the other hand
- Removing gloves
  - When removing PPE, remove glove first
  - Hold the cuff of glove with thumb and forefinger of other hand and pull it inside out
  - Remove the other glove in the same way
  - Roll it and discard taking care not to contaminate hands
- Disposal of PPE
  - Put gloves into red bin
  - Cap, mask, shoe covers to yellow bin

***PPE are effective in reducing risk of injury, to protect from exposure to blood, other potentially infectious materials and chemicals***



# PROTECTIVE IMMUNIZATION





### Introduction

Taking vaccines to prevent Tetanus and Hepatitis B is very important.

### How to teach?

- In an informal setting with a chart showing infections which these waste handlers are exposed to followed by discussion in local language

### Talking points:

- Explain about hazards from infectious waste and sharps. Infectious waste may contain great variety of pathogenic microorganisms. Pathogens in infectious waste may enter the human body by a number of routes:
  - through a puncture, abrasion, or cut in the skin;
  - through the mucous membranes;
  - by inhalation;
  - by ingestion.

- Why should they get vaccination done?
  - infection with human immunodeficiency virus (HIV) and hepatitis viruses B and C is of main concern, viruses are generally transmitted through injuries from syringe needles contaminated by human blood.
- They are also vulnerable for tetanus infection while handling contaminated sharps
- They should get themselves immunized with Hepatitis B vaccination (0, 1 and 6 months) and TT vaccination

***Immunization is an effective preventive measure to protect against infections while handling infectious waste and sharps***







## Introduction

Having medical check-up once a year is a must. This will help us to monitor our health.

## How to teach?

- Sitting in an informal setting with a health card
- Discussion in local language

## Talking points:

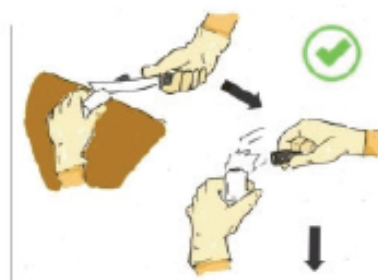
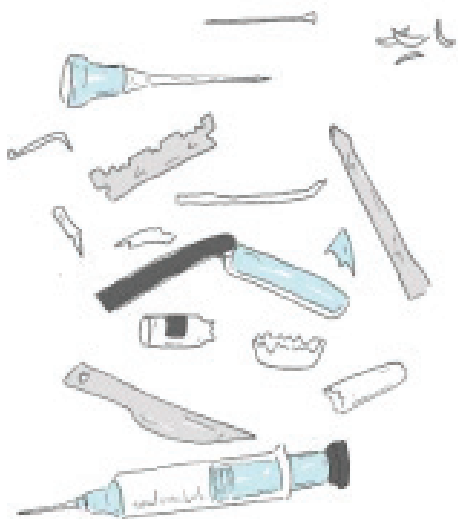
- Why should periodic health examination be done?
  - To detect early signs of adverse health effects, and thereby facilitate appropriate protective measures at the earliest
- Periodic health check - up includes
  - Medical history, focusing on changes in health status, illnesses, and possible work related symptoms

- Exposure to any infectious waste should be reported
- Physical examination
- Laboratory tests done if necessary depending on available exposure information, medical history, and examination results
- The frequency and content of examinations will vary, depending on the nature of the work and exposures. Generally, medical examinations have been recommended at the time of induction and once a year/when the need arises.
- Immediate action is warranted in case of needle stick injury (refer to lesson 8 D)

***Daily tasks may expose them to toxic chemicals, safety hazards, biological hazards, and radiation, so periodic health check - up is essential***

LESSON 9D:

# SHARPS INJURY PREVENTION AND REPORTING





## Introduction

Germs can enter our body by prick of needles, razor, scalpel, glass etc. They can cause illnesses in us.

## How to teach?

- Sitting in an informal setting with needle cutter, puncture proof container to demonstrate safe method of disposal of sharps
- Injury register to be shown
- Discussion in local language

## Talking points:

- How are these injuries caused?
  - The greatest risk of exposure to infectious agents are via needle stick injury eg., improperly packaged waste sharps. Injuries can also occur from scalpels, blades, broken ampoules (glass)
- How to prevent from getting injured?
  - Adequate protective clothing should be worn during all waste handling operations.
  - All sharps should be discarded in puncture proof container
  - Check that waste storage bags and containers are sealed

- Bags should be picked up by the neck
- Sharps may occasionally puncture the side or bottom of a polythene container; the container should therefore be carried by its handle and should not be supported underneath with the free hand
- To avoid puncture or other damage, waste bags should not be thrown or dropped
- Use cleaning equipment to clean underside and other inaccessible areas of cupboard. Do not clean by hand
- Do not mix infectious waste and general waste
- What to do in an event of a needle stick injury?
  - Immediately wash the wound with soap and water
  - Report the injury as soon as possible to the nursing staff of that ward/OPD and subsequently they will report it to the concerned officer.
  - Details of injury should be entered in the injury register
  - Post exposure Prophylaxis (PEP) should be started at least within 72 hours depending on the risk evaluation.

***Do not neglect if any injury happens while handling waste. Report immediately.  
Proper management of sharps will reduce injuries.***

**LESSON 10A:**

**MANAGEMENT OF LIQUID SPILLS- BLOOD, PUS  
AND OTHER BODY FLUIDS**



*Disinfection before disposal*

## LESSON 10A:

# MANAGEMENT OF LIQUID SPILLS- BLOOD, PUS AND OTHER BODY FLUIDS



### Introduction

Spills of body fluids, chemicals, mercury can occur in health care. Three lessons make us learn how to manage them. Spills of infectious body fluids (blood, pus, ascitic fluid, pleural fluid, cerebrospinal fluid, etc.) can be common occurrences in healthcare settings. They have to be managed effectively to ensure cleaning of the spill with minimal contamination to surrounding areas and to protect the healthcare worker from the hazards of the infectious material.

