

# An Overview of Hospital Bio-medical Waste Management in India

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**Abstract:** Hospitals' commitment to patient care and community health has been cited to paradoxically defy their own objectives. On one hand, they cure patients and on the other, have emerged as a source of several diseases. Hospital waste is of special kind of waste. By the nature of its origin, hospital waste can become a health hazard and in extreme cases a source of the epidemic. In order to provide for better management of hospital waste the Bio-medical (Handling and Management) Rules, 1998 were notified under the Environment Protection Act, 1986. The problem of hospital waste is more of quality as compared to quantity. It has been computed by the WHO that the average waste generated by hospitals in developed countries is in the range of 1-5 kg/bed/day, in comparison, the average for developing countries is between 1 to 2 kg/bed/day. This calls for coordination between all hospital departments that generate waste and agencies employed for the segregation, collection, transportation, treatment, and disposal of waste.

**Key Words:** — *Biomedical waste, Biohazards, Colour codes, Autoclaving, Disposal of waste.*

## I. INTRODUCTION

Hospital waste management is a scientific system that handles the segregation, containment, and disposal of hazardous hospital-generated waste materials. It is a small generated waste that has a very high potential for infection and injury.<sup>1</sup> Only about 10%–25% of BMW is hazardous, and the remaining 75%–95% is non-hazardous (F). As there is rapid expansion in the health set-ups there is increasing production of hospital waste. By the nature of its origin, hospital waste can become a health hazard and in extreme cases a source of an epidemic.<sup>2</sup> So, there is an urgent need for coordination between all hospital departments that generate waste and agencies employed for the segregation, collection, transportation, treatment, and disposal of waste.<sup>3</sup> This is even more important in the Covid -19 pandemic situation.<sup>4</sup>

Health-care waste management in India undergoes changes since the introduction of the Biomedical Wastes (Management & Handling) Rules, 1998.<sup>5</sup> The waste generation rate ranges between 0.5 and 2.0 kg bed<sup>-1</sup> day<sup>-1</sup>. It is estimated that annually about 0.33 million tons of waste are generated in India.<sup>6</sup>

### 1.1 History of Medical Waste Management in India

After the year 1980, hospital waste was considered a serious issue, especially HIV and Hepatitis B infected materials which can be a potential risk factor to other patients. This concept of biomedical waste management is new in India; it came into the limelight recently after the notification of Bio-Medical Waste (BMW) (Management and Handling) Rules 1998.

The hospital waste attracted more attention to the Supreme Court when a writ petition was filed under Article 32 of the Constitution against the concerned authorities to provide a clean and healthy environment.<sup>7</sup> All hospitals with a minimum of 50 beds should install incinerators or any other effective alternative, incinerators should be fitted with a pollution control mechanism conforming to the standards laid down by the central pollution control board, which was asked to regularly monitor the collection, transportation, and disposal of waste.

The central government of India introduced Bio-Medical Waste Management Rules, 2016 on 28<sup>th</sup> March 2016. The ambit of the rules has been expanded to include vaccination camps, blood donation camps, surgical camps, or any other healthcare activity.<sup>8</sup>

### 1.2 Amendments in Bio-Medical Waste Management Rules 2016

These rules were amended to improve compliance and strengthen the implementation of environmentally sound management of biomedical waste in India.

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It is known as Bio-Medical Waste Management (Amendment) Rules, 2018 vide Notification G.S.R. 234(E) dated March 16, 2018.<sup>8</sup> Some important features of Bio-Medical Waste Management (Amendment) Rules, 2018 are as follows:<sup>8</sup>

- Bio-medical waste generators including hospitals, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological laboratories, blood banks, health care facilities, and clinical establishments will have to phase out chlorinated plastic bags (excluding blood bags) and gloves by March 27, 2019.
- All healthcare facilities shall make available the annual report on its website within a period of two years from the date of publication of the Bio-Medical Waste Management (Amendment) Rules, 2018.
- Operators of common bio-medical waste treatment and disposal facilities shall establish bar coding and global positioning system for handling of bio-medical waste in accordance with guidelines issued by the Central Pollution Control Board by March 27, 2019.
- The State Pollution Control Boards/ Pollution Control Committees have to compile, review and analyze the information received and send this information to the Central Pollution Control Board in a new Form (Form IV A), which seeks detailed information regarding district-wise bio-medical waste generation, information on Health Care Facilities having captive treatment facilities, information on common bio-medical waste treatment and disposal facilities.
- Every occupier, i.e. a person having administrative control over the institution and the premises generating biomedical waste shall pre-treat the laboratory waste, microbiological waste, blood samples, and blood bags through disinfection or sterilization on-site in the manner as prescribed by the World Health Organization (WHO) or guidelines on the safe management of wastes from health care activities and WHO Blue Book 2014 and then sent to the Common bio-medical waste treatment facility for final disposal.

