

**BIO- MEDICAL WASTE MANAGEMENT - SELF
LEARNING DOCUMENT FOR
DAYAS, AAYAS AND CLASS IV EMPLOYEES
2009**



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Gachibowli, Hyderabad, Andhra Pradesh.

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Acknowledgement

Bio-Medical Waste Management is an important responsibility of every hospital. **Bio-Medical Waste Management- Self Learning Document for Aayas, Dayas and Class IV Employees**, is an attempt to make the class IV employees of hospital understand the various steps involved in bio-medical waste management.

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Dr. Razia Sultana
Coordinator &
Director (Programs) i/c,
Environment Protection Training and Research Institute(EPTRI),
Hyderabad, Andhra Pradesh, India
Email: emailrazia@yahoo.com

**Bio- Medical Waste Management -Self Learning Document
for
Aayas, Dayas and Class IV Employees**

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About the Manual:

Bio- Medical Waste Management is a critical issue in every health care establishments / hospitals. To address this concern and improve the quality of service delivery, it was conceptualized that entire health care staff needs to be equipped with appropriate knowledge and skill. **Bio- Medical Waste Management Self Learning Document for Aayas, Dayas and Class IV Employees** is designed to meet the above objectives. The inputs, feedbacks and comments from the review committee members has given this manual the present shape. This manual, when used by the concerned staff will act as an enabling tool towards excellent service delivery. The various steps involved in managing the bio- medical waste is expressed in very simple way and more emphasize has been given on pictorial representation to ease in understanding bio-medical waste management.

Objective:

The objective of this manual is to

- Sensitize on ill-effects due to improper management of bio-medical waste.
- Appreciate the importance and purpose of bio-medical waste management.
- Enhance knowledge and skills on bio-medical waste management.

Out Put:

The reader will be able to understand different categories of bio-medical waste , its segregation, treatment and appropriate disposal.

1. INTRODUCTION:

All the hospitals be it big or small, produces waste which is called Bio- Medical Waste . It carries a higher potential for infection due to infectious waste and injury due to needle prick. Management of Bio-Medical waste is very much important to protect health and environment. It is a risk to all those who generate, collect, segregate, handle, package, store, transport, treat and dispose waste. Apart from medical staff, in and out patients, visitors, workers in support services, workers in waste disposal facilities and the general public are at risk of getting infection and over 20 blood born diseases can be transmitted if it is not managed properly. In general the bio-medical waste can be divided into non infectious waste, infectious waste (including pathological waste, sharps waste, items contaminated with blood and body fluids) and chemical or pharmaceutical waste. If bio-medical waste is not managed properly, it causes environmental, occupational and public health hazard.

The proper bio-medical waste management will help to

- Control hospital acquired infections,
- Reduce HIV/AIDS, sepsis, and hepatitis transmission from dirty needles and other improperly cleaned or disposed medical items,
- Control diseases passed to humans through insects, birds, rats and other animals,
- Prevent illegal repackaging and resale of contaminated needles,
- Cut cycles of infection and avoid negative long term health effects like cancer, from the environmental release of toxic substances.

Hospital waste management is part of hospital hygiene and maintenance activities. General hospital hygiene is a prerequisite for good bio-medical waste management.

2. PERSONAL PROTECTIVE AIDS:

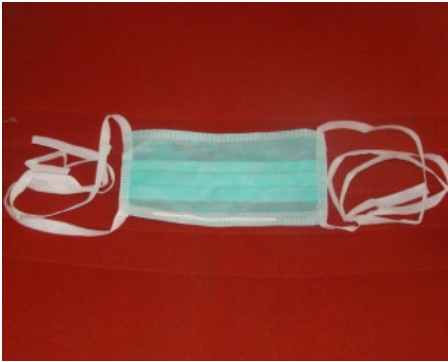
While handling the bio-medical waste Aayas, Dayas and Class IV employees should protect themselves from getting and acquiring infection or injured by needle stick.

Protective clothing must be worn at all times when handling bio-medical waste. The protective aids are as follows.