### How to teach?

- Sitting in informal setting, with spill kit demonstrate how to manage liquid spills
- Discussion in local language

### Talking points:

- **Step 1:** Use stop/ caution board. Cordon off the area
- **Step 2:** Open the spill kit
- **Step 3:** Wear PPE - Gown, Cap, Mask, Goggles and gloves in that order
- **Step 4:** Absorb the spill swab with paper towels/ old newspaper and discard it into yellow bin
- **Step 5:** Sprinkle/ flood the spill area with equal volume of disinfectant solution and leave for 30 minutes. Absorb

the spill swab with paper towels/ old newspaper and discard it into yellow bin

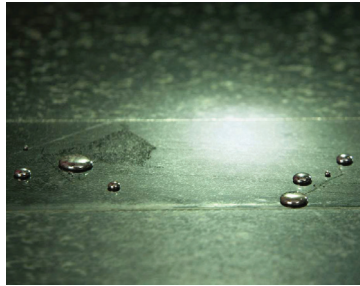
- **Step 6:** Wipe the area using swab/ cloth and discard into yellow bin
- **Step 7:** Wash the area with detergent after decontamination
- **Step 8:** Remove the gloves and discard into red bin
- **Step 9:** Wash hands with soap and water
- **Step 10:** Rearrange the spill kit with required contents for next use
- Seek medical attention if exposure to hazardous material has occurred during the operation.
- Report the incident and document the response

*Spills should be dealt with safe handling operations and appropriate protective clothing*



## LESSON 10B:

# MANAGEMENT OF MERCURY SPILLS



1 Mercury spill



2 Place Caution board



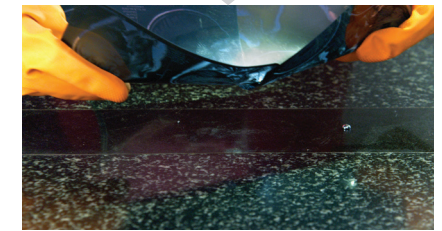
3 Mercury spill kit



4 Remove jewelry



5 Wear PPE



6a Collect mercury droplets using x ray film.

OR



6b Collect mercury droplets using syringe



7 Transfer collected mercury into a container with water



8 Label the container with date and contents



9 Remove PPE and keep in a separate plastic bag to send to TSDF



## Introduction

Mercury is a 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. Mercury spillage is to be dealt meticulously.

## How to teach?

- Sitting in informal setting, with Mercury spill kit demonstrate how to manage mercury spills
- Discussion in local language

## Talking points:

- Put a caution board and cordon off the area
- Remove all jewellery from hands and wrist so that mercury does not react with the precious metals.
- Wear PPE - Gown, Cap, Mask, Goggles and gloves in that order
- Collect mercury droplets together by using two cardboard pieces or using a filler / duct tape/syringe.

- Drop the collected mercury into a bottle half filled with water and tightly cover the bottle's lid.
- Label the bottle with date and contents in the container.
- Cover the spill area with 10% sodium thiosulphate solution and clean area with mop.
- Remove all the personal protection gears and place it in separate plastic bag and send it to TSDF. (Treatment, Storage, and Disposal Facility)
- Send the bottle containing mercury back to manufacturer for recovery.
- 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.

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







### Introduction

Accidental spillage of any chemical waste within an HCF should be dealt with accordingly to minimize impact on human health and environment. Spillage usually requires clean-up only of the contaminated area.

### How to teach?

- Sitting in informal setting, with spill kit demonstrate how to manage chemical spills
- Discussion in local language

### Talking points:

- **Step 1:** Put a caution board and cordon off the area.
- **Step 2:** Decontaminate the eyes and skin of exposed personnel immediately.
- **Step 3:** Inform the designated person (usually the Safety Officer or the Waste Management Officer), who should coordinate the required necessary actions.
- **Step 4:** Determine the nature of the spilled material.
- **Step 5:** Injured individuals to be provided with first aid and medical care.
- **Step 6:** Wear PPE – Gown, Cap, Mask, Goggles and gloves in that order.

- **Step 7:** Limit the spread of spill and neutralize or disinfect (Neutralize acids with soda ash or sodium bicarbonate. Bases can be neutralized with citric acid or ascorbic acid) spilled or contaminated material and leave it for 30 minutes.
- **Step 8:** Decontaminate or disinfect the area; wipe up with an absorbent cloth. Never turn the cloth during this process, because this will spread the contamination.
- **Step 9:** Collect all spilled and contaminated material (sharps should be picked up by brushes and pans or other suitable tools). Spilled material and the material used for cleaning should be disposed in yellow bin.
- **Step 10:** Wipe the area and dry with absorbent cloth.
- **Step 11:** Remove PPE. (heavy duty gloves and gum boots can be washed and dried and replaced into the spill kit; other PPE to be disposed in yellow bin)nursing stations of wards in HCFs to allow rapid access to use the same in the event of chemical spillage.

Preferably to be done under the guidance of supervisor

***Chemical spills are to be managed appropriately by the personnel using PPE***





### Introduction

Cytotoxic substances can show their effects when swallowed or breathed in, or when absorbed through the skin. Such substances should be clearly labeled with the type of waste and the name of the cytotoxic chemicals, with necessary hazard labels attached. A cytotoxic spill requires immediate attention and must be effectively controlled so as not to promote unnecessary contamination of the environment.

### How to teach?

- Sit in an informal setting with the spill kit.
- Discussion in local language.
- Demonstration of correct management practices utilizing videos, hands-on demonstration, simulation exercises, etc.

### Talking points:

#### SPILLS DURING AGENT ADMINISTRATION, PATIENT CARE AND TRANSPORT

**MINOR SPILLS** (cytotoxic spills less than 50ml or spills of body fluids containing cytotoxic agents)

- **Step 1:** Isolate area and place signs if required.
- **Step 2:** The spill should be managed by designated trained person.

