

## Waste management: A social Perspective

### A study with reference to hazardous biomedical waste

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**Abstract - With the economic development, the quantity of waste is increasing rapidly. The total quantities of municipal solid waste (MSW), industrial solid waste (ISW), and hazardous waste (HW) have become a threat to the environment. The sustainability of a healthy environment demands freedom from all kinds of waste whatever the source the waste has originated. In this regard though there are many ways and means to keep the environment pollution free from such effluents which originate from different modes and have different bearing upon environment disposal of certain effluents like those of biomedical is difficult to manage. Biomedical waste consists of solids, liquids, sharps and laboratory waste that are potentially infectious or dangerous and are considered bio-waste. The biomedical waste produced in the course of health care activities carries a higher potential for infection and injury than any other type of waste. Inappropriate handling of biomedical waste may have serious public health consequences and a significant impact on the environment. It must be properly managed to protect the general public, specifically healthcare and sanitation workers who are regularly exposed to biomedical waste as an occupational hazard. The present paper proposes to focus on biomedical waste - its different types, hazards associated and strategies for purifying the environment from such waste which degrade the environment. The implications and suggested remedies would help in liberalizing environment from such harmful effluents.**

**Keywords—Waste management, biomedical waste, healthcare, environment, sanitation**

#### I. INTRODUCTION

With rapid urbanization and ever increasing population growth there has been a substantial increase in the generation of waste. The arising quality of life and high rates of resource consumption patterns have had an unintended and negative impact on the urban environment - generation of wastes far beyond the handling capacities of urban governments and agencies. Bio-medical wastes are the major concern of the era. It is the responsibility of waste generator to treat and dispose of the biomedical waste. Whereas local governments have to assist the hospitals, if they come forward for establishment of a Common Treatment Facility, by identifying suitable land, it is the responsibility of the local bodies to treat and dispose the non biomedical waste (general waste) and treated biomedical

waste generated in the healthcare institutions. The solid waste from the hospitals consists of bandages, linen and other infectious waste, plastics, disposable syringes, glass and other general wastes including food. For two major reasons, besides others, Bio Medical waste generation is on the increase: an increasing population as well as increased demand for Allopathic treatment, and proliferation of smaller to corporate hospitals in towns and cities on a commercial basis. Thus to tackle the situation a well developed strategy and its impartial implementation are the need of the hour.

#### II. BIOMEDICAL WASTES

The hospital waste has always been considered potentially hazardous. The disposal of untreated bio-medical wastes poses an environmental and public health risk. It also presents an occupational health hazards to the health care personnel who handle these wastes at the point of generation, and those involved with their management i.e. segregation, storage, transport, treatment and disposal. The indiscriminate disposal of untreated wastes is the causes to spread the infectious diseases. Apart from these, a good amount of bio-medical wastes such as disposable syringes, saline bottles, I.V. fluid bottles etc. etc. are picked up by the rag pickers and are recycled back into the market without any disinfection. It is imperative, therefore, to adopt appropriate system for the safe collection, storage, transport, treatment and disposal of the hospital wastes. Realizing the seriousness of the problems associated with the poor management of the bio-medical wastes, the Govt. of India had notified the Bio-Medical Waste (Management & Handling) Rules in the years 1998 in order to regulate the environmental menace due to mismanagement of the hospital waste. Managing these wastes is a challenging task due to unpredictable variation in the load on common biomedical waste treatment facility.

#### III. TYPES OF BIOMEDICAL WASTES

**Type A:** Waste which does not require any special treatment. This is the waste produced by the hospital administration, the cleaning service, the kitchens, stores and workshops. It can be disposed of in the same way as household waste.

**Type B:** Waste with which special precautions must be taken to prevent infection in the hospital. This is usually taken to include all waste from inpatient and casualty wards and doctors' practices, e.g. used dressings, disposable linen and packaging materials. It only constitutes a risk for patients with weakened defenses while it is still inside the hospital. Once it has been removed from the wards it can be handled by the local domestic refuse collection service.

**Type C:** Waste which must be disposed of in a particular way to prevent infection. This is waste from isolation wards for patients with infectious diseases; from dialysis wards and laboratories, in particular those for microbiological investigations, which contains pathogens of dangerous infectious diseases, e.g. tuberculosis, hepatitis infectious diarrheal diseases and which constitutes a real risk of infection when disposing of this waste. It includes needles and sharp objects coated with blood, or disposable items contaminated with stool.

