



## A Review - An Emerging issue of Biomedical Waste Management System in Hospitals

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### ABSTRACT

Medical care is vital for our life and health. All human activities produce waste. We all know that such waste may be dangerous and needs safe disposal. HCWM (Health care waste management) is first of all a management issue before being a technical one and therefore completely depend on the commitment of the entire staff within HCFs. This dedication will only be possible if people are first of all properly trained and made aware of the risks that this particular type of waste poses. Industrial waste, sewage and agricultural waste pollute water, soil and air. It can also be dangerous to human beings and environment. Similarly, hospitals and other health care facilities generate lots of waste which can transmit infections, particularly HIV, Hepatitis B & C and Tetanus, to the people who handle it or come in contact with it.

India generates around three million tonnes of medical wastes every year and the amount is expected to grow at eight per cent annually.

According to Biomedical Waste (Management and Handling) Rules, 1998 of India "Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biological. Biomedical waste poses hazard due to two principal reasons – the first is infectivity and other toxicity.

**CONCLUSION :** Medical wastes should be classified according to their source, typology and risk factors associated with their handling, storage and ultimate disposal. The segregation of waste at source is the key step and reduction, reuse and recycling should be considered in proper perspectives. We need to consider innovative and radical measures to clean up the distressing picture of lack of civic concern on the part of hospitals and slackness in government implementation of bare minimum of rules, as waste generation particularly biomedical waste imposes increasing direct and indirect costs on society. The challenge before us, therefore, is to scientifically manage growing quantities of biomedical waste that go beyond past practices. If we want to protect our environment and health of community we must sensitize our selves to this important issue not only in the interest of health managers but also in the interest of community.

**KEYWORDS :** HCWM, Biomedical waste, Human tissue/organ

### Classification of Bio-Medical Waste

CATEGORIES OF BIOMEDICAL WASTE SCHEDULE – I		
WASTE CATEGORY	TYPE OF WASTE	TREATMENT AND DISPOSAL OPTION
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 and colleges, discharge from hospitals, animal houses)	Incineration/ deep burial*
Category No. 3	Microbiology & Biotechnology Waste (Wastes from laboratory cultures, stocks or specimen of live micro organisms or attenuated vaccines, human and animal cell cultures used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins and devices used for transfer of cultures)	Local autoclaving/ microwaving / 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)	Disinfecting (chemical treatment / autoclaving / microwaving / shredding)
Category No. 5	Discarded Medicine 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 body fluids including cotton, dressings, soiled plaster casts, lines, bedding and other materials contaminated with blood.)	Incineration / autoclaving / microwaving
Category No. 7	Solid Waste (Waste generated from disposable items other than the waste sharps such as tubing, catheters, intravenous sets, etc.)	Disinfecting by chemical treatment / autoclaving / microwaving and mutilation / shredding
Category No. 8	Liquid Waste (Waste generated from the laboratory and washing, cleaning, house keeping and disinfecting activities)	Disinfecting by chemical treatment and discharge into drains
Category No. 9	Incineration Ash (Ash from incineration of any biomedical waste)	Disposal in municipal landfill
Category No.10	Chemical Waste (Chemicals used in production of biological, chemicals used in disinfecting, as insecticides, etc.)	Chemical treatment and discharge into drains for liquids and secured landfill for solids.

### COLOUR CODING AND TYPE OF CONTAINER SCHEDULE II

Colour Coding	Type of Container	Waste Category	Treatment options as per Schedule I
Yellow	Plastic bag	Cat.1,Cat.2, Cat.3 and Cat.6	Incineration/ deep burial
Red	Disinfected container/ plastic bag	Cat.3, Cat.6, and Cat.7	Autoclaving/Micro waving/ Chemical Treatment
Blue/ White Translucent	Plastic Bag/ puncture proof container	Cat.4 and Cat.7	Autoclaving/Micro waving/ Chemical Treatment and destruction/ shredding
Black	Plastic bag	Cat.5, Cat.9, and Cat.10 (solid)	Disposal in secured landfill

**Sources of Biomedical Waste:** Govt. hospitals/private hospitals/nursing homes/ dispensaries, Primary health centres, Medical colleges and research centres/paramedic services, Veterinary colleges and animal research Centres and Blood banks/mortuaries/autopsy centres are the major sources.