## II. CATEGORIES OF BIOMEDICAL WASTE

They are divided into the following categories: -

- CATEGORY – 1: Human Anatomical Waste such as human tissues, organs, body parts, etc. They can be disposed of by incineration or deep burial. \*
- CATEGORY – 2: Animal Waste such as animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood, and experimental animals used in research, waste generated by veterinary hospitals, etc. They can be disposed of by incineration or deep burial. \*
- CATEGORY – 3: Microbiology and Biotechnology Wastes such as wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, etc. Autoclaving, microwaving or incineration are available means of their disposal.
- CATEGORY – 4: Waste sharps such as needles, syringes, scalpels, blades, glass, etc. They must be disposed of after disinfection, autoclaving, and microwaving followed by shredding to prevent re-use.
- CATEGORY – 5: Discarded Medicines and Cytotoxic drugs such as wastes comprising of outdated, contaminated and discarded medicines. Disposed of by incineration.
- CATEGORY – 6: Soiled Waste such as items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines beddings, etc. Disposed of by incineration, microwaving, or autoclaving.
- CATEGORY – 7: Solid Waste such as wastes generated from disposable items such as tubing, catheters, intravenous sets etc. Disposed of after disinfected with chemical, autoclaving or microwaving.
- CATEGORY – 8: Liquid Waste such as waste generated from laboratory and washing, cleaning, housekeeping, and disinfecting activities, etc. Disposed of after disinfected with chemical and drains into a drainage.
- CATEGORY – 9: Incineration Ash such as ash from incineration of any bio-medical waste. Disposal into municipal landfill.

- **CATEGORY – 10:** Chemical Waste such as chemicals used in the production of biomedical, chemicals used in disinfection, insecticides, etc. Can be disposed of after being disinfected with chemicals and discharge into drains for liquids and secured landfill for solids.

NB\*: Deep burial shall be an option available only in towns with population less than five lakhs and in rural areas.

### III. COLOR CODING OF CONTAINERS

Biological waste materials as stated above must be segregated and stored in the following different colored containers.

- **YELLOW CONTAINER:** All human anatomical waste, animal waste microbiology, wastes from the laboratory cultures, etc., and soiled wastes such as cotton, bandages, and items contaminated with blood and body fluid, etc. (Fig No.1).
- **RED CONTAINER:** All solid waste-infected such as plastic wastes generated from disposable items other than the waste sharps such as tubing, catheters, intravenous sets, plastic syringes, etc. (Fig No.2)
- **BLUE CONTAINER:** Glass items such as vials, ampules, other glass wares, etc. (Fig No.3).
- **BLACK CONTAINER:** Discarded medicines, cytotoxic drugs are to be stored in black container. (Fig No.4).
- **WHITE CONTAINER:** Sharps needles, scalpels, blades, etc. This container must be puncture-proof. (fig. No.5).

Any non-infectious waste materials should not be put into a container meant for bio-medical waste. Rather such materials may be put into a separate container which may be coded as GREEN CONTAINER (Fig No.6).

#### 3.1 Label for Biological Waste Containers

The waste containers must be properly labeled before the waste goes into them. The words "Biohazard Waste"; or international biohazard symbol and the word "Biohazard" etc. must be there on each container. The commonly used symbols of bio-medical waste are shown in Fig No.7. & Fig No. 8.



Fig No.1(Yellow container); Fig No.2 (red container); Fig No.3 (Blue container); Fig No.4 (Black container); Fig No.5 (White container); Fig No.6 (Green container); Fig No. 7. (Biohazard); Fig No.8 (Cytotoxic hazard)

### IV. CONCLUSION

- Injuries from sharps instruments to hospital personnel and waste handlers.
- Increase in hospital-acquired infection in patients from poor infection control practices.
- Risk of infection outside the hospital among waste handlers and scavengers.
- There is a chance of reuse of discarded or disposable items by unscrupulous traders.
- Chemical injury from toxic, corrosive, flammable, reactive and genotoxic waste, Radiation injury due to exposure to vials and accessories contaminated with radioactive spills, radium stores and isolation room in nuclear medicine.
- There is an increased chance of environmental contamination & pollution.

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