- **Step 3:** Wear PPE; gown, gloves and eyewear.
- **Step 4:** Open the two cytotoxic waste bags from the Cytotoxic Chemical Spill Kit and place one inside the other, rolling the tops outwards. Place the bags nearby the spill area for ease of access.
- **Step 5:** Begin containment by removing a Chemosorb pad from the Cytotoxic Chemical Spill Kit and placing it gently over the top of the spill to reduce/prevent evaporation and inhalation risk. When a cytotoxic spill is cleaned, all cleaning should begin from the outside of the spill area and gradually work towards the centre. For Powder spills – Place the Chemosorb pad over the powder then carefully and gently pour a small amount of water on top of the chemosorb pad to dissolve and absorb the powder. Wait for the liquid to be fully absorbed into the pad.

Preferably to be done under the guidance of supervisor



- **Step 6:** Collect up the Chemosorb pad using gloved hands and place it inside the waste bag.
- **Step 7:** Scoop up slurry and broken glass using scoop and scraper provided and place inside the waste bag.
- **Step 8:** Wash area with copious amounts of alkaline detergent
- **Step 9:** Rinse area thoroughly with water
- **Step 10:** Dry area with absorbent material
- **Step 11:** Discard all waste into designated cytotoxic waste container
- **Step 12:** Remove personal protective equipment, discard into designated cytotoxic waste container
- **Step 13:** Wash hands thoroughly with soap and water
- **Step 14:** Complete an incident report

#### MAJOR SPILLS (cytotoxic spills greater than 50 ml)

- **Step 1:** Isolate area and place signs if required
- **Step 2:** The spill should be managed by designated trained person.
- **Step 3:** Access the nearest spill kit
- **Step 4:** Put on gown, mask, protective eyewear, shoe coverings and double gloves (inner latex glove and outer heavy utility glove) contained in the spill kit

- **Step 5:** Contain and cover the spill using appropriate absorbent material (absorbent side facing down and plastic backed side up) provided in the spill kit
- **Step 6:** Use spill towels or chemosorb pads (in spill kit on ward) to wash area with alkaline detergent
- **Step 7:** Use spill towels to rinse area thoroughly with water and to dry area fully
- **Step 8:** Discard all waste into large poly bag of designated colour.
- **Step 9:** Remove shoe coverings and outer utility gloves and discard into poly bag of designated colour.
- **Step 10:** Wearing inner gloves, seal the poly bag of designated colour and place into chemotherapy waste poly bag along with gown, mask and protective eyewear
- **Step 11:** Remove inner gloves and seal chemotherapy waste poly bag
- **Step 12:** Place entire bag into cytotoxic waste bucket of designated colour.
- **Step 13:** Wash hands thoroughly with soap and water
- **Step 14:** Complete an incident report form



### SPILLS WITHIN SAFETY CABINET OR ISOLATOR

work should stop and the spill should be cleaned up immediately. Small spills may be easily cleaned using absorbent gauze. Large spills may require a spill pillow to absorb a larger volume of fluid. The area should then be washed with an appropriately diluted strongly alkaline detergent, rinsed thoroughly with sterile water, and then wiped with sterile isopropyl alcohol (70%) or other suitable agent

### SPILLS WITHIN CLEANROOM AND ANTEROOM

Cytotoxic clean rooms which have a positive pressure in relation to the external environment should be fitted with a spill switch. When activated, this switch will alter the pressure differentials within the cytotoxic suite to minimise any contamination of the external environment. The switch should also be fitted with an audible alarm to

alert other staff working in the immediate vicinity. The steps in the cleaning should proceed as for major spills mentioned above.

### Disposal of Cytotoxic waste

Cytotoxic waste is highly hazardous and should never be landfilled or discharged into the sewerage system. Disposal options include:

1. Return to the original supplier
2. Incineration at high temperatures
3. Chemical degradation in accordance with manufacturers' instructions

***For dangerous spills of hazardous chemicals or highly infectious materials, the clean-up operations should be carried out by designated personnel specially trained for the purpose. Spills should be dealt with safe handling operations and appropriate PPE.***







## Introduction

Germs can spread to health care workers, patients, from linen too. It is important to know correct management of soiled linen.

## How to teach?

- Demonstration of correct method of management of linen followed by discussion in local language

## Talking points:

- Appropriate PPE should be worn during handling of soiled linen to prevent skin and mucous membrane exposure to blood and body substances
- Soiled or dirty linen (when linen is merely dirty with dust but not contaminated)
- Contaminated linen (when soiled with blood, pus, urine, faeces other body fluids)

- Soiled linen is collected in a bag / covered trolley and sent to laundry
- Used linen must not be rinsed or sorted in patient-care areas or washed in domestic washing machines
- Linen contaminated with body substances should be placed into yellow bag, disinfected with 1% phenol for 30 minutes; and then sent to laundry
- Hand hygiene is performed following the handling of used linen.
- Clean linen and soiled linen should be handled, stored, and transported separately.

***Soiled linen to be handled as little as possible.  
Appropriate PPE should be worn while handling soiled linen.***



# USE OF DISINFECTANTS





### Introduction

Disinfectants help reduce load of germs. They kill germs or prevent their multiplication.

### How to teach?

- Chart/ flipchart showing the method of use of disinfectant.

### Talking points:

- Why should we disinfect waste?
  - The aim of disinfection is to eliminate microorganisms or at least reduce their numbers to an acceptable level.
- Some disinfectants are effective in killing or inactivating specific types of microorganisms, and others are effective against all types.
- It is therefore important to know the identity of the target microorganisms to be destroyed.

- Selection of disinfectants depends not only on their effectiveness, but also on their availability and hazards related to their handling.
- Currently used disinfectants
  - Sodium hypochlorite
  - Alcohols
  - Phenolic compounds
- Disinfectant solution to be used
  - Used for disinfection of sharps, liquid spills
- Phenolic compounds used for disinfecting soiled linen
- Alcohols used for disinfection of hands

***Powerful disinfectants are often hazardous and toxic, and many are harmful to skin and mucous membranes. Use PPE while using disinfectants.***

# LESSON 11: HOUSEKEEPING IN HEALTH CARE FACILITIES



# LESSON 11: HOUSEKEEPING IN HEALTH CARE FACILITIES



## Introduction

Good housekeeping helps to do our work well. It helps pick up what we want early without much search. It keeps our environment clean.