#### **Risks associated with bio medical waste**

All individuals exposed to hazardous biomedical waste are potentially at risk of being injured or infected. They include:

- Medical staff: doctors, nurses, sanitary staff and hospital maintenance personnel;
- In- and out-patients receiving treatment in health-care facilities as well as their visitors;
- Workers in support services linked to health-care facilities such as laundries, waste handling and transportation services;
- Workers in waste disposal facilities, including scavengers;
- The general public and more specifically the children playing with the items they can find in the waste outside the health-care facilities when it is directly accessible to them.

During handling of wastes, the medical and ancillary staff as well as the sanitary labourers can be injured if the waste has not been packed safely. Many injuries occur because syringe needles or other sharps have not been collected in safety boxes or because these have been overfilled. On dumpsites, scavengers during their recycling activities may also come in contact with infectious waste if it has not been properly treated or disposed of. The general public can be infected by it either directly or indirectly through several routes of contamination. Dumping in open areas is a practice that can have major adverse effects on the population.

#### **Biomedical Waste Management Process**

There is a big network of Health Care Institutions in India. The hospital waste like body parts, organs, tissues, blood and body fluids along with soiled linen, cotton, bandage and plaster casts from infected and contaminated areas are very essential to be properly collected, segregated, stored, transported, treated and disposed of in safe manner to prevent nosocomial or hospital acquired infection.

**1. Waste collection:** The collection of biomedical waste involves use of different types of container from various sources of biomedical wastes like Operation Theatre, laboratory, wards, kitchen, corridor etc. The containers/ bins should be placed in such a way that 100 % collection is achieved. Sharps must always be kept in puncture-proof containers to avoid injuries and infection to the workers handling them.

**2. Segregation:** Segregation is one of the most important steps in managing the biomedical waste. Segregating hazardous from non-hazardous waste reduces also greatly the risks of infecting workers handling biomedical waste.

**3. Transportation and storage:** In order to avoid accumulation of the waste, it must be collected on a regular basis and transported to a central storage area before being treated. The waste should be transported for treatment either in trolleys or in covered wheelbarrow. Manual loading should be avoided as far as possible. The bags / Container containing BMWs should be tied/ lidded before transportation. Before transporting the bag containing BMWs, it should be accompanied with a signed document by Nurse/ Doctor mentioning date, shift, quantity and destination. Besides this, storage area should be marked with a caution sign.

**4. Treatment & Disposal:** Health care waste is a heterogeneous mixture, which is very difficult to manage as such. But the problem can be simplified and its dimension reduced considerably if a proper management system is planned.

**Incineration:** This is a high temperature thermal process employing combustion of the waste under controlled condition for converting them into inert material and gases.

**Non-Incineration:** Non-incineration treatment includes four basic processes thermal, chemical, irradiative, and

biological. The majority of non-incineration technologies employ the thermal and chemical processes. The main purpose of the treatment technology is to decontaminate waste by destroying pathogens.

**Autoclaving:** The process involves using steam at high temperatures. The steam generated at high temperature

penetrates waste material and kills all the micro organism.

**Microwave Irradiation:** The microwave is based on the principle of generation of high frequency waves. These waves cause the particles within the waste material to vibrate, generating heat. This heat generated from within kills all pathogens.

**Chemical Methods:** 1 % hypochlorite solution can be used for chemical disinfection.

**Plasma Pyrolysis:** Plasma pyrolysis is a state-of-the-art technology for safe disposal of medical waste. It is an environment-friendly technology, which converts organic waste into commercially useful by products. The intense heat generated by the plasma enables it to dispose all types of waste including municipal solid waste, biomedical waste and hazardous waste in a safe and reliable manner.

**Conclusion:** first page