



A Review on Biomedical Waste and its Management



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Abstract

Biomedical waste is highly hazardous which can give rise to serious diseases that may be fatal; therefore it is a matter of global concern. Biomedical waste management is of great importance to reduce the serious health implications. This article deals with the basic issues of biomedical waste disposal and management of biomedical waste. Its purpose is to spread knowledge among the personnel involved in health care services to prevent transmission of the diseases in the society and to protect public health and environment.

Keywords: Biomedical waste; Diseases; Health care services; Public health; Environment

Introduction

Biomedical waste is any kind of waste either solid or liquid containing harmful materials generated by healthcare facilities e.g. hospitals, practices, health camps etc. This waste consists of human tissues, contaminated blood, body fluids, discarded medicines, drugs, contaminated cotton, dressings, and sharps such as needles, glass, blades, scalpels, lancets [1]. Biomedical waste collection and disposal has greatest risk to healthcare, sanitation workers and the general community. The biomedical waste without proper sterilization leads to acquired immune deficiency syndrome (AIDS), Hepatitis B & C, severe acute respiratory syndrome (SARS), tetanus, psychosocial trauma etc. [2]. Biomedical waste management is important to protect the environment and health of the population.

Necessity of Biomedical Waste Management

Improper management of waste generated in health care facilities causes a direct health hazards on the society, the health care workers and on the environment. There is a requirement for the management of biomedical waste to minimize the risk of infection outside the hospital for waste handlers, scavengers and those living in the vicinity of hospitals. Management is also needed due to the risk of air, water, and soil pollution, or due to improper incineration emissions and ash. It plays an important role in disposal of the discarded drugs that can be repacked and sold off [3].

Biomedical Waste Management

Biomedical waste management is of great significance because biomedical waste can adversely affect health inviting serious

implications to the people who get in touch with it. Segregation, storage and safe disposal of the waste is the key to the effective management of biomedical waste in a workplace [4,5].

Segregation of Biomedical Waste

Segregation of waste plays a major role for improved biomedical waste management. It is important to reduce the volume of infectious waste otherwise the quantum of waste will go beyond the control of management [6]. The waste is segregated according to different color coding system of waste containers which is given below:

- A. Red bag: Recyclable contaminated waste such as bottles, intravenous tubes, catheters, urine bags, syringes and gloves.
- B. Yellow bag: Human and animal anatomical waste, soiled waste including items contaminated with blood, body fluids like dressings, plaster casts, cotton swabs, expired or discarded medicines, chemical waste (liquid), discarded linen, mattresses, beddings contaminated with blood or body fluid, microbiology, biotechnology and other clinical laboratory waste.
- C. Black bag: Incineration ash and chemical waste (solid).
- D. White bag: Waste sharps including needles, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts.
- E. Blue bag: Metallic body implants and glassware such as medicine vials, ampoules.

Storage of Biomedical Waste

Healthcare facilities must provide a storage area for medical waste until it is collected for treatment and disposal. Storage area should be selected carefully which is unapproachable to the general public and must exhibit warning symbols & signs. It should be stored in a dry and secured area before being transported. The area must be protected from water, wind, rodents, insects and animals. Hazardous biomedical waste should not be stored for more than 3 months [7].

Treatment of Biomedical Waste

Biomedical waste treatment refers to the processes to eradicate the deleterious effects of the waste. There are several treatment options which maximize safety during handling and disposal of the waste. It also minimizes environmental hazards. Incineration, Autoclaving, irradiation and chemical treatments are the most common methods used for treatment and decontamination of biomedical waste.

Incineration

It is a treatment process used to convert pathological and pharmaceutical waste into ash, flue gases and heat. Operating temperature for incineration should be in the range of 800-1400°C. It decreases the mass of waste by 90-95% and thus reduces adverse effects on the environment [8].

Autoclaving

It is a process of steam sterilization and is the most common alternative to incineration. Autoclaving requires a temperature of 121°C and pressure of about 15 pounds per square inch (psi) for 20-30 minutes. This treatment is applied to inactivate the infectious agents and to sterilize the equipment used in medical services. It is less costly and carries no documented health impacts [9].

Chemical treatment

This treatment is often used to decontaminate liquid waste, so that it can be disposed off locally. It makes use of several techniques such as oxidation, reduction, precipitation and pH neutralization to convert waste into less hazardous substances. Chlorine, sodium hydroxide or calcium oxide can be used according to the nature of waste [10].

Irradiation

These systems are presently being used in waste treatment operations which include gamma, electron-beam, ultraviolet and X-rays. Irradiation sterilizes waste in an enclosed chamber by exposing it to a radioactive cobalt-60 which gives out gamma rays that are lethal to micro-organisms. It is very expensive as compared to other methods and precautions must be taken to protect workers from harmful effects of radiations such as cancer, radiation sickness or even death [11].

Disposal of Biomedical Waste

Land disposal is typically used for remediation of waste which is decontaminated by above applicable treatment methods. This

method is generally used in developing countries which involves the dumping of waste into a landfill. Land-filling should be done at locations where groundwater level is low and which are far from flooding sources. Radioactive wastes are generally dumped in the oceans far away from human habitations. Every state and local government has its own rules and regulations for disposal of disinfected waste [12].

Advantages of BMW Management

Planning the waste management and recycling for all of the waste generated in the health care facilities is a crucial task which plays an exceptionally important role in the worldwide cleanliness, public health, conservation of resources and sustainability of the ecosystem. Recycling medical waste minimizes utilization of raw material and reduces the amount of the waste materials that must be disposed in a landfill. It reduces the hazards and risks to the community which can be acquired by hospital. Reduction in the occurrence of HIV/AIDS, sepsis, hepatitis, and other diseases transmitted by infectious medical equipments takes place by proper waste management [13]. Illegal trading of used syringes, injection needles and medical tools can also be prevented by proper management strategies. Awareness about hazards of biomedical waste and its proper disposal is required for a safe and healthy future [14,15].

Conclusion

Waste generation should be minimized for the protection of environment and general public health. People must be sensitized to the issues related to biomedical waste and should participate in the programs organized for waste minimization. The medical employees must be trained to create awareness and foster responsibilities for prevention of exposure and unsafe disposal to the waste. Medical personnel should strictly follow all the rules and regulations implemented by concerned governing bodies.

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