## How to teach?

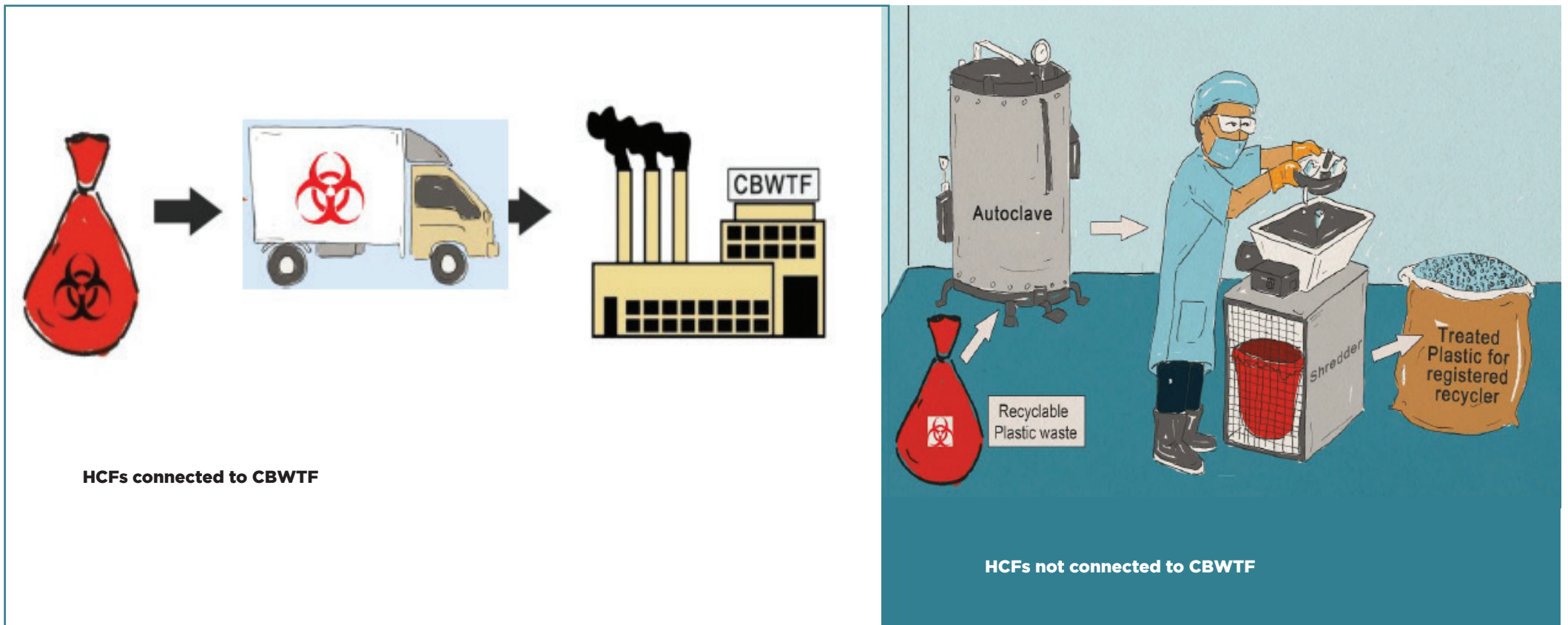
- Interact freely with them and make them understand the subject utilizing images or illustrations.
- Demonstrate by doing things in front of them using equipment available to them.

## Talking points:

- Usage of PPE at all times while handling waste.
- Not to insert bare hands into waste bins to avoid needle stick injury or injury from other sharps.
- Use mops and other equipment to clean floors and other inaccessible areas.
- Pitfalls of improper cleaning practices and suggestions on improvement of the same.
- Procedure of sweeping floor, toilets, hospital compounds, walls, screens, windows, bedside screens and other equipment.
- Having adequate stores of equipment and chemicals needed for good housekeeping practices.

***Good housekeeping means everything has a place***

# LESSON 12: MANAGEMENT OF PLASTIC WASTE



Management of recyclable plastic waste as per BMW Rules 2016 [Part II, Section 3, Sub-section (i) 5 (m)]

# LESSON 12: MANAGEMENT OF PLASTIC WASTE



## Introduction

Management of plastic waste is a challenge. Reducing its use and recycling after autoclaving should be principle of management. Latter process is done by registered recyclers in CBWTF.

## How to teach?

- Chalk and board method utilizing pictures and flipcharts, in local language.
- Posters can help in summarizing the talked about contents.
- Discussion on the subject with active involvement of audience preferably in locally spoken language.

## Talking points:

- Segregation of plastics into Red colored bins with Red colored non-chlorinated plastic bags wrapped inside.
- Once filled up, the Plastic material should be transferred into red colored autoclavable safe bags or containers for sterilization in an autoclave or a hydroclave or a micro wave. This is next transported to CBWTF. If this is not accessible, autoclaved plastic can be linked to registered recyclers.
- Chemical disinfection only as last resort if sterilization by heat is not possible (Disinfectant solution). The treated plastic then be subjected to mutilation and transportation to CBWTF.
- The subsequent product to be sent to authorized recyclers for salvage of plastics.
- Plastic waste should not be sent to landfill sites or for incineration.

***Plastic waste need to be segregated in red color bins having non chlorinated red bags. Send them to CBWTF; if CBWTF not available, should be autoclaved and send it to registered recycler.***



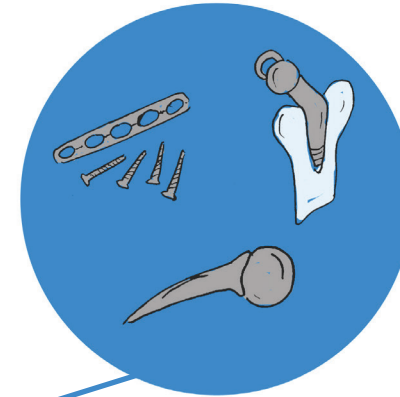
# LESSON 13: MANAGEMENT OF GLASSWARE AND METALLIC BODY IMPLANTS



Broken bottles, test tubes,  
ampoules



Metallic body  
implants



**Puncture proof  
Leak proof box /  
container with blue  
marking**





## LESSON 13: MANAGEMENT OF GLASSWARE AND METALLIC BODY IMPLANTS



### Introduction

Management of glassware is a challenge. While intact glassware can be considered for reuse, broken glass and metallic implants should be contained in Puncture proof, Leak proof Box/ Container with blue colored marking.

