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BIO-MEDICAL WASTE: A REVIEW OF UPDATED GUIDELINES

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ABSTRACT

In every situation, biomedical waste needs to be managed, divided, dismembered, cleansed, stored, moved, and eventually disposed of in a safe and scientific manner. All healthcare facilities must adhere to the government's biological waste management regulations. Waste is produced by human activities. We are all aware that waste of any kind, whether it be industrial, sewage, or agricultural, can contaminate the air, water, or land. As such, it must be disposed of safely. It may possibly be dangerous for individuals and the environment. Similarly, a lot of waste is produced by hospitals and other healthcare facilities, which might expose people to diseases including Tetanus, HIV, and Hepatitis B and C. The biological waste management rules , which were released in the Indian government6, after notification from the Ministry of Environment, Forests, and Climate Change, are in compliance with the biological waste management policy of our hospital. Medical trash is divided into three groups: bio-medical waste, general waste, and miscellaneous wastes. These categories are applicable to garbage generated by healthcare institutions.

Keywords: Health, Bio Medical Waste, Segregation, Waste Management.

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INTRODUCTION

Human activity generates waste. Whether it is industrial, sewage, or agricultural waste that contaminates the air, water, or land, we are all aware that such trash may be hazardous and has to be disposed of safely. It may potentially pose a threat to both the environment and people. In a similar vein, hospitals and other healthcare institutions produce large amounts of garbage that might expose individuals to illnesses, including Tetanus, HIV, and Hepatitis B and C.

The yearly production of medical waste in India is estimated to be three million tonnes, with a predicted 8% annual growth. Our hospital's biological waste management policy complies with the biological Waste Management Rules 2016, which were published in the government of India's gazette on March 28, 2016, after notice from the Ministry of Environment, Forests, and Climate Change. Categorization of Medical Waste is as follows categories apply to waste produced by healthcare facilities: bio-medical waste, general waste, and other wastes.

DEFINITION

Waste produced during the diagnosis, treatment, or immunization of humans or animals, as well as during related research activities, the manufacture or testing of biological agents, or at health camps, is referred to as bio-medical waste.

PROCEDURES FOR MANAGING BIO-MEDICAL WASTE

1. Waste Generated Survey
2. Hospital Waste Segregation
3. Waste Collection and Categorization
4. Storage
5. Transportation
6. Treatment

1. Waste Generated Survey

It should be investigated before garbage is delivered to see if the amount of waste produced may be reduced to ease the burden of processing, treating, and disposing of it later.

2. Hospital Waste Segregation

One important step in efficiently managing medical waste is the segregation of hospital trash. Strict segregation protocols might result in a significant reduction in treatment and removal costs, given the data and facts indicating that between 10 and 25 percent of HCW are harmful. Separating hazardous trash from non-hazardous waste is the first step in reducing or minimising

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the spread of illness. The process of segregation involves separating the various waste streams according to their hazardous nature, method of treatment, and disposal techniques. Sorting waste materials into bags or containers with clear labels and colour coding is one recommended method for identifying medical waste. Segregation should always take place at the point where waste is generated; it should be simple for clinical and lower-level staff to implement; it should ensure that there are no infectious health care workers in the domestic waste flow; it should be widely recognised and understood by the staff of the health care facility; and it should be regularly monitored to ensure that the strategies are being followed.

3. Waste Collection and Categorization

To prevent buildup, waste has to be regularly collected and relocated to a central storage place inside the health care facility before it is handled or evacuated. To minimise the number of laden carts passing through wards and other clean areas, the collection must travel via predetermined routes within the HCF.

The carts must to have two features: 1) Easy to stack and empty; 2) No jagged edges that might cut trash bags or containers 3) Easy to maintain.

4. Storage

Every healthcare institution should have a storage space before materials are handled, disposed of, or moved off-site. A 24-hour period is the maximum that should be stored. To prevent cross-contamination, infected and non-infectious medical waste should be kept separatelyThe amount of garbage generated should not exceed the capacity of the storage facility. The authority people should be the only ones with access to it. In addition, it should be simple to maintain, have adequate ventilation and lighting, and be built to keep out birds, rats, and insects. Off-site transportation is necessary for medical waste that is processed outside of a medical institution. After then, it is the occupier's responsibility to ensure that the transported containers are appropriately packaged and labelled. The ability to swiftly identify the contents of HCW bags or containers in the event of an accident and take the necessary action is one of the reasons for identifying them. Every vehicle shall deliver a transfer notice from the location of assortment to the treatment office, and the transportation should be duly recorded and documented. Furthermore, the cars used for the variety of dangerous/irresistible HCW shouldn't be used for any reason else. They must have no sharp edges, be simple to load and unload manually, be easy to clean and disinfect, and be completely enclosed to stop spills while being transported on hospital property or the road.

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5. Transportation

Although each class of HCW needs a different approach, it is recommended to select three main classes that account for about 90% of the generation of biomedical waste in order to be practical. These three main types may be: • Sharps waste; • Cytotoxic and infectious wastes. • Hazardous or infectious HCW can be treated to a degree of hazard / infectiousness that is deemed acceptable. • Organic wastes (blood and bodily fluid wastes, human anatomical waste).

6. Treatment

They are therefore disposed of with regular solid trash after treatment by following the non-risk HCW stream. Additionally, they can be disposed of immediately in sanitary landfills or by burning.

A GUIDELINE FOR BIOMEDICAL WASTE MANAGEMENT

In accordance with the terms of the Environment Act of 1986, the Indian government's Ministry of Environment and Forests published the Bio-Medical Waste (Management and Handling) Rules on July 27, 1998. To protect the environment, the public, employees, and patients, these regulations have been designed to control how different types of biomedical waste are disposed of. The regulations have been changed on occasion; at the moment, they are being amended, and this section will be appropriately updated.

