Legal Aspects and Process of Biomedical Waste Management Practices in India

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Abstract

Biomedical waste management plays an important role in safe guarding environment and human health. Many hospital and small nursing home ignores this very important aspect. This article deals with legal aspects of the biomedical waste management, starts from Environment protection act, 1986, followed by biomedical waste (management & handling) rules, 1998. The other part of the article deals with the process and composition of the BMW.

Key words: Biomedical waste management, BMW regulations, BMW management plans

Introduction

Bio Medical Waste (BMW) means any waste generated during diagnosis, treatment or immunization of human beings, animals etc. This medical waste management concept has recently emerged as an important issue and concern to the hospitals, Governments, individuals and to the Environment. The proper management of medical waste has become a worldwide topic. The Biomedical waste (Management and Handling) rules, 1998 says "Any waste which is generated during the diagnosis, treatment or immunization of human or in research activities pertaining thereto or in the production or testing of biological". It also says that it is a part of hospital hygiene and maintenance activity. Bio medical waste poses hazards due to two important reasons one is infectivity and other is toxicity.

World Health Organization (WHO) says, 85% of hospital wastes are non hazardous, and 10% are infectious, other 5% are non infectious. Biomedical waste consist of human anatomical waste like tissues, organs and body parts, animal wastes from veterinary hospitals, microbiology and biotechnology wastes, sharps like needles, syringes, and broken glass, Discarded medicines, solid waste items, liquid wastes.

Classification of Biomedical Waste

The World Health Organization (WHO) classified this into eight categories like 1) General waste 2) Pathological waste 3) Radioactive waste 4) Chemical waste 5) Infectious waste 6) Sharps 7) Pharmaceutical waste 8) Pressurized containers

Sources of Biomedical waste

Primary source of biomedical waste are Hospital, nursing homes, veterinary hospitals, clinics, dispensaries, blood banks and research institutions. Other sources include households industries, education institutions and research institutions.

Legal Aspect of BMW

The Environment Protection Act, 1986

This act made various rules and guidelines under sections 6, 8 & 25. Based on this the Biomedical wastes (management & handling) Rules, 1998 was formulated. Of this,
Sec. 3: Facilitates Government authority to undertake various steps for protection and improvement of environment
Sec. 5: Provides for issuance of direction in writing
Sec. 6: empowers the governments to make rules
Sec. 8: Education of individuals dealing with hazardous waste regarding safety measures
Sec. 10: Permits authorities to enter the premises and inspect
Sec. 15: Government can take steps against defaulters
Sec. 17: Punishment in case of violations by government departments

Biomedical waste (Management & Handling) Rules 1998

In accordance with this rules, it is the duty of every "occupier" i.e., a personwho has the control over the institution or its premises, to take all steps to ensure that waste generated is handled without any adverse effect to human health and environment.
The hospitals have to set up their own facilities within the time frame (Schedule VI) or ensure the medical waste treatment at a common waste treatment facility.

The state governments shall require establishing a prescribed authority for this purpose.

The respective governments would also constitute advisory committees to advise the governments in this matter. This rules amended in 2000 & 2003. This consists of Six schedules.

Table: Six Schedules

SCHEDULE	CONSIST
Schedule I	Categories of biomedical waste
Schedule II	Colour coding, type of container for BMW
Schedule III	Label for transport of biomedical waste bags/containers
Schedule IV	Bill for transport of biomedical waste bags/containers
Schedule V	Standards for treatment and disposal of BMW
Schedule VI	Schedule for BMW treatment facilities

SCHEDULE I

Categories of Biomedical Waste

Waste Category No	Waste Category	Treatment and Disposal
Category No.1	**Human Anatomical Waste** (human tissues, organs, body parts)	Incineration/deep burial
Category No.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)	Incineration/deep burial
Category No.3	**Microbiology & Biotechnology Wastes (**wastes from laboratory cultures, stocks or specimens of 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, dishses and devices used for transfer of cultures)	local autoclaving / micro-waving/ incineration
Category No.4	**Waste sharps (**needles, syringes, scalpels, blades, glass etc. that may cause puncture and cuts. This includes both used and unused sharps)	disinfection (chemical treatment/auto claving/ microwaving and multilation /shredding

Category No.5	**Discarded Medicines and Cytotoxic drugs** (wastes comprising of outdated, contaminated and discarded medicines)	incineration/destruction and drugs disposal in secured landfills
Category No.6	**Soiled Waste** (Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines beddings, other material contaminated with blood	incineration / autoclaving/microwaving
Category No.7	**Solid Waste** (wastes generated from disposable items other than the waste sharps such as tubings, catheters, intravenous sets etc.)	disinfection by chemical treatment/autoclaving/ microwaving and mutilation/shredding
Category No.8	**Liquid Waste** (waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities)	Disinfection by chemical treatment and discharge into drains.
Category No.9	**Incineration Ash** (ash from incineration of any bio-medical waste)	disposal in municipal landfill
Category No.10	**Chemical Waste** (chemicals used in production of biologicals, chemicals used in disinfection, as insecticides etc)	Chemical treatment and discharge into drains for liquids and secured landfill for solids

Source: The Bio-Medical Waste (Management and Handling) Rules, 1998 - tnp

SCHEDULE II

Colour Coding and Type of Container for Disposal of Bio-Medical Wastes

Colour Coding	Type of Container	Waste Category	Treatment options as per Schedule I
Yellow	Plastic bag	Cat.1, Cat.2, Cat.3, Cat. 6	Incineration/deep burial
Red	Disinfected container/plastic bag	Cat.3, Cat.6, Cat.7	Autoclaving/Microwaving/ Chemical Treatment
Blue/White translucent	Plastic bag/puncture proof container	Cat.4, Cat.7	Autoclaving/Microwaving/ Chemcial Treatment and destruction/shredding
Black	Plastic bag/puncture proof container	Cat.5 and Cat.9 and Cat10 (Soli)	Disposal in secured landfill