### How to teach?

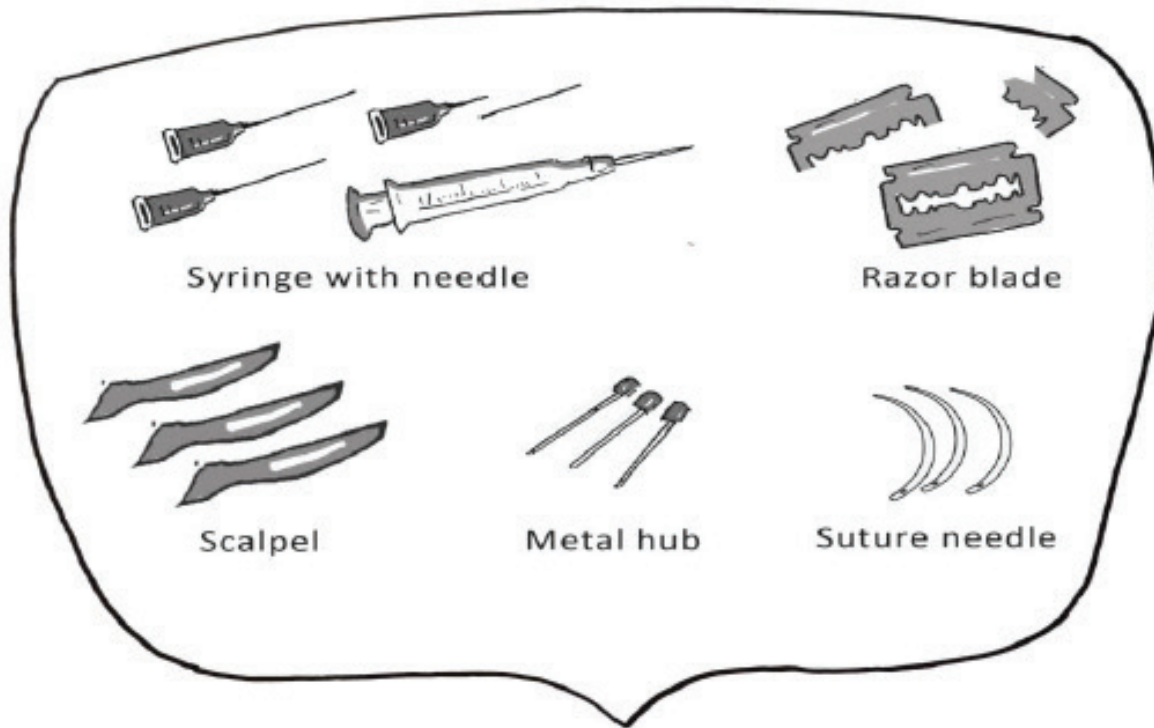
- Demonstration of correct way of management of glass showing Puncture proof, Leak proof Box/ Container with blue marking and glass ware.
- Discussion in local language with utilizing posters showing different types of glass ware.
- Using LCD power point presentation, evoking their curiosity and interest.

### Talking points:

- Types of glass items commonly seen in health care settings.
- Segregating the items into blue colored boxes.
- Soaking of glass in hypochlorite solution for a minimum time as per guidelines.
- Finally glass items to be put in blue boxes.
- Important to mention that glass items containing cytotoxic waste to be handled separately.
- Metallic implants also to be subjected to similar treatment as glassware.
- Treated waste to be sent to authorized recyclers.

***Broken or discarded and contaminated glass and metallic implants should be put into Puncture proof, Leak proof Box/ Container with blue colored marking Send them to CBWTF; if CBWTF not available, should be autoclaved and send it to registered recycler.***

# LESSON 14: MANAGEMENT OF WASTE SHARPS



Syringe with needle

Razor blade

Scalpel

Metal hub

Suture needle



White puncture proof, leak proof, tamper proof container



# LESSON 14: MANAGEMENT OF WASTE SHARPS



## Introduction

“Containment of waste” is an important aspect in life cycle approach. Proper management of waste sharps helps prevent needle-stick injuries/ other sharp injuries.

## How to teach?

- Chalkboard
- Videos in locally spoken language
- Posters, charts etc.
- Power point presentation with interactive discussion

## Talking points:

- Different types of sharps generated in health care settings.
- Importance of preventing needle stick injury and injury from sharp items
- Modes of getting injured from sharp items in hospitals.
- Importance of PPE.
  - Different types of PPE and how to use them while handling sharps.

- Segregation of sharp items in leak proof, tamper proof, white puncture proof containers with proper labeling.
- Transportation of container taking precautions by using heavy duty rubber gloves in trolleys preferably.
- Sterilization of sharp items in autoclave or hydroclave or hot air oven.
- Subjected to shredding and final product sent to iron foundries (having consent to operate from the State Pollution Control Boards or Pollution Control Committees).
- Alternatively sharps can be managed in sanitary landfill or a designated concrete sharp pit.

***Waste sharps should be managed with great care to avoid injury and infection. They should be put in leak proof, tamper proof, puncture proof translucent container and transported in-house, with minimal contact using appropriate PPE and then sent to CBWTF for final disposal. If no CBWTF, dispose waste sharps into designated concrete sharp pit.***

# LESSON 15: MANAGEMENT OF DISCARDED MATTRESSES



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# LESSON 15: MANAGEMENT OF DISCARDED MATTRESSES



## Introduction

Often mattresses are made with outer covering being rexin. Size makes it difficult to be put in a bin. It is useful to put a “yellow” label on the mattress for transportation to CBWTF.

