

Bio-Medical & Health Care Waste Management in India

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Abstract

The Bio Medical and Health Care waste management is very different from other house waste or industries waste management. The different types of methods are involved to handle to dispose, treat and disinfectant and deep burial is done. There is certain rule for worker and treatment of waste is mandatory in India.

KEYWORDS: Bio- Medical – Health Care Waste, Dioxin- Furan, Rules

INTRODUCTION

The Biomedical Waste Management the disposal of biomedical wastes and lays down the procedures for collection treatment and disposal and standards to be complied with. These rules apply to all person who generate, collect, receive store, transport, and treat or handle biomedical wastes in any form. Biomedical wastes mean any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities etc.

The mode of disposal specified is dependant on the type of wastes, and various methods of disposal are used such as Incineration, micro-waving, autoclaving, disinfecting and deep burial. This, therefore, makes biomedical waste treatment different from other types of pollutions, as each establishment required different expertise and resources to handle the waste generated.

The biomedical waste management rule was notified in 1998 in India.

SOURCES OF HEALTH – CARE WASTE

The institution involved in generation of bio-medical waste is:

- Government Hospitals
- Private Hospitals
- Nursing homes
- Physician's office/clinics
- Dentist's office/clinics
- Dispensaries
- Primary health centers
- Medical research and training establishments
- Mortuaries
- Blood Banks and collection Centers
- Animal houses

- Slaughter houses
- Laboratories
- Research Organizations
- Vaccinating Centers
- Bio-Technology Institutions/Production Units

All these health-care establishments generate waste and are therefore covered under Bio-Medical Waste (BMW) Rules.

Approximate percentage of waste type per total waste in Bio-Medical Care centers:

- Non-infectious waste: 80% are like domestic wastes
- Pathological waste and infectious waste: 15%
- Sharps waste: 1%
- Chemical or Pharmaceutical waste: 3%
- Pressurized cylinders, broken thermometers... less than : 1%

Average Composition of Hospital waste in India

Material	Percentage (Wet-Weight basis)
Paper	15
Plastics	10
Bags	15
Metal (sharps etc.)	1
Infectious waste	1.5
Glass	4.0
General waste (food waste, sweeping from hospital premises etc.)	53.5

BIOMEDICAL WASTE MANAGEMENT IN INDIA:-

Biomedical waste is generated by human & animals during diagnosis treatment, Immunization and research and testing of biological only 10-25% of health care waste is dangerous as compared to domestic waste.

The Healthcare waste or biomedical waste may cause health risk & environmental health pollution protection needed to manage the waste.

HAZARDS DUE TO BIOMEDICAL WASTE: -

Biomedical waste causes disease or injury to public because of followings:-

- 1) Toxins by Chemicals & Pharmaceuticals
- 2) Infecting Agents & Pathological Waste
- 3) Sharps Instruments
- 4) Genotoxic
- 5) Radioactive
- 6) Pressurized Containers
- 7) Heavy Metals & Mercury

The Persons who are handling the waste or exposed to healthcare waste are at potential risk. For Medical doctor, Nurses, Hospital Personnel, Patients, Visitors, laundries & waste handling personals.

HAZARDS DUE TO INFECTIOUS WASTE HANDLING & INSTRUMENTS:-

As pathogens enter in body by cut skin, mucous membranes by inhalation, by ingestion like HIV hepatitis B&C Resistant bacteria by antibiotics.

PHARMACEUTICALS & CHEMICALS WASTE: - the wastage by industries of pharmaceuticals are toxic materials genotoxic, corrosives, Flammable explosive may cause injuries & burns.

HAZARDS BY GENOTOXIC WASTE:- By inhalation of dust aerosol absorption through skin, Cytotoxic drugs chemicals waste causes food accident by ingestion.

HAZARDS BY RADIOACTIVE WASTE:- This causes headache, dizziness vomiting because of genotoxic

PUBLIC SENSITIVITY: - Visual impact of wastage leads to noxious feelings like anatomical waste.

TREATMENT AND DISPOSAL TECHNIQUES FOR BIOMEDICAL WASTE:-

There are so many methods for treatment and disposal for dangerous Biomedical waste management.

- 1) Incineration
- 2) Chemical Disinfection
- 3) Wet & Dry thermal treatment
- 4) Microwave
- 5) Irradiation
- 6) Land Disposal
- 7) Inertization

INCINERATION: - This is proved in which there is increase temperature causes dry oxidation. To Reduce organic & combustible waste to inorganic incombustible to reduce volume & weight that cannot be revealed, reused or disposed in outer land fields.

✓ Basic principle is high temperature in treatment plants chamber.

There Are types:-

- 1) Double Chamber- More Temp. In Purolic chamber infection
- 2) Single Chamber- No Purolic chamber less Temp.
- 3) Rotating Kilns:- Increase Temp decompose for genotoxic & chemicals

ADVANTAGE OF INCINERATION: - No Pretreatment is required and suitable for low heating volume above 2000 Kcal/Kg for single chamber & 3500 Kcal/Kg for double-chamber The waste should be less moistured as less than 30% and also combustible.

DISADVANTAGES OF INCINERATION: - Certain waste cannot be disposed as pressurized gas, Reactive chemicals. Silver salts, Photographic Materials or radio graphic hologenalid, PVC high mercury cadmium content & broken thermometer used batteries, lead, wooden, Ampules & heavy metals.

CHEMICAL DIS-INFECTION:- In this process chemical add to stabilize liquids like blood, Urine, Stool, Hospital sewage like microbiological culture.

DRY & WET THERMAL TREATMENT:-

WET THERMAL TREATMENT:- Steam disinfecting by high pressure, High Temp similar to autoclave This process is not good for anatomical waste and animal carcasses. So not good for pharmaceutical waste.

