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BIOMEDICAL WASTE MANAGEMENT- A REVIEW



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INTERNATIONAL JOURNAL
OF PURE MEDICAL RESEARCH**ABSTRACT**

The authority of biohazards waste is a key problem for all healthcare practitioners & healthcare facilities since this sort of trash is more likely to cause infection and harm than other types of waste. The handling of biomedical waste has recently come to the attention of both environmental authorities, hospitals and nursing care authorities. Moreover, the quantity of bio-medical waste created by health services facilities depends on a quantity of variables, including disposal methods, the type of facilities, the number of patients they can accommodate, their specialization, the proportion of recyclable products they use, the affordability of infrastructure, etc. Now days, the human treatment of biological waste has become a global issue. Biohazards waste management is very essential because it can adversely affect the human life and can lead to serious diseases.

INTRODUCTION

The term "biomedical waste" refers to a few wastes that is manufactured throughout the immunization, handling or diagnosis of people or research operations, as well as from animals and consist probable hazardous germs that can spread to health profession and the general population¹.

Hospitals are among the intricate institutions that are used by people from all facets of society, regardless of their age, sex, color, or religion. This is in addition to the hospital's regular residents, such as patients and personnel. Due to improvements in scientific knowledge, all of them produce garbage, which has been growing in quantity and variety and is having an influence.² BMW consists of blood, sharp instruments, chemicals, radioactive substances, body parts, drugs and chemicals. Research laboratories, clinics, dentists, veterinarian offices, funeral homes, home health care facilities and Hospitals are typical origin of biological waste. BMWs are included because, after radioactive waste, they are the second-highest source of hazardous waste globally. Biomedical waste is a pressing concern for many countries and poses a serious risk to community health on a world wide range.

BMW has not gotten the significant attention it deserves in underdeveloped nations, particularly in Africa. The process of gathering, transporting, disposing, sorting, storing, treating and taking additional protection measures with regard to waste at

health services is called as biomedical waste management (BMW). Waste created in healthcare institutions must be separated, collected, stored, transported, treated, and finally disposed of. These activities are essential to good BMW.³

An effective BMW system depends on health care workers (HCWs) possessing the necessary knowledge, attitudes, and practices (KAPs), which are crucial prerequisites for preventing the spread of infectious diseases in the community and the environment⁴.

The top 4 states that developed BMWs in December 2020 were Delhi, Gujarat, Andhra Pradesh, Kerala, according to the data currently available. The statistics shows that the issues affecting the BMW sector in India are now more significant as a result of the current epidemic. BMW hazard management is a major concern due to India's connectivity treatment facilities being already lacking and the fact that there have been over 11 million cases of COVID-19⁵.

The Indian government (notice, 1998) stipulates that medical hygiene and maintenance tasks include waste disposal management. This entails managing a variety of primarily engineering-related tasks, including collection, transportation, operation or treatment of processing systems, and waste disposal.⁶

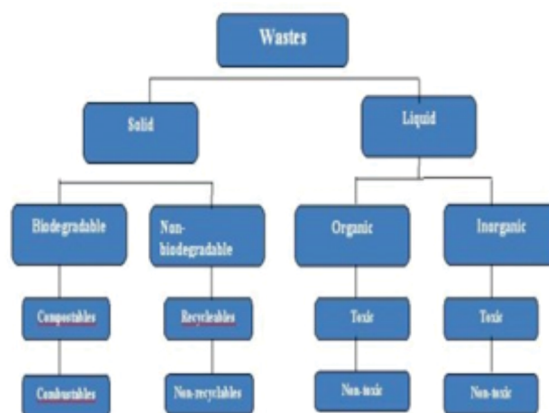


Figure 1.1 Types of waste

The Need for Biomedical Waste Management

Equally important is that the entire service providers in the medical, dental, nursing, paramedical, and waste management fields —like as workers—are properly instructed in the handling and disposal of biomedical waste⁷.

Even though only 15% to 20% of biomedical wastes produced from biological entities are employed in the diagnosis, management, or treatment of illnesses, is dangerous or infectious. If it is not separated at the point it is produced and is miscellaneous with additional non-hazardous garbage, then all of the trash becomes hazardous.⁸

General trash or waste is different from medical waste. The handling of waste disposal safely is a topic that causes a lot of uncertainty among the general public operator, decision-makers and generator. Lack of knowledge could be one of the cause⁹.

Distribution of Bio-Medical Waste according to WHO

The World Health association has classified health waste into eight varieties:

1. General Waste
2. Pathological
3. Chemical
4. Radioactive
5. Sharps
6. Infectious to potentially transferable waste
7. Pharmaceuticals

Major sources of Biomedical waste

- Primary health centers.
- Laboratories and research centers.
- Govt. hospital/private hospital/nursing homes/dispensaries.
- Blood banks and collection centers.
- Veterinary colleges and animal research centers.
- Production units.
- Animal investigate and testing laboratories.