## How to teach?

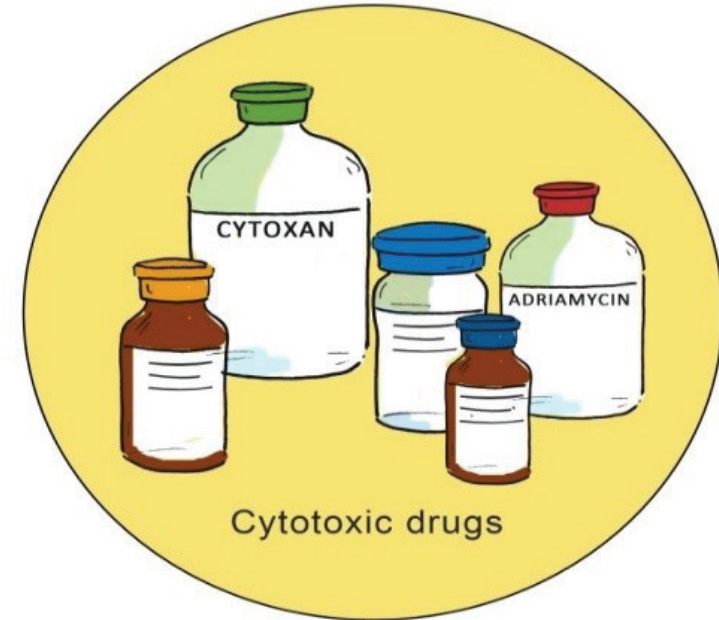
- Through Images
- Through bedside demonstration.
- Through discussion.

## Talking points:

- Use personal protection while handling contaminated mattress.
- Use yellow colored non-chlorinated packing material to segregate and contain discarded mattress.
- Final treatment by shredding and mutilation followed by incineration; It can also be managed by shredding and sterilization.

***All mattresses contaminated with body fluids and their remnants should be segregated, wrapped into a yellow sheet/ labelled yellow and periodically sent to CBWTF for its final disposal.***

# LESSON 16: MANAGEMENT OF EXPIRED/ DISCARDED DRUGS



Cytotoxic drugs



Yellow bin with non-chlorinated yellow bag





# LESSON 16: MANAGEMENT OF EXPIRED/ DISCARDED DRUGS



## Introduction

Drugs are chemical waste. They can contaminate soil/water/air. Expired/ discarded drugs and drugs used for cancer should be collected in two separate bags.

## How to teach?

- Sitting in an informal environment with a few tablets, vials, yellow container
- Discussion in local language.

## Talking points:

- Tablets, vials, ampoules etc. used by the patient may be remaining on the table/bed/floor of the ward
- We should pick it up, show to the nurse-in-charge and find out whether it is expired or not/ whether it is drugs used for cancer.
- If the medication is not expired, it can be retained by the nurse for possible reuse
- If due date has expired, it should be put in yellow container
- Drugs used for cancer and expired/ discarded drugs should be collected in two separate yellow bags.

What did we learn?

***Drugs are chemical substances.  
If not properly managed, may contaminate soil, water, air and will  
be harmful to human beings, animals, plants and environment.***

# LESSON 17: MANAGEMENT OF BLOOD BAGS (DISCARDED/ USED)



Pre treated by autoclave/ microwave at HCFs

*Disinfection before disposal*

# LESSON 17: MANAGEMENT OF BLOOD BAGS (DISCARDED/ USED)



## Introduction

Discarded blood bags are infected. Universal precaution for prevention for prevention of HIV/ AIDS to be practiced in its management. Use of PPE is a must. Let us learn how to manage discarded blood bags.

## How to teach?

- Graphic illustrations through images and posters.
- Demonstration using blood bags and other materials.
- Discussion

## Talking points:

- Handling of used blood bags.
- Demonstrating correct way of managing blood bags using necessary materials like PPE, blood bags, autoclave -safe plastic bags or containers and subsequently putting into an autoclave.
- Blood bags should be autoclaved and subsequently put into yellow bags before their final disposal into CBWTF for incineration.

***Discarded or contaminated blood bags to be pretreated by autoclave/microwave and then to be segregated in yellow bags and then sent to CBWTF***

# LESSON 18:

# RECORD KEEPING





## Introduction

Good record keeping helps track of waste quantity, injuries, accidents, spills. We should help ward sister in record keeping.

## How to teach?

- Demonstration and discussion using registries and other necessary materials.
- Images of different areas of hospitals like wards, store rooms, nurses station, and waste storage areas showing necessary record keeping files and registers being entered by staff

## Talking points:

- Importance of record keeping of health care waste.
- Records to be maintained for a minimum period of 5 years.
- Keep track of counts of bags, counts of trolley trips, weighing of different color bags.
- Various records to be kept which include among other things, Category-wise waste quantification registry,