DRY THERMAL TREATMENT: - Good for infection waste & sharp It is non burn dry thermal process no good for Cytotoxic & radioactive waste.

Microwave Irradiation: - Microwave of frequency 2450 MHz disinfects The Bacteriological & Pathological product.

LAND DISPOSAL: - Biomedical waste should not be disposed in open dumps because of risk to people & animal as come in contact & infection pathogens are degenerated in isolated geological environment with continuous control & coverage by assistant.

INERATIZATION: - Biomedical waste is maximize cement to minimize risk of toxic waste.

As 65% pharmaceuticals waste +15% time +15% cement +5% water in the from of mass, cubes pellets & transport to storage.

The United Nations Conference on the Environment and Development (UNCED) in 1992 recommended the following measures:

- (a) Prevent and minimize waste production
- (b) Reuse or recycle the waste to the extent possible
- (c) Treat waste by safe and environmentally sound methods, and
- (d) Dispose off the final Residue by landfill in confined and carefully designed sites.

BIO-MEDICAL WASTE MANAGEMENT IN INDIA

Bio-Medical waste (Management and Handling) Rule 1998, prescribed by the Ministry of Environment and Forests, Government of India, came into force on 28th July 1998. This

rule applies to those who generate, collect, receive, store, dispose, treat or handle bio-medical waste, types of waste and treatment and disposal options under Rule 1998.

The bio-medical waste should be segregated into containers/bags at the point of generation of waste. The colour coding and the type of containers used.

ADVANTAGES OF GOOD HEALTH CARE WASTE MANAGEMENT

The need for proper HCWM has been gaining recognition slowly. It can:

- Help control nosocomial diseases (hospital acquired infections),
- Dramatically reduce HIV/AIDS, sepsis, and hepatitis transmission from dirty needles and other improperly cleaned/disposed medical items;
- Control zoo-noses (disease passed to humans through insects, birds, rats and other animals);
- Cut cycles of infection; complementing the protective effect of proper hand washing;

PROBLEMS DUE TO HEALTH CARE WASTE MANAGEMENT

1. UNSAFE HEALTH CARE WASTE MANAGEMENT

Unsafe Health Care waste management leads to death and disability because sharp waste is highly infectious and poorly managed syringes causes hepatitis – B, C & HIV infection to public and worker.

2. RISK OF HEALTH CARE WASTE MANAGEMENT

Health Care waste management may also represent a risk to health because small incinerators are operated below 800⁰C leads to production of dioxins, furans are other toxics pollutant a emissions and/ or bottom fly ash transport to disposal facilities leads to hazard for immune system causes cancer because of long term low level of exposure of **DIOXINS & FURANS**.

3. GUIDING POLICY

- A- W.H.O has recently developed a Health care waste management guide. Preventing health risk associated with health care management worker by environmental management.
- B- Reduce the Noxious Emission
- C- Supporting Stockholm convention on persistent organic pollutants.
- D- Reducing exposure to toxic pollutants in Combustion process during high temperature.

4. STRATEGY

It is the responsibility of governments to create a framework for the safe management of health – care waste and to ensure that health-care facility managers take their share of responsibility to manage wastes safely. This requires a **national strategy** national strategy for health-care waste management involving the **MINISTRY OF HEALTH** and other stakeholders. It is important that a designated authority coordinates these efforts and receives sufficient political support, funding and trained staff. Creating **national action plans**, developing national health-care waste management guidelines and building capacity at the national level are all important activities which can help to minimize risks posed by health care waste.

LOCAL LEVEL IN HEALTH CARE CENTERS: TRAINING AND EQUIPMENT

TRAINING

Training all health care workers in techniques associated with newly procured items and medical equipment is crucial to proper HCWM. All workers in the facility need some training on the importance of proper HCWM, and their roles and responsibilities. Information about cleaning techniques and protocols should be prominently displayed.

COMMON BIOMEDICAL WASTE TREATMENT FACILITY

The facility will have the following equipments:

- 1 Incinerators
- 2 Auto Claves
- 3 Microwave equipment
- 4 Shredders
- 5 Chimney
- 6 Effluent Treatment Plant
- 7 Vehicle Washing Equipments
- 8 Water pumps, Storage, Air compressors
- 9 Generator for Electricity

And these are essential equipments required to dispose of the plastic bags in which the wastes are kept. The following bags are containing the following waste by the health worker including doctors, nurses and cleaners etc.

Colour	Waste Content	Treatment Option
Red Bags	For Plastic Tubes, IV Bags, Syringes, Blood and Urine Bags, catheters and gloves.	Autoclaving/Micro-waving/chemical Treatment
Yellow Bags	Cotton Swabs, Pathological Tissues & Body Parts,	Incineration/deep burial

	Microbiology Waste, Surgical masks	
Puncture Proof wires (Blue/White Translucent)	Sharps, Needles, Sculpt, Blade, IV Catheters, Ampoules, Containers, Vials, Guide	Autoclaving/Micro-waving/Chemical Treatment and Destruction/Shredding.
Black Bags	Papers, Plastic Packing, Food Waste, Disposable Cups & Plates.	Disposal in secured landfill

CONCLUSION & FUTURE CHALLENGES

The Bio-Medical waste management is very essential for health workers and communities because this can lead to dangerous hazards in public so it includes planning, procurement, construction, staff training and behavior, proper use of tools, proper treatment and disposal methods inside and outside the hospital, and evaluation. Its many dimensions require a broader focus than the traditional health specialist or engineering point of view and recycling of syringes should be banned and chronic exposure to dioxin and furan and Non-Incineration technique should be discovered by the help of environmentalist and engineers to manage the hazardous health care waste.

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