Protective Aids



Gloves



Mask



Soap



Over Garment / Apron



Boots or closed - toe shoes

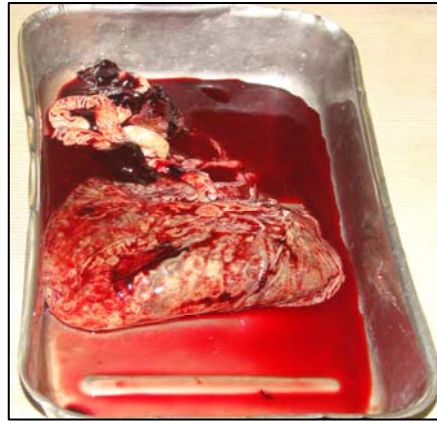


Protective Aids

3. CATEGORIES OF BIO- MEDICAL WASTE:

As per Bio-Medical Waste (Management and Handling) Rules, 1998 and as amended, there are ten categories of bio-medical waste, they are as follows.

Category 1: Human Anatomical Waste (body parts, organs, human tissues etc.)



Category 2: Animal Waste (animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals, colleges, discharge from hospitals, animal houses).



Category 3: Microbiology & Biotechnology Waste (Wastes from laboratory cultures, stocks or micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures).



Category 4: Waste Sharps (needles, syringes, scalpels, blade, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps).



Category 5: Discarded Medicines and Cytotoxic drugs (Waste comprising of outdated, contaminated and discarded medicines).



Category 6: Soiled Waste (items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, beddings, other material contaminated with blood).



Category 7: Solid Waste (Waste generated from disposable items other than the waste sharps such as tubings, catheters, intravenous sets etc.).



Category 8: Liquid Waste (Waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities).



Category 9: Incineration Ash (Ash from incineration of any bio-medical waste).



Category 10: Chemical Waste (Chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.).



4. BIO- MEDICAL WASTE MANAGEMENT:

As soon as the bio-medical waste as mentioned above is generated it should be segregated into specific color coded bin / bag. It should be ensured that waste bags are tightly closed when they are about three-quarter full and are picked up from the neck and placed, so that bags can be picked up by the neck again for further handling. At a time only one bag should be lifted. The waste should be transported within the hospital to the temporary central storage place through predefined route by means of wheeled trolleys, containers or carts that are not used for any other purpose. The trolleys should not be over loaded with waste bins/ bags, care should be taken that there should not be any spillage along the way to the central storage place. Suitable system for securing the load during transport should be ensured. The trolleys have to be cleaned daily. It is important to note that no waste should be kept beyond 48 hours. If Common Bio-Medical Treatment Facility (CBMWTF) is available, the segregated waste should be handed over to them. If the facility is not available then various treatment and disposal options need to be selected or under taken are as follows.

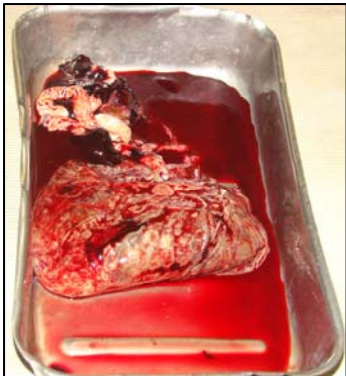
Segregation, Treatment and Disposal Options			
Colour Coding	Type of Container	Waste Category	Treatment and Disposal Options
Yellow	Plastic Bag – Non Chlorinated	Cat -1 Human Anatomical Waste Cat -2 Animal Waste Cat -3 Microbiology & Biotechnology Waste Cat-6 Soiled Waste	Incineration/ Deep Burial
Blue	Plastic Bag	Cat -7 Solid Waste	Autoclaving / Microwave/ Chemical Treatment and Destruction / Shredding

White/ Translu cent	Puncture Proof Translucent Container	Cat – 4 Sharps Waste	Autoclaving/ Microwave/ Chemical Treatment and Destruction / Shredding
Red	Disinfected container / plastic bag	Cat-3 Microbiology & Biotechnology Waste Cat – 6 Soiled Waste Cat-7 Solid Waste	Autoclave/ Microwave/ Chemical Treatment
Black	Plastic bag	Cat-5 Discarded Medicine & Cytotoxic Drugs Cat – 9 Incineration Ash Cat – 10 Chemical Waste (solid)	Disposal in Secured Landfill

It is observed from the above table that depending on treatment and disposal option the different categories of bio-medical waste is segregated in specific color coded bins / bags. If the treatment and disposal option is incineration or deep burial , category 1,2,3 and 6 (human anatomical waste, animal waste, microbiology and biotechnology waste and soiled waste) can be put in yellow color bin. If the treatment option is either Autoclaving / Microwave or Chemical Treatment with Destruction / Shredding category 7 (plastic waste) to be put in blue and category 4 (sharp waste) to be in white translucent puncture proof bin. If the treatment option is Autoclaving / Microwave/ Chemical Treatment, category 3,6 and 7 (microbiology and biotechnology waste, soiled waste and plastic waste) to be put in the red color bin / bag. If the disposal option is in secured landfill , category 5,9 and 10 (discarded medicine, cytotoxic drugs, incineration ash and solid chemical waste) to be put in black bin or bag having logo of cytotoxic. Except black color bin / bag all other bins and bags should have biohazard logo on them.