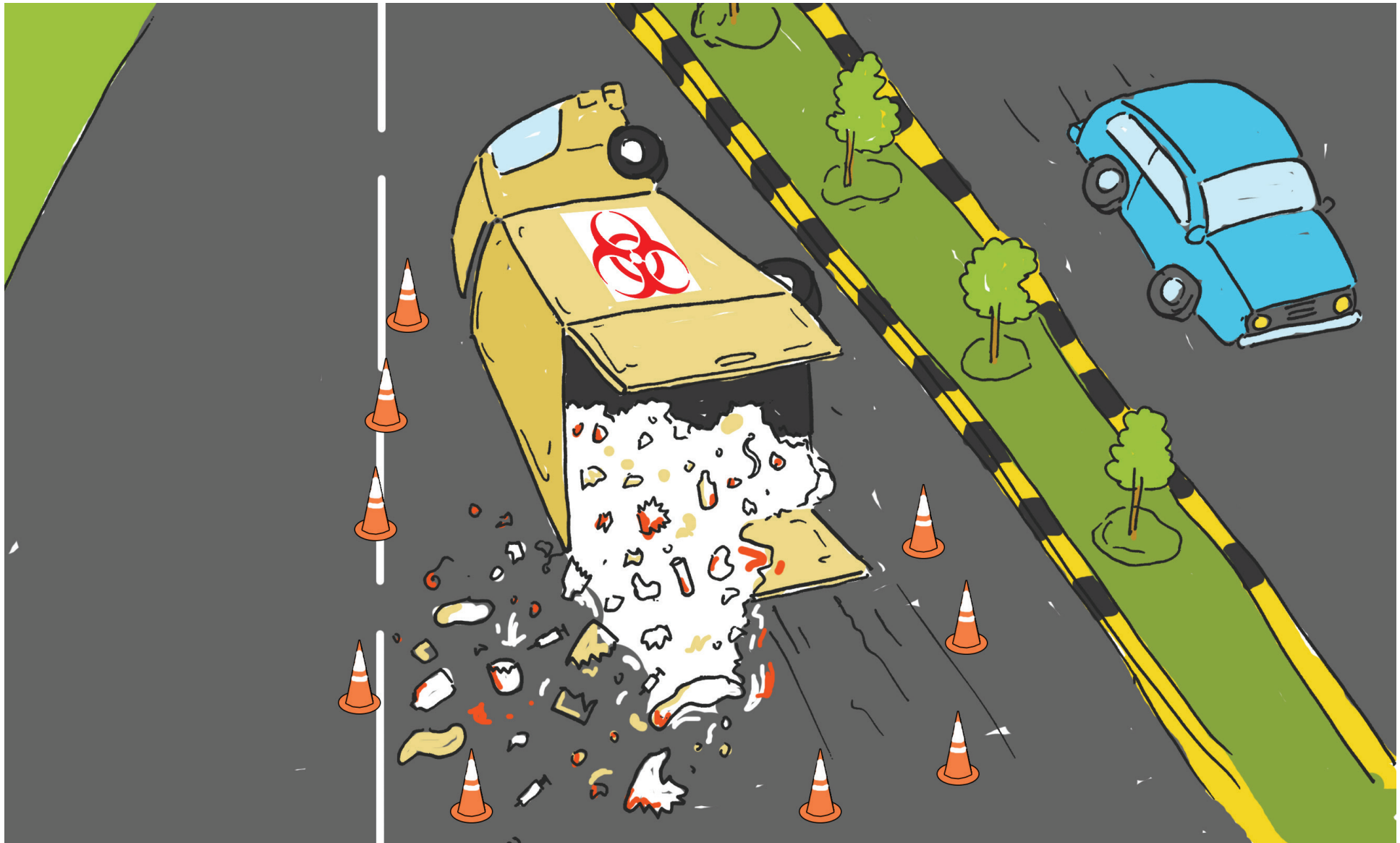
Injury register, describing type, nature and treatment given.

- A log book for tracking waste movement from SOG to storage.
- Staff nurses and waste managers should maintain records meticulously and accurately.
- List of records to be maintained
  - Waste generation register
  - Needle-stick injury register
  - Accident register
  - Spill register
  - Minutes of meetings by BMWM committee
  - Waste handlers' periodic health checkup register/ card
  - Immunization register of waste handlers

***Meticulous keeping of records forms an important aspect of BMWM, keeping track of bag counts, weighing waste bags, maintain waste register, injury register and maintaining a log book keeping a track on waste movement from point of generation to storage.***



# LESSON 19: MANAGEMENT OF ACCIDENTS WHILE TRANSPORTING BIO-MEDICAL WASTE





# LESSON 19: MANAGEMENT OF ACCIDENTS WHILE TRANSPORTING BIO-MEDICAL WASTE



## Introduction

Accidents affect large masses of public and include toppling of the truck carrying biomedical waste and accidental release of bio-medical waste in any water body.

## How to teach?

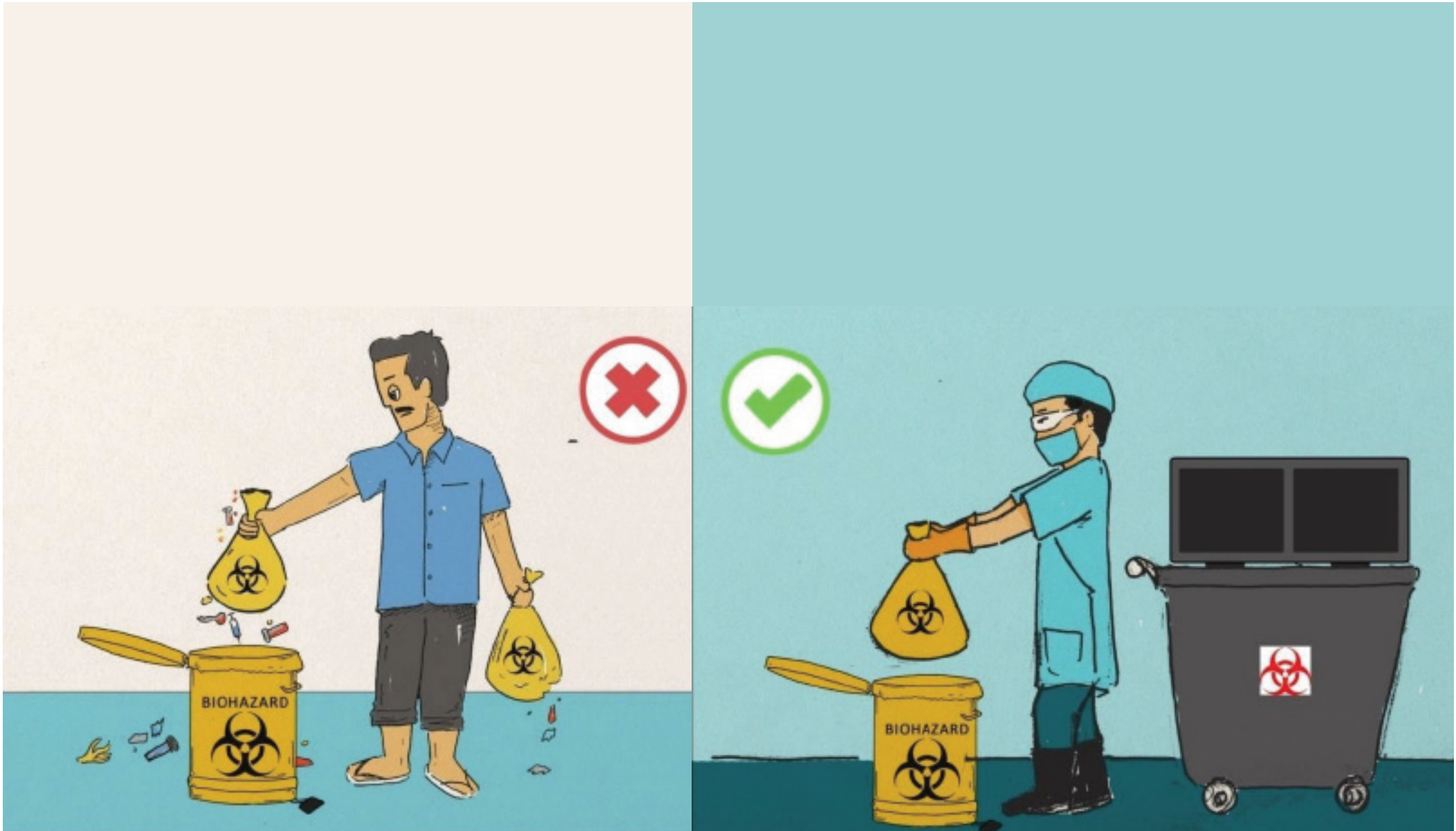
- Sitting in an informal setting.
- Discussion in local language.
- Interactive discussion, use of AV aids

