



## BIOMEDICAL WASTE MANAGEMENT IN INDIA – A CONSORTIOUS APPROACH

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### ABSTRACT

The duty of all people supporting and financing healthcare activities is to manage safely and sustainably biomedical waste (BMW), so that it does not adversely affect the environment and society. In order to maintain a healthy and clean environment, effective management of Biomedical Waste is very crucial. This study has made an extensive review on the recent Biomedical Waste Management Rules, 2016, practical problems w.r.t effective implementation of rules and regulations with respect to Biomedical Waste (BMW), addressing major hindrances with respect to applying appropriate techniques and methods to be adopted for ejecting Biomedical Waste (BMW). The new rules and regulations are framed and structured in order to:

1. Improving the process of segregation, transportation, and disposal method.
2. Reducing level of environmental pollution and degradation thereby making dynamic change in the disposal of BMW and its process of treatment in India.

Collaborative teamwork should be done with government support in order to develop from the perspective of:

1. Finance
2. Infrastructure
3. Providing facilities for healthcare workers for their safety
4. Continuous Monitoring of Biomedical Waste Disposal Practices

**KEYWORDS :** Biomedical Waste, changes, India, challenges

### INTRODUCTION:

Biomedical wastes (BMW) are those kinds of unavoidable wastes which are produced in the process of the detection, ministration or inoculation of human and animals' research activities in the course of biological and health testing.

The basic principle behind adopting "Biomedical Practice" is based on 3R's which involves: R=Reduce, R=Recycle and R=Reuse.

The basic objectives behind adopting Biomedical Waste Management (BMWM) method are

- To avoid generation of excessive waste
- Possible steps to be taken in order to recover/ recycle as much as possible rather disposing the same

Different methods can be adopted in order to dispose of Biomedical Waste (BMW) which involves: Preventing, Reducing, Reusing, Recycling, Recovering, Treating and finally disposing of the same. Hence, waste should be managed at the very beginning instead of managing it at the end.

As per the study, it has been observed that a particular percentage of Biomedical Waste is hazardous which involves certain categories of risk to the people and health care workers who are associated with handling, treatment and disposal of waste on one hand whereas remaining is non-hazardous on the other hand.

### International Agreements and Convention:

There are three international agreements and conventions which involves:

#### 1) Basel Convention on Hazardous Waste:

The basic objectives behind this treaty are to:-

- a. Protect health and wellbeing of people
- b. Protect the environment against the process of dealing with hazardous waste which may adversely affect the same.

#### 2) Stockholm Convention on Persistent Organic Pollutants:

The basic objective behind this treaty was to safeguard the wellbeing of humans and people from Persistent Organic Pollutants (toxic chemicals formed by biomedical waste incinerators and other combustion processes which cause harmful damages among living organisms).

#### 3) Mina-Mata Convention on Mercury

The basic objective was to protect the wellbeing of humans and the environment from the dreadful impact of mercury. It excludes excessive usage of medical equipment in health care services.

### Scenario of Biomedical Waste in India

The first Bio-Medical Waste Rules were notified for the first time in the month of July 1988 by the Ministry of Environment and Forest (Government of India).

In India Biomedical Waste problems get more complicated due to ignorance and absence of awareness which involves usage of unprotected gloves, masks or shoes and re-use of syringes without sterilizing properly. Adequate measures should be taken in order to

- To strengthen capacity of existing system
- To increase funding capacity in order to dispose BMW safely
- Adherence towards safe disposal of BMW thereby eroding hazardous substances

Extensive efforts are required in order to improve the procedures which involves:

- Step 1: Collection of Waste from all sources
- Step 2: Segregation of Waste
- Step 3: Transportation of Waste which has been segregated
- Step 4: Disposal of Waste

### Striking Attributes of Biomedical Waste Rules 2016: -

1. Certain modifications have been made with respect to rules which involve setting up various health camps related to vaccination and blood donation.

2. Certain factors need to be taken into consideration with respect to Biomedical Waste which involves:

- a) Mandatory pretreatment should be given to the laboratory wastes, microbiological waste, blood bags before disposal either on site at CBMWTF.
- b) The extensive usage of chlorinated plastic bags, gloves, blood bags etc. should be gradually put to an end and such termination should be done within the prescribed period of time from the date of notification of these rules.
- c) To provide adequate training and protection to the Health Care Workers against diseases such as Hepatitis B and Tetanus by immunization.
- d) Liquid waste items should be segregated at the initial phase of pre-treatment before mixing the same with other liquid waste.
- e) The Barcode system should be set specifically for Biomedical Waste which will be radiated out of the premises for treatment and disposal.
- f) Remedial actions should be taken by prescribed authority against major accidents that take place while dealing with Biomedical Waste and such actions must be reported on time by appropriate authority.

g) Biomedical Waste Disposal Register to be maintained on daily basis and the same should be updated on monthly basis on the website.