The pictorial representation of segregation of waste into specific color coded bins/ bags/ containers is as follows.

Bio-Medical Waste – Segregation in Yellow Bin / Bag/ Container



**Category 1:
Human Anatomical Waste**



**Category 2:
Animal Waste**

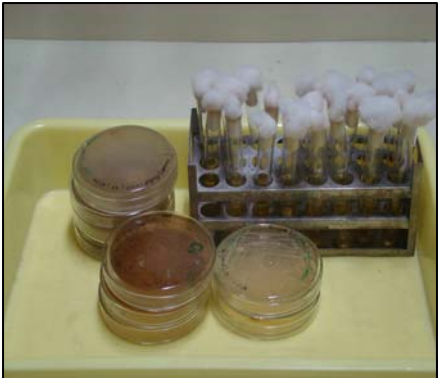


**Category 3:
Microbiology &
Biotechnology Waste**



**Category 6:
Soiled Waste**

Bio-Medical Waste – Segregation in Red Bin / Bag/ Container



**Category 3:
Microbiology &
Biotechnology Waste**



**Category 6:
Soiled Waste**



**Category 7:
Solid Waste (Plastic)**

Bio-Medical Waste – Segregation in White Translucent Container



**Category 4:
Waste Sharps**



Bio-Medical Waste – Segregation in Blue Bin / Bag/ Container



**Category 7:
Plastic Waste**



Bio-Medical Waste – Segregation in Black Bin / Bag/ Container



**Category 5
Discarded Medicines &
Cytotoxic Drugs**



**Category 9:
Incineration Ash**

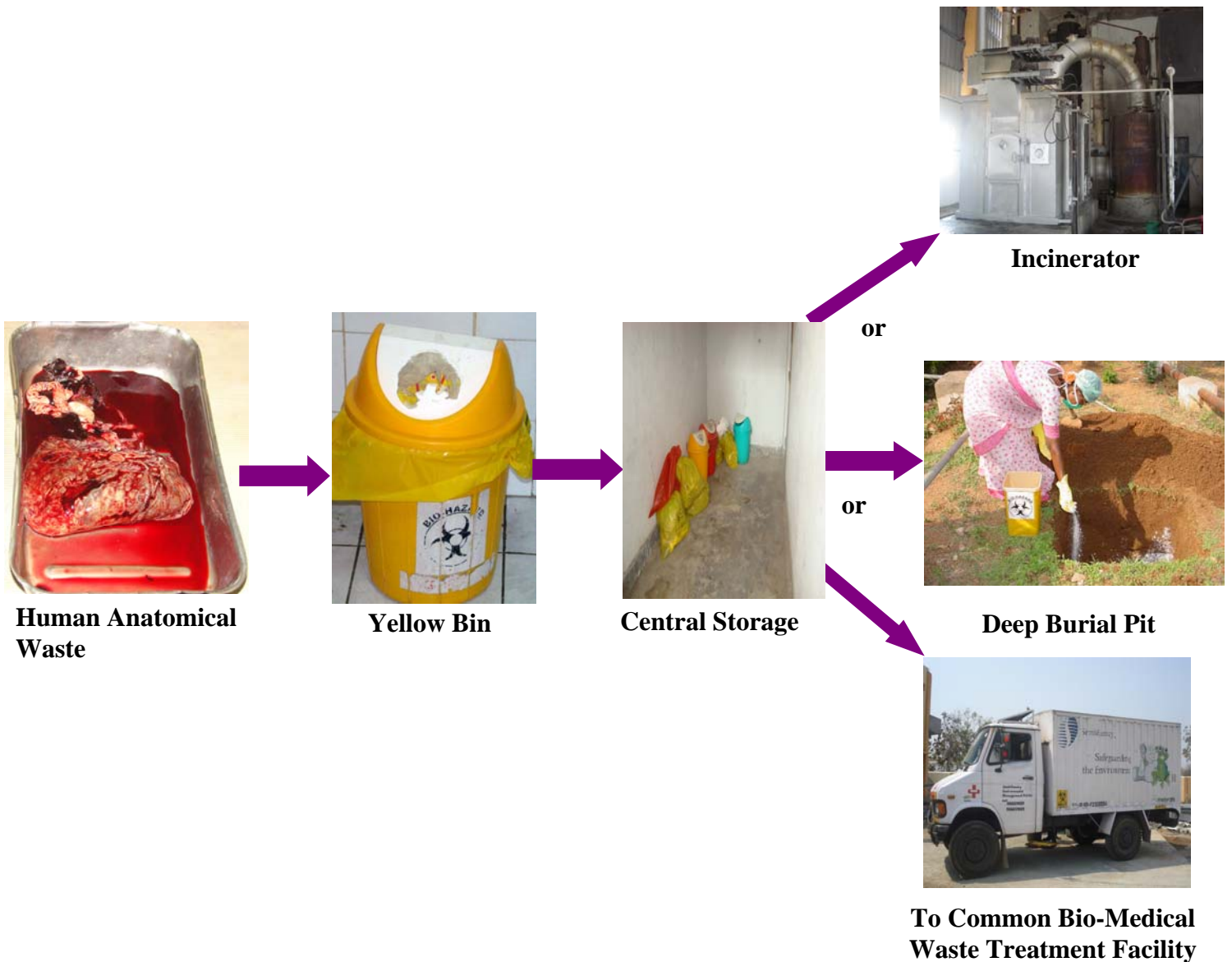


**Category : 10
Chemical Waste (Solid)**

After segregation the waste has to be treated or disposed off as per Bio-Medical Waste (Management and Handling) Rules. Policy and planning should be evolved to manage the bio-medical waste properly. The pictorial representation of management of bio-medical waste (cradle to grave) with various technological options available for each category of bio-medical waste is as follows.

Category Wise Bio – Medical Waste Management Options

Category – 1 (Human Anatomical Waste)



Category -2 (Animal Waste)