Minor sources of biomedical waste

- Blood donation camps.
- Physicians/dentists clinics.
- Vaccination centers.
- Animal houses.
- Funeral services.
- Organizations for disabled people

Essential of biomedical waste organization in clinics

1. Danger of disease outdoor the clinic for the workers, scavengers, and occasionally the wide-ranging people that resides nearby.
2. Disposables that haven't even been washed are being repackaged and sold by dishonest individuals.
3. Sharps-related injuries infecting all types of hospital staff, including waste handlers.
4. Danger related with hazardous elements, drugs to people treatment waste at all points.
5. Nosocomial contaminations in patients as a result of unsatisfactory waste management and contamination regulator procedures.
6. Risks of pollution of the air, water, and soil caused by improper incineration of pollutants and ash¹⁰.

Benefits of biomedical waste management

- a) It keeps the environment clean.
- b) It prevents from infection and decrease the possibility of disease.
- c) Avoid the repackaging and reusing of infectious disposable.
- d) Decrease the management cost and production of waste due to proper management and treatment.
- e) Rise the quality of lifecycle.

Steps involved in Biomedical waste organization

Biomedical waste management is very important because it can adversely affect the human life and can lead to serious diseases. There are various steps involved in handling of biomedical waste organization.

- 1) **Collection**- The first stage of biomedical waste organization is collection of waste. The waste is collected so that it will not be harmful to others.

- 2) **Segregation**- Different type of waste requires different treatment that's why the waste is thrown in different color of dustbins according to their type. Separation of waste must be done carefully because it reduces the risk of infection to the workers and public. It also avoids any physical injury.

a. Red bag- Plastic waste like catheter, urine bags, gloves, intravenous tubes, saline bottles should be segregated in this bag.

b. yellow bag- Solid waste, human anatomical waste and the objects which are in contact with blood should put in this bag like body fluids, plaster cast, expired medicines, cotton swabs, liquid chemical waste, clinical laboratory waste, bandage.

c. Black bag- Solid chemical waste, incineration ashes.

d. White bag- Sharp objects should be discarded in this bag like scalpel, Shari needles, blades.

e. Blue bag- Medicine vials, metallic body implants, broken glasses, antiseptic, disinfectant should put in this bag¹¹.



Figure 1.2- segregation chart in Hospital

- 3) **Storage**- After segregation the waste is stored in large plastic polythene.

4) Transportation- The waste is then shifted to the dumping site via vehicle. The container is covered to avoid smell and public exposure.

5) Treatment- The treatment of waste is done here. Some pathogens die after the treatment like bleaching, chemical disinfection. Residual waste is transported to the disposal site.

6) Disposal- After the treatment of waste, it is disposed with the help of different processes like autoclave, incineration, gas sterilization, chemical disinfection, Thermal inactivation

a. Autoclave- These are highly effective and inexpensive tool of sterilization¹⁴. These are closed chambers that use pressure, heat or steam to sterilize medical equipment. In this the equipment's are sterilized with temperature 250° for 15-20 minutes¹⁵. Autoclave process has been using for many centuries to sterilize medical equipments¹³. Microorganisms are destroyed by using autoclave process. 90% of medical waste is sterilized by using this process¹².

b. Incineration- This process is used to control the combustion of waste at high temperature. It has various advantages like we can destroy the all kind of wastes, reduce air pollution through air pollution control units. The energy from the incinerators can be used for many ways like gas to water heat conversation, where is transformed to steam, which can be used to produce electricity¹⁶. Limitation of using incinerators is its high cost¹².

c. Thermal inactivation- In this the waste is sterilized with steam by placing the waste container in closed chamber at required

temperature and pressure. In this 121°C temperature is needed for 30 minutes to inactivate the microorganisms¹⁷. The contents can be discharged into the sewers after the treatment.

d. Gas sterilization - In these gases are used for sterilization. Most common gas is ethylene oxide. Workers should be cautious while using this gas because it might be poisonous.¹²

e. Chemical disinfection- This method is suitable for treatment of liquid disinfection waste. Chemical treatment depends upon some factors like type of microorganisms, type of disinfectant, degree of contamination, contact time, other factors like pH, temperature, biology of microorganisms and mixing requirement. The waste should be disposed according to local and state requirements¹².

Suggestion

- 1) Biomedical waste can cause serious problem to the environment and it may lead to the adverse effect on human and animal life as well. It should be properly treated and disposed, so that it would not be harmful. 15% of waste are hazardous that can be toxic, infectious or radioactive.¹⁸
- 2) Estimate and monitor economic profit from waste minimization in clinic.
- 3) Private sector, specialists should participate in the process of hospital waste management.
- 4) Meeting should be done by officials and managers for familiarity and closer relationship with practical solutions.
- 5) Providing help to the campus to progress the implement of devices and to suggest innovative recommendations.
- 6) Promotion must be done to aware the general public.
- 7) Use new technology to reduce the waste in different parts of hospital.¹⁹

CONCLUSION

The management of medical waste is currently emphasized by both government and non-government organizations. Citizens want to be alert of the problems arising due to improper handling of biomedical waste and are optimistic to take part in programmes planned to decrease waste. The checkup employees must receive training to promote knowledge and give confidence responsibility intended for experience avoidance and inappropriate waste discarding. Medical professionals are required to adhere to all laws and regulations put in place by the relevant governing organizations. These interventions must encompass all healthcare professionals, regardless of their designation, experience, qualification in order to prevent cross-infections between healthcare workers and clients.

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