3. Role of Operators: Operators plays an important role with respect to -
- Providing **adequate training to Health Care Workers** regarding places from where waste to be collected.
  - Establishing System of Barcoding and Global Positioning** in order to handle Biomedical Waste within prescribed time.
  - Proper Records** should be maintained with respect to operations.

4. If CBM WTF is present **within 75 kilometers** then it is not possible to set up a proper on-site BMWF for disposal and treatment purposes.

5. Appropriate standards framed specifically for "Emission from Incinerators" in order to make it more ecofriendly.

6. This rules setup by the Central Government will be monitored and implemented by setting up committees at district levels under the chairmanship of District Collector or Magistrate. The committee formed at the district level will submit the report to appropriate authority every 6 months.

#### Benefits of New Bio-Medical Waste Rules:

Major steps have been taken in case of proper Packaging, Transportation, Segregation and Dissemination of BMW wastes. To make the segregation process easy for health care workers in case of BMW, the categorization has been reduced to four so that the health care workers can easily do the given tasks will full concentration because the segregation of BMW has to be done at the time of collection at the initial phase so that it does not create any harmful reactions. To make the segregation process more convenient for HCWs the color coding bin bags has been introduced so that it will be very easy for HCWs to segregate the BMW at the source.

Example - Such a yellow bin bag is to be used to store any chemical solid waste and cytotoxic waste which directly goes for incineration/deep burial treatment. Red color bin bags are used for Non-Chlorinated plastic bags or containers. Blue bin bags are used for contaminated glass. White bin bags are used for sharp waste materials including metals. The BMW stored in red/blue bin bags or containers is to be sent to authorized recyclers agents for recycling the same. This new rule has given greater focus on recycling the wastes in proper manner so as to reduce pollution from these into the environment.

#### Challenges w.r.t Implementation of New Bio-Medical Waste Rules:

Major problem that Government Hospitals and Small Health Care Facilities observed while implementing and executing rules related to Bio-medical Waste was shortage of adequate funds. Huge costs as well time will be required in order to suspend usage of plastic bags, gloves, blood bags and establishment and execution of the Bar Code system.

Currently In India, there are various biomedical waste facilities available which are under operations and operation. Hence, there is an urgent need for treatment and disposal of Biomedical Waste in order to deal with pollutants which are hazardous in nature.

#### About Incinerator and its Threats:

**Burning Waste** was only key with respect to disposal of Bio Medical Waste. First Biomedical Waste Rule was implemented in the late 1990. India in the late 1990 observed a boom in the number of incinerators being applied. The basic objective behind installing an incinerator is to kill pathogens and procedures that are required to be followed in order to destroy materials in which microbes exist.

#### Threats With Respect To Emission Of Dioxin During Incinerator Operation:

Burning of biomedical waste consisting of **Polyvinyl Chloride (PVC)** which act as a catalyst for formation of dioxin which are very toxic and in turn causes endocrine and immune damage among human beings. Ash generated from Incinerator is hazardous and certain requirements need to be evaluated in order to ascertain the level of toxin.

#### Alternative Technology for Biomedical Waste Disposal:

There are various practices followed in order to deal and manage with Biomedical Waste which has been categorized into:

- Disinfection efficacy of the treatment process
- Low heat treatment systems

- Autoclaving
- Microwave Irradiation
- Chemical Methods

#### 1) Disinfection efficacy of the treatment process-

It involves 4 levels of treatment which includes:

- Low Level Disinfection
- Intermediate Level Infection
- High Level Disinfection
- Sterilization

#### 2) Low Heat Treatment System-

The basic purpose behind this treatment technology is to decontaminate waste by destroying pathogens provided certain criteria should be met for disinfection.

#### 3) Autoclaving:

This is the low heat thermal process where steam is taken in direct contact with waste in a controlled manner in order to disinfect the waste.

#### 4) Microwave Irradiation:

It is a heating process where all infectious components get destroyed by heat conduction.

#### 5) Chemical Methods:

This is a method used in order to destroy microorganisms that exist on medical equipment and on floors and walls. This treatment or method acts as a disinfection rather than sterilization as this is more suitable for liquid waste purposes which involves blood, stool, or hospital sewage. Chemical Technology/ Method has been developed specifically for health care waste .This technology can be used for commercial purposes.

#### CONCLUSION:

Biomedical Waste Management should be a collaborative effort with Government support and guidance in order to conduct good medical practices which should be monitored by health care workers in order to provide good health care facilities. Biomedical Waste Management Rules, 2016 have been modified in order:

- to make certain modifications in the process of dealing with bio-medical waste and reducing level of environmental pollution
- Appropriate safety measures to be taken by staffs, patients and public at large
- Preference should be given towards usage of medical devices which does not involve PVC (Polyvinyl Chloride)
- Novel environmental friendly systems should be developed in order to safely dispose of Biomedical Waste.

In order to manage Bio-Medical Waste, all participants should work together in order to give assurance for making a clean and free environment.

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