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Bio Medical Waste Management- A Review

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Abstract: *Biomedical Waste, (BMW), are hazardous waste materials, consisting of solids, liquids, sharps, and laboratory waste which pose a grave hazard to the health of humans as well as to the environment. It is significance that this waste ought to be precise managed and disposed off safely so as to prevent outbreak of infections to society and harmful to the environment. Every day, particularly large amount of waste is generated in the health care hospitals and amenities around the world which want applicable biomedical waste management. The present article provides the definition, categories, and sources of biomedical waste and technique of managing and disposal technologies of Biomedical Waste Management. It additionally intends to create consciousness amongst the people to defend their health & protect the environment.*

Keywords: *Hazardous, infection, biomedical, management, health;*

I. INTRODUCTION

All human activities to produce waste. We all know that such waste might also be unsafe and desires protected disposal. Waste such as industrial waste, domestic waste, sewage and agricultural waste pollute water, soil and air and harmful to human health. It can additionally be dangerous to environment. Similarly, hospitals and other health care facilities generate a lot of waste which can transmit infections, mainly HIV, Hepatitis B & C and Tetanus, to the humans who deal with it or come in contact with it. Biomedical waste management has lately emerged as an issue of main concern not solely to hospitals, nursing domestic authorities however also to