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Review Article

Biomedical Waste And It's Public Health Significance

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Abstract:

Biomedical waste management is one of the biggest challenges of the present-day times because it has a direct impact on the health of human beings. Biomedical waste refers to any solid or liquid waste that contains infectious or potentially infectious materials originating from medical, laboratory, or research activities, including those involved in the diagnosis, prevention, and treatment of diseases. Biomedical waste (BMW) can be categorized into general, pathological, radioactive, chemical, infectious, sharps, pharmaceutical, and pressurized waste. India has implemented well-defined regulations to ensure the proper handling and management of BMW. Hence, establishing eco-friendly methods along with effective plans and protocols for the disposal of biomedical waste is crucial for achieving the objective of a clean and sustainable environment.

Keywords: biomedical waste, segregation

Introduction:

India generates a massive amount of biomedical waste (BMW) on a daily basis. Biomedical waste management has recently become a significant concern for healthcare facilities, both public and private- as well as for human safety, environmental protection, and regulatory authorities. India generates a vast amount of biomedical waste (BMW) daily. Biomedical waste (BMW) includes anatomical waste, sharps, laboratory waste, and more, and improper segregation can be life-threatening. Furthermore, the incorrect separation of contaminated plastics, cytotoxic substances, and recyclable materials poses a significant threat to the ecosystem. Hospitals are frequented by individuals from all sections of society, irrespective of their age, gender, ethnicity, or religion, leading to the growing volume and diversity of BMW. WHO defines "Bio-medical waste" as 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 (WHO,2018). The basic principle of good BMW practice is based on the concept of 3Rs, namely, reduce, recycle, and reuse.

The need for effective hospital waste management arises due to the following reasons:

- Injuries caused by sharps can result in infections affecting all categories of hospital staff and waste handlers. Additionally, nosocomial infections in patients may arise from inadequate infection control measures and improper waste management practices.
- The risk of air, water, and soil pollution arises either directly from waste or indirectly from emissions and ash produced by faulty incineration processes.
- Unscrupulous individuals repackage and sell disposable items without proper cleaning, while discarded drugs are similarly repackaged and sold to unsuspecting buyers.

Steps of Bio medical Waste Management:

1. Waste collection

2. Segregation

3. Transportation and storage

4. Treatment & Disposal

5. Transport to final disposal site

6. Final disposal

Colour Code	Type of Waste	Disposal Method	Examples
Yellow	Infectious and pathological waste	Incineration or deep burial	Human tissues, organs, soiled bandages, expired medicines
Red	Contaminated recyclable waste	Autoclaving or microwaving followed by recycling	Tubing, catheters, intravenous sets, syringes (without needles)
Blue / White	Sharp waste	Autoclaving or shredding, then disposal in sharps pit	Needles, scalpels, blades, glassware
Black	General waste (non-hazardous, non-infectious)	Disposal in municipal landfill	Paper, wrappers, food waste, non-infectious plastics

The Biomedical Waste Management Rules, 2016:

- Apply to all healthcare facilities, including clinics, laboratories, and veterinary institutions, ensuring proper segregation, treatment, and disposal of waste.
- Waste must be segregated at the source into color-coded containers, and methods like incineration, autoclaving, or shredding are mandated for disposal.
- Facilities are required to obtain authorization, adopt barcoding and GPS tracking for traceability, and submit annual reports to regulatory authorities.
- The rules emphasize reducing plastic use, banning open burning, promoting shared treatment facilities, and

providing regular training to healthcare workers, ensuring environmental protection and public health safety.

The Impact and Implications of Biomedical Waste (BMW) on Public Health:

- **Transmission of Infectious Diseases**: BMW is often contaminated with harmful pathogens, such as viruses, bacteria, and fungi, that can cause infections like HIV, Hepatitis B and C, tuberculosis, and other communicable diseases. Improper disposal, such as dumping biomedical waste in open areas or mixing it with general garbage, can lead to the spread of these diseases.
- **Environmental Impact**: When biomedical waste is not treated or disposed of properly, it can pollute the environment, including soil, water, and air. The leaching of harmful chemicals, pharmaceuticals, or radioactive waste into the soil or water can have long-term consequences, including contamination of drinking water sources and harming local ecosystems.
- **Occupational Health Risks**: Healthcare workers, waste handlers, and sanitation staff who come into contact with BMW are at risk of exposure to hazardous materials. Needle-stick injuries, chemical burns, and exposure to infectious agents can lead to occupational health problems, including serious infections.
- **Vector-Borne Diseases**: Improperly disposed BMW, such as organic waste or sharps, can attract pests like rodents and insects, which can serve as vectors for disease transmission. These pests can spread infections to the local community, exacerbating public health problems.
- **Public Health Infrastructure**: Ineffective BMW management can overwhelm healthcare systems, leading to increased costs for disease control, emergency responses, and healthcare services. It also puts a strain on the infrastructure, particularly in areas with limited waste treatment.

Conclusion:

In conclusion, effective biomedical waste management is crucial for maintaining public health, the environment, and the well-being of healthcare professionals. Proper handling, segregation, and disposal of biomedical waste prevent the spread of infectious diseases, reduce environmental pollution, and minimize occupational health hazards. Training, awareness, and adherence to guidelines are essential in achieving these goals. By promoting a culture of responsibility and ensuring that all healthcare professionals are involved in these practices, we can create a safer, cleaner, and more sustainable healthcare environment for everyone.

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