Animal Waste



Yellow Bin



Central Storage



Incinerator



Deep Burial Pit

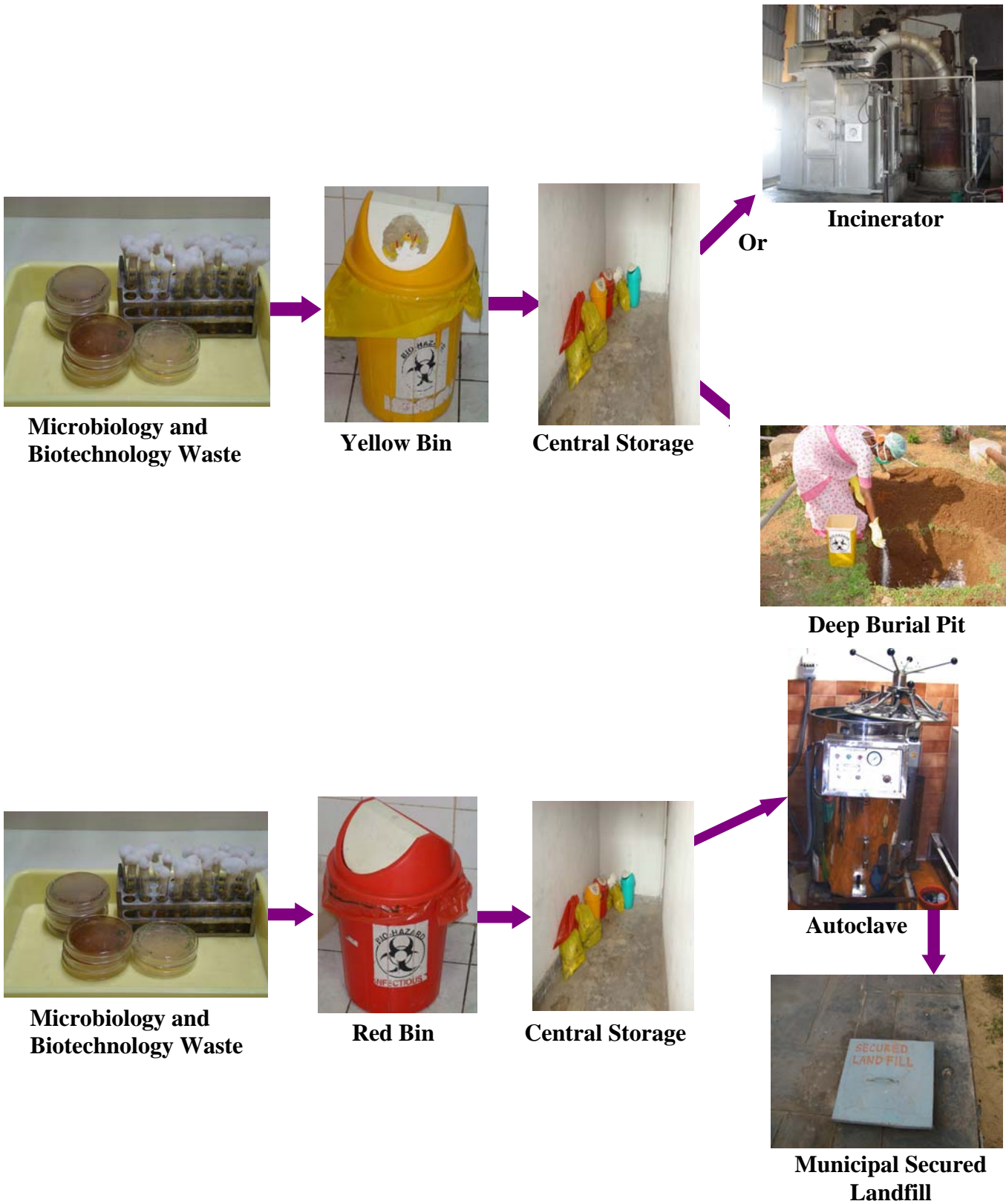


To Common Bio-Medical Waste Treatment Facility

or

Or

Category –3 (Microbiology and Biotechnology Waste)



Category –4 (Waste Sharps)



Needles



Mutilate with Needle Cutter



White Translucent container with Disinfection Solution



Or Or



To CBMWTF



Sharp Pit



Metal Recycler



Glass



Blue Bin

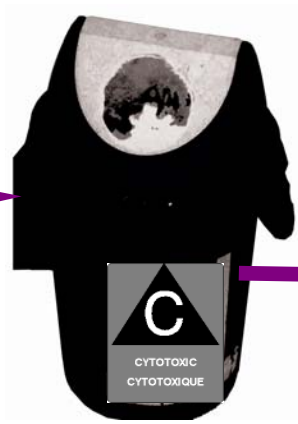


Glass Recycler

Category –5 (Discarded Drugs and Medicines)



Discarded Drugs and Medicines



Black Bin



Central Storage



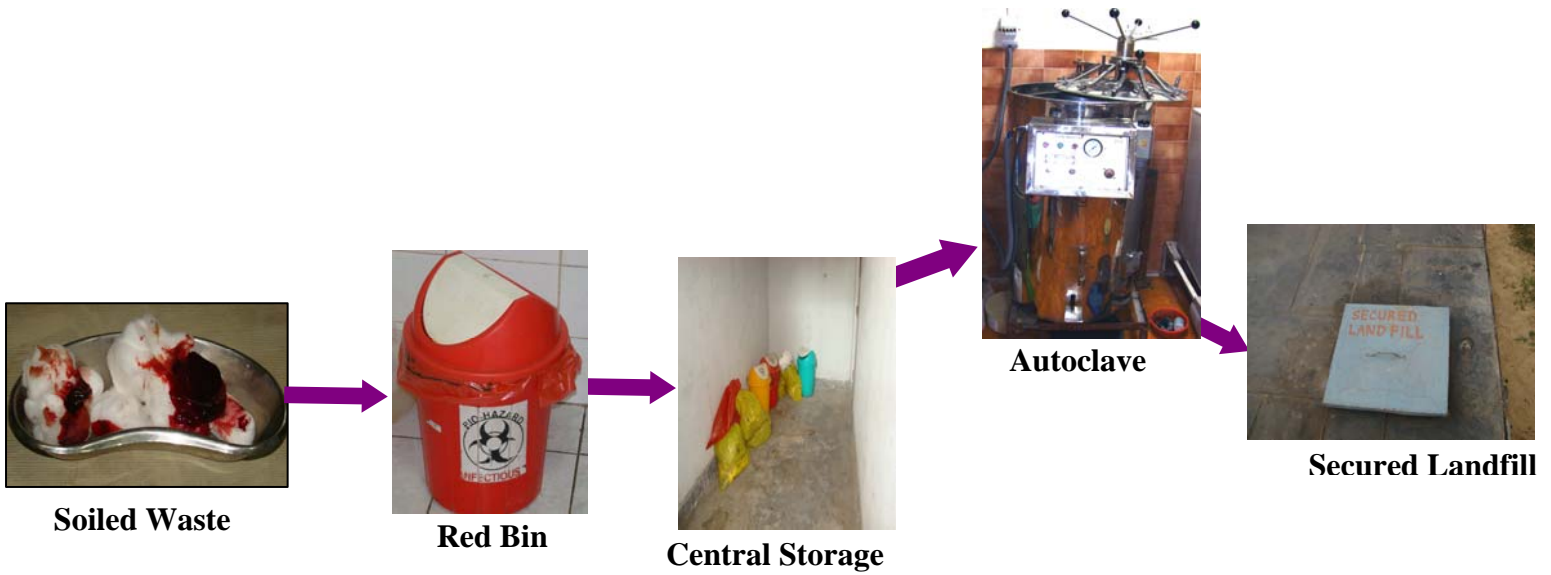
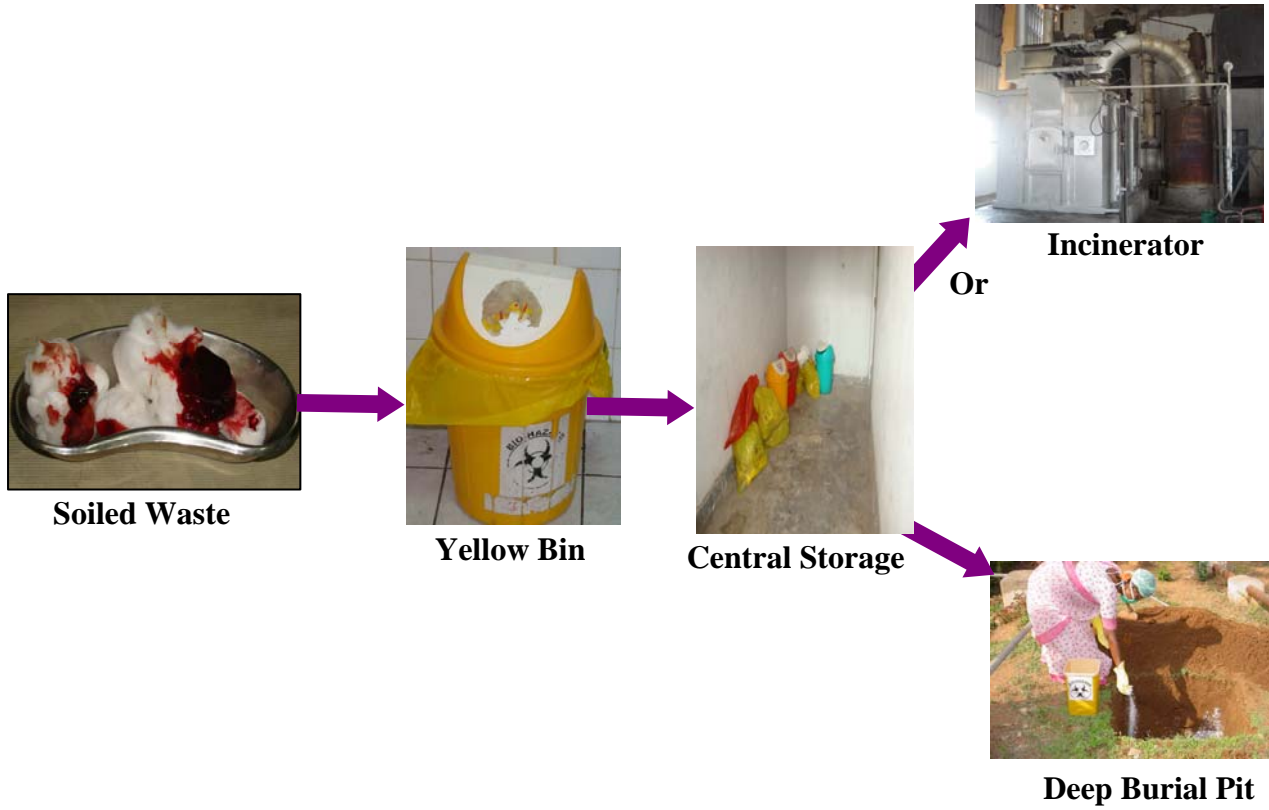
Secured landfill

Or



To Common Bio-Medical Waste Treatment Facility

Category -6 (Soiled Waste)



Category -7 (Solid Waste)



Plastic Waste



Mutilate



Red Bin



Central Storage



Autoclave



Plastic Recycler



Plastic Waste



Mutilation



Blue Bin with Disinfection Solution



To Common Bio-Medical Waste Treatment Facility

Category –8 (Liquid Waste)



Liquid Waste



Effluent Treatment Plant



Discharge into Drains

Category –9 (Incinerator Ash)



Incinerator Ash



Black Bin



Central Storage



Secured Landfill

Category –10 (Chemical Waste)



Liquid Waste



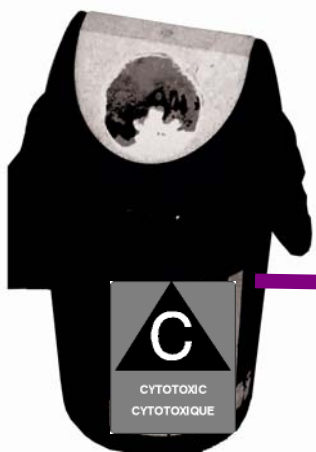
Effluent Treatment Plant



Discharge into Drains



Chemical Solid Waste



Black Bin



Central Storage



Secured Landfill

Or



To Common Bio-Medical Waste Treatment Facility

5. Bio- Medical Waste Management in Primary Health Centers and in Small hospitals in Rural Areas:

All the categories of bio-medical waste are not generated in primary health centers or in small hospitals in rural areas because all the activities are not undertaken in these type of hospitals. The type of waste generated are human anatomical waste, soiled waste i-e gauze, cotton etc., waste sharps like needle etc., and solid plastic waste like saline bottles etc. The bio-medical waste management in primary health centers or in small hospitals in rural areas as per categories of bio-medical waste is as fallows.

Category – 1 (Human Anatomical Waste)



Body Parts

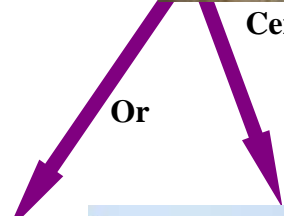


Yellow Bin



Central Storage

Or



Washing Hands



Deep Burial Pit



To Common Bio-Medical Waste Treatment Facility

Category – 6 (Soiled Waste)



Soiled Waste



Yellow Bin



Central Storage

Or



Washing Hands



Deep Burial Pit



To Common Bio-Medical Waste Treatment Facility

Category – 4 (Waste Sharps)



Waste Sharps



Needle Burner



Or

Needle Cutter



Disinfection Solution



Central Storage



Or

Sharp Pit



Hand Washing



To Common Bio-Medical Waste Treatment Facility

Category – 7 (Plastic Waste)



Plastic Waste



Mutilation



Mutilation



Plastic Recycler

Or



Store in Big Container at Central Storage Place



Blue Bin with Disinfection / Solution







Hand Washing



To Common Bio-Medical Waste Treatment Facility

Bio-Medical Waste Management in Primary Health Centers and Small Hospitals in Rural Areas

The bio-medical waste management in primary health centers and in small hospitals in rural areas is as follows.

Waste Type	Requirement	Pre Treatment	Disposal	Post Disposal
Human Anatomical Waste and	1. Deep burial pit 2. Yellow bin/bag 	Not required	Deep burial Or Handover the Yellow Bag to transporter of CBMWTF	Cover it with soil and lime
Soiled Waste	1. Deep burial pit 2. Yellow bin/bag 	Not required	Deep burial Or Handover the Yellow Bag to transporter of CBMWTF	Cover it with soil and lime
Waste Sharps	1. Needle cutter 2. Sharp pit 3. White puncture proof translucent container  4. Sodium Hypochlorite 1%	Mutilate the needle and disinfect	Handover the bag to transporter of CBMWTF Or Dispose mutilated needles in sharp pit	Close the sharp pit and lock.
Solid Waste (Plastic)	1. Scissors / knife for mutilation 2. Sodium Hypochlorite 1% 3. Blue bin / bag 	Mutilate the plastics and disinfect	Handover the bag to transporter of CBMWTF Or Store in bigger container and dispose by sale for recycle. Or Put it in municipal waste	-
General Waste like paper, eatable etc.	Green bin 	Not required	Put in municipal waste	-

6. Preparation of Disinfection Solution:

Disinfection is an important phenomena in bio-medical waste management. Disinfectants are antibacterial agents that are applied to non-living objects to destroy, microorganisms, the process of which is known as disinfection. The aim of disinfection is to eliminate microorganisms. The disinfection solution becomes unstable rapidly, hence it needs to be freshly prepared daily or changed on becoming dirty / turbid. The methodology to prepare the solution freshly to the desired concentration is as follows.

Hypochlorite Solution of 1% Available Chlorine		
Product	Chlorine Available	How to Dilute to 1%
Sodium hypochlorite liquid bleach	3.5%	1 part bleach to 2.5 parts water
Sodium hypochlorite liquid	5%	1 part bleach to 4 parts water
Sodium dichloro isocyanurate powder	60%	17 grams to 1 litre water
NaDCC (1.5g / tablet) tablets	60%	11 tablets to 1 litre water
Chloramine powder	25%	40 grams to 1 litre water

7. Mercury Spill Collection:

Mercury spills in hospitals, clinics and laboratories pose risks to doctors, nurses, aayas, dayas, all other health care workers and patients. People are exposed to mercury when medical devices containing mercury break and when liquid mercury spills or evaporates. The most common exposure routes are through inhalation or through contact with the skin. The risk of exposure to mercury is highest in warm or poorly ventilated rooms. Collection of mercury spill and storage aspect is as follows.

1. Remove everyone from the area that has been contaminated with mercury. Keep the heat below 20°C and ventilate the area if possible.
2. Put on face mask in order to prevent breathing of mercury vapor.
3. Remove all jewelry from hands and wrists so that the mercury cannot combine (amalgamate) with the precious metals.
4. Appropriate personal protective equipment (rubber gloves, goggles / face shields and clothing) should be used while handling mercury.
5. Locate all mercury beads carefully. Cardboard sheets should be used to push the

spilled beads of mercury together. Mercury should be placed carefully in a container with some water.

6. Never use a broom or a vacuum cleaner.
7. It should not be swept down the drain and wherever possible, it should be disposed off at a hazardous waste facility or given to a mercury-based equipment manufacture.



8. Do's and Don'ts in Bio Medical Waste Management:

Do's

1. Segregate waste as soon as it is generated into different categories of waste.
2. Collect the waste in specific color coded covered bins.
3. Clean regularly with soap and water and disinfect the bins.
4. Collect the domestic waste (eatables, wrappers, fruit peels, papers etc., in green bin).
5. Carry the waste in closed containers.
6. Use dedicated waste collection bins/trolleys/ wheel barrows for transporting waste.
7. Transport waste through a pre- defined route within the hospital.
8. Mutilate the needle soon after injection.
9. Mutilate plastic waste (solid waste) as soon as it is generated.
10. Disinfect needle and solid waste (plastic) after mutilation.

11. Dispose body parts in yellow bin, if Common Bio-Medical Waste Treatment Facility is available, hand over to them within 48 hours.
12. Wastes sharps should be kept in white translucent bin, $\frac{3}{4}$ filled with disinfectant solution.

Don'ts

1. Never mix infectious and non-infectious waste
2. Never mix chlorinated wastes with the waste which goes for incineration.
3. Never overfill the bins.
4. Never store waste beyond 48 hours.
5. Should not be any spillage of waste on the way of transport.
6. Avoid transport of waste through crowded areas.
7. Do not put infectious waste into general waste.
8. Don't dispose the body part into deep burial where population is more than 5000.
9. Don't dispose waste sharps with other wastes.
10. Don't dispose the solid waste and sharp waste without mutilation and disinfection.

Questions

1. Name the categories of bio-medical waste.
2. How do you manage sharps waste?
3. What is the method to dispose human anatomical waste?
4. Should plastic waste be mutilated before handing over to authorized recyclers?

Reference:

1. Bio-Medical Waste (Management and Handling) Rules, 1998 and amendments
2. PATH. Training Health Workers in the Management of Sharps Waste. Version 1. Seattle: PATH; 2005.
3. Bio-Medical Waste Management- Self Learning Document for Nurses and Paramedical, by EPTRI, Hyderabad