SCHEDULE III

Label for Bio-Medical Waste Containers/Bags Biohazard Symbol

Cytotoxic Hazard Symbol

SCHEDULE IV

Label for Transport of Bio-Medical Waste Containers

Day…… Month……
Year …… Date of generation……
Waste category No……
Waste Class
Waste description
Sender's Name & Address
Receiver's Name & Address
Phone No……
Phone No……
Telex No……
Telex No……
Fax No……
Fax No……
Contact Person……
Contact Person……
In case of emergency please contact: Name & Address Phone No

SCHEDULE V

Standards for Treatment and Disposal of Bio-Medical Wastes

All incinerators shall meet the following operating and emission standards:

A. Operating Standards

1. Combustion efficiency (CE) shall be at least 99.00%.
2. The Combustion efficiency is computed as follows:

$$C.E. = \frac{\%CO_2}{\%CO_2 + \%CO} \times 100$$

3. The temperature of the primary chamber shall be 800 ± 50c°.
4. The secondary chamber gas residence time shall be at least 1 (one) second at 1050 ± 50c°, with minimum 3% Oxygen in the stack gas.

B. Emission Standards

	Parameters	Concentration mg/Nm³ at (12% CO_2 correction)
(1)	Particulate matter	150
(2)	Nitrogen Oxides	450
(3)	HCl	50

(4) Minimum stack height shall be 30 metres above ground.
(5) Volatile organic compounds in ash shall not be more than 0.01%.

Note:

- Suitably designed pollution control devices should be installed/retrofitted with the incinerator to achieve the above emission limits, if necessary.
- Wastes to be incinerated shall not be chemically treated with any chlorinated disinfectants.
- Chlorinated plastics shall not be incinerated.
- Toxic metals in incineration ash shall be limited within the regulatory quantities as defined under the Hazardous Waste (Management and Handling) Rules, 1989. Only low sulphur fuel like L.D.O./L.S.H.S./Diesel shall be used as fuel in the incinerator & etc.

SCHEDULE VI

Schedule for Waste Management Facilities like Incinerator/Autoclave/Microwave System

A. Hospitals and nursing homes in towns with population of 30 lakhs and above	By 30th June, 2000 or earlier
B. Hospitals and nursing homes in towns with population of below 30 lakhs - with 500 beds and above with 200 beds and above but less than 500 beds. With 50 beds and above but less than 200 beds With less than 50 beds	 By 30th June, 2000 or earlier By 31st December, 2000 or earlier By 31st December, 2001 or earlier By 31st December, 2002 or earlier
C. All other institutions generating bio-medical waste not included in A and B above.	By 31st December, 2002 or earlier

Source: The Bio-Medical Waste (Management and Handling) Rules, 1998 - tn

Process of Biomedical waste management

The hospital industry is one of the growing industries in India. The hospital wastes like body parts, organs, tissues, blood and body fluids, cottons, bandage are very important and essential items to be properly collected, segregated, stored, transported, treated and disposed of in proper manner. The process includes waste collection, segregation, transportation and storage, treatment & disposal.

Composition of Biomedical Waste

Segregation

Segregation refers to the basic separation of different categories of waste generated at source, which leads to reducing the cost of handling and disposal. This is most important step in bio medical waste management process. The effective segregation

helps to prevent the mixture of medical waste & municipal waste. It also provides an opportunity for recycling certain items.

Collection

It involves use of different types of container from various sources like operation theatre, laboratory, hospital wards, kitchen, etc. The bins colour coded are in table 2

Table 2: Colour Coding of bins

Colour Coding	**Waste**
Yellow	Human Anatomical waste, Animal waste, Micro biology & biotechnology waste, item contaminated with blood & body fluids
Red	Micro biology & biotechnology waste, item contaminated with blood & body fluids
Blue/White	Sharps, solid wastes
Black	Discarded medicines & drugs, Incineration ash, chemical waste

Storage

If the proper collection done with the colour coded bins, the biomedical waste is stored in a proper place. The duration of storage should not more than 8 – 10 hrs for multi speciality hospitals and 24 hrs for nursing homes.

Transportation

This biomedical waste must be transported for treatment centers by trolleys or by the vans. Manual loadings should be avoided. The transport containers must properly enclose. There should not be any spillage form the container or from the van. The vehicle should also be possible to wash the interior of the inner container.

BMW treatment technologies

There are different types of treatment technology for each category of biomedical wastes. They are a) Incineration method, b) Autoclave treatment, c) Hydroclave treatment, d) Microwave treatment e) Chemical disinfecting f) Land filling g) General waste handling. These methods were used to treat the biomedical wastes.

Findings

The safe management of the biomedical waste is received much attention in the recent years. The importance have to given for the proper handling of the waste. More education and awareness must be given to the waste handlers in the hospitals and in the nursing homes. Hospitals must introduce the waste minimization process and the recycling, reuse technology. Small hospitals must avoid throwing the biomedical waste in common places or in the municipal waste bins or paces.

Conclusion

The proper bio medical waste management system will lead to the better environment and the control of spread of disease in the environment. Keeping these valuable factors in mind, hospitals have to follow the legal aspects.

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