**Type D:** Parts of human bodies: limbs, organs etc. This waste originates in pathology, surgical, gynecological and obstetric departments. It has to be disposed of separately, not to prevent infection but for ethical reasons.

**Type E:** Other waste. Hospitals provide a service, and hence have infrastructures which can also generate hazardous waste products, like chemical residues from laboratories, as well as inflammable, explosible, toxic or radioactive waste, which must be disposed of in accordance with statutory provisions.

#### IV. SUGGESTED REMEDIES FOR BIOMEDICAL WASTE MANAGEMENT

##### A. Waste avoidance and waste minimization at source:

In the hierarchy of waste management, waste avoidance and waste minimization have to be attempted first.

##### B. Inventory of hazardous waste generation:

As per the Hazardous Waste regulations, industries are required to store hazardous waste for a period not exceeding 90 days. The waste could either be recycled /reused or disposed of in captive or common Treatment, Storage and Disposed Facilities (TSDF) available in the state, or be incinerated.

##### C. Reuse, recovery and recycling of hazardous waste:

Industrial associations/industries should explore options/opportunities of reusing, recovery and recycling of hazardous waste in an environmentally sound manner.

Establishment of **'Waste exchange Banks/ Centres'** should be encouraged to provide information on wastes and promote reuse, recovery and recycling technologies which upscale the quality of resource recovery.

#### V. CONTAINMENT OF BIO MEDICAL WASTE

Biomedical waste like sharps should be contained in leak proof, rigid, puncture- and break-resistant containers that are tightly lidded and labelled before storage, transport or disposal. Biomedical waste excluding sharps should be placed in leak proof plastic bags strong enough to prevent

tearing, ripping and bursting open under normal conditions. The container holding the biomedical waste should be labelled with the international biohazard symbol.

#### VI. MANAGEMENT OF BIO MEDICAL WASTE

Biomedical waste can be managed properly by ensuring proper segregation at the source, the use of accurate packaging (leak resistant, puncture resistant and not susceptible to degradation by cleaning agents in case the packaging is reused), appropriate colour coding, proper in-house movement of waste (minimizing employee exposure to biomedical waste in a workplace), designating waste storage areas and ensuring safe disposal.

#### VII. DISPOSING BIO MEDICAL WASTE

Awareness level among the biomedical waste producers and biomedical waste Handlers should be increased. Promoting the establishment of **Common Biomedical Waste Treatment facility (CBWTF)** would prove to be very useful in disposing biomedical wastes. There are two major units in CBWTF, they are

1. Autoclaving, Segregation, Shredding.
2. Incineration.

Figure 1. Shows the flow diagram for autoclaving, segregation and shredding

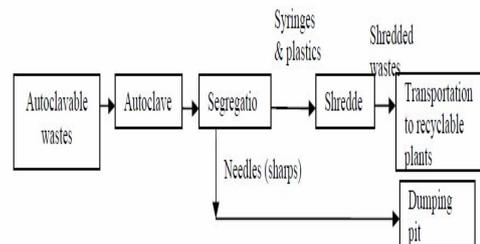


Figure 1. Flow Diagram for Autoclaving, Segregation and Shredding

The primary purpose of autoclave is to sterilize/ disinfect the wastes. Microorganism, which contribute to infection do not survive beyond high temperature. At this temperature and pressure, microorganisms are completely destroyed and thus render the wastes infection free. The disinfected waste from the autoclave is led for the segregation of rubber, glass, plastics and metals. At the incineration the Wastes are burnt partly by electric burners and partly by addition of diesel. The ashes from the incinerator are disposed by means of secured land filling. The size of the landfill is about 4.5m x 9m and the depth of about 3.6m. The landfill is filled up with the alternate layers of blue metals and gravels. Each layer is covered with clay sheets and finally the whole layer is covered with the sand layer.

#### VIII. 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.

Construction of a Medical Waste Materials Recovery Facility will reduce the quantities of medical waste requiring landfill or incineration. The study presents the status of the issues related to Bio Medical waste. An appropriate strategy for safe management of BMW has been taken up integrating technical, financial, institutional, managerial, social and environmental issues. The technology used in CBWTF is a combination of incineration and secured landfill. All the BMW generators are yet to get enrolled to utilize this off-site facility. For the speedy remedy to the problem of Bio Medical Waste disposal and urge the government sector hospitals (CMCH, E.S.I, and Corporation dispensaries) should also join in this endeavor as early as possible. To reduce the burden of disease, health care waste needs sound management, including alternatives to incineration. Quick empowerment of healthcare staff and provision of effective training materials will allow the swift improvement of the situation.

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