The Bio-Medical Waste Management Policy's goals

The hospitals' biomedical waste management policy must accomplish the following overarching goals: -

(i) Establish a system for managing hazardous and possibly infectious waste in accordance with the recommendations and requirements of the Biomedical Wastes (Management and Handling Rules) 1998.

(ii) Determining, characterising, and categorising the different waste types produced in hospitals. Utilising distinct containers with colour coding to segregate different waste kinds at the point of creation.

(iii) Separating different waste categories at the site of generation into containers with color-coded separators, ensuring that each category is handled appropriately to produce no harm.

(iv) Immediately following usage, disinfect/decontaminate contaminated objects at the point of generation.

(v) The proper "treatment technology" should be used on-site based on the waste category.

(vi) Establishing a framework in which all staff members and categories bear accountability and

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responsibility for effective waste management

(vii) Patient-friendly safety standards and the environment.

(viii) Deep burial disposal is only allowed in isolated or rural locations without access to a common biomedical waste treatment facility. This shall be executed in accordance with the Standards listed in Schedule-III and with prior authorization from the designated authority. The location of the deep burial facility must adhere to the rules and regulations that the Central Pollution Control Board periodically issues.

Cat.	Type of Bag/ Container used	Type of Waste	Treatment/Disposal options
Yellow 	non-chlorinated plastic bags Separate collection system leading to effluent treatment system	**a) Human Anatomical Waste** **b) Animal Anatomical Waste** **C) Soiled Waste** **d) Expired or Discarded Medicines** **e) Chemical Waste** **f) Micro, Bio-t and other clinical lab waste** **g) Chemical Liquid Waste**	Incineration or Plasma pyrolysis or deep burial*
Red 	non-chlorinated plastic bags or containers	**Contaminated Waste (Recyclable)** tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles) and gloves	Autoclaving/microwaving /hydroclaving and then sent for recyling not be sent to landfill
White 	(Translucent) Puncture, Leak, tamper proof containers	**Waste sharps including Metals**	Auto or Dry Heat Sterilization followed by shredding or mutiation or encapsulation
Blue 	Cardboard boxes with blue colored marking	**Glassware**	Disinfection or autoclaving, microwaving, hydroclaving and then sent for recycling

Figure1: Segregation of Biomedical Waste

RULES FOR THE HANDLING AND GETTING RID OF BIOMEDICAL WASTE

- **Incineration Standards.**

Health care wastes are often incinerated, a thermal procedure that reduces their organic and combustible content and thus reduces their volume and weight. The main goal is to reduce garbage to tiny particles and eliminate harmful organisms from it. Incinerators for medical waste typically run at temperatures between 900 and 12000 degrees Celsius. There are no leftover end products that may be disposed of or discharged into the atmosphere.

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- **Guidelines for Bio-Medical Waste Autoclaving.**

Before being disposed of in a conventional landfill or receiving additional treatment, autoclaves can be utilised as a heat treatment processing unit to eliminate germs. Biomedical waste needs to be treated and disinfected specifically with the autoclave. Medical waste must be exposed to a minimum of three pre-vacuum pulses when using a vacuum autoclave in order to completely remove any air from the device. To stop the discharge of pathogens, the air collected during the pre-vacuum cycle should be decontaminated using steam treatment, HEPA and activated carbon filtration, or any other technique. Until the time, temperature, and pressure indicators show that the necessary time, temperature, and pressure were attained throughout the autoclave procedure, medical waste cannot be said to have been appropriately treated. The entire load of medical waste has to be autoclaved again until the correct temperature, pressure, and residence time were attained if, for whatever reason, the time temperature or pressure indicator shows that the necessary temperature, pressure, or residence time was not obtained.

- **Microwave Standards**

Microwaving is a different method that uses steam and moist heat produced by microwave radiation to disinfect medical waste. These microwave therapy machines are available as mobile treatment trucks or as on-site installations.Points to Keep in Mind When Microwaving (1) Large metal objects, infected animal corpses, radioactive, poisonous, or toxic wastes cannot be treated with a microwave.(2) Before the limit is operated, the microwave system must pass the efficacy test or regular testing, and the provider may offer a performance warranty.

- **Guidelines for Chemical Disinfection Efficacy**

Chemical Cleansing: - Chemical agents are used in this procedure to disinfect. Although they can occasionally be applied to solid wastes as well, chemical disinfections are primarily suitable for liquid wastes. Waste is ground before being exposed to a chemical disinfectant. Grinding guarantees that trash is sufficiently exposed to the chemical agent, allowing the agent to come into contact with every portion of the waste. The liquid byproduct is subsequently disposed of in a landfill along with the remaining solid residue. The kind of microbe, the type of disinfectant, and the degree of contamination are only a few of the numerous variables that need to be taken into account for efficient utilisation.

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"Log10 kill," which is the difference between the logarithms of the number of test microorganisms before and after chemical treatment, is equivalent to the efficacy of microbial inactivation. In chemical treatment systems, chemical disinfection techniques must show at least a 4 Log10 decrease in Bacillus Subtilis (ATCC 19659).

- **Dry Heat Sterilisation Standards**

Dry heat sterilisation, which involves a sterilisation time of 90 minutes and a residence length of at least 150 minutes in each cycle, can be used to treat waste sharps. The temperature must be at least 1850C. An automated recording system must to be in place to keep an eye on operational parameters.

SUMMARY

Biomedical waste must be handled, separated, mutilated, cleaned, stored, transported, and disposed of finally in a safe and scientific manner in any context. The government's biomedical waste management rules should be strictly followed by all healthcare institutions.

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