## Talking points:

- Careful selection of waste containers should be done to reduce the likelihood of breakage and leakage during use.
- Specific routes must be planned through the healthcare facility for transportation within the health care facility.
- Carts used for moving biomedical waste within the health care facility should be designed to prevent spills, and made of materials able to withstand exposure to common cleaning agents.

- The biohazard symbol should be clearly displayed on these carts.
- Vehicles Transporting Bio-medical waste for the final disposal, should comply with the conditions, if any, stipulated by the State Pollution Control Board or Pollution Control Committee. This is in addition to the requirement contained in the Motor Vehicles Act, 1988 (59 of 1988) Government of India.
- In case of accidents, the authorised person shall intimate immediately to the prescribed authority about such accident and forward a report within twenty-four hours in writing regarding the remedial steps taken.
- Label for transporting bio-medical waste bags or containers to be attached.
- Accident reporting to be done.

***Transportation vehicles to comply with standards stipulated by State Pollution Control Board. The authorised personnel to intimate immediately to the prescribed authority about any accident for dangerous spills of hazardous chemicals or highly infectious materials; the clean-up operations should be carried out by designated personnel specially trained for the purpose.***



## LESSON 20:

# ATTITUDINAL CHANGE



### Introduction

“Attitudes” make difference. If ‘attitude’ is right, work will be easier. If biomedical waste management can be developed as a culture to be “inculcated” implementation of “rules” becomes easier.

### How to teach?

- Sitting in an informal environment with few waste materials, and colour coded containers.
- Demonstration followed by a discussion in local language.

### Talking points:

- In a health care facility, clean practices are to be followed when handling waste.
- Unclean practices are harmful.
- To put the waste only in the respective colour coded containers and care should be taken that there is no spillage around the bins during disposal.
- To wear all the personal protective equipment when handling the waste.

### Strengths of clean practices:

Prevent spread of infections and injuries to the waste handlers, improve the cleanliness of surroundings and maintain a healthy environment for patients, staff and public.

### Reasons for not able to follow clean practices:

Lack of resources and equipment like bins, trolleys, lack of knowledge, attitude and training and lack of monitoring by senior staff.

Are you following clean practices? If not, enumerate why....  
Let us move towards learning about hazards and types of waste.

***Some houses are kept clean, some not  
Some hotels are kept clean, some not  
BUT ALL THE HOSPITALS SHOULD BE KEPT CLEAN***

## TAKE HOME MESSAGES



- 1. Waste may not be useful immediately to the user, but harmful if not properly managed**
- 2. Robust infection control isolate microorganisms and thus constitute a barrier for transmission of infections**
- 3. Waste segregation at the point of generation is critical for appropriate waste management**
- 4. All the infected waste should go to yellow coloured non-chlorinated plastic bag**
- 5. All the recyclable waste should go to red coloured non-chlorinated plastic bag**
- 6. All sharp waste should go to white (translucent) puncture proof container**
- 7. No waste is to be stored beyond 24 hours - especially organic waste**
- 8. Proper hand washing is one of the most important things to help prevent and control the spread of many diseases from one person to another. 'CLEAN HANDS SAVE LIVES'**
- 9. PPE are effective in reducing risk of injury, to protect from exposure to blood, other potentially infectious materials and chemicals**

## TAKE HOME MESSAGES



- 10. Immunization is an effective preventive measure to protect against infections while handling infectious waste and sharps**
- 11. Daily tasks may expose them to toxic chemicals safety hazards, biologic hazards, and radiation, so periodic health check-up is very essential**
- 12. Proper management of sharps will reduce injuries. Do not neglect if any injury happens while handling waste. Report immediately.**
- 13. Spillages should be dealt with safe handling operations and appropriate protective clothing.**
- 14. Soiled linen to be handled as little as possible. Appropriate PPE should be worn while handling soiled linen.**
- 15. Powerful disinfectants are often hazardous and toxic and many are harmful to skin and mucous membranes. Use PPE while using disinfectants**
- 16. Good housekeeping means everything has a place and everything is in its place after its use.**
- 17. Drugs are chemical substances. If not properly managed, may contaminate soil, water, air and will be harmful to human beings, animals, plants and environment.**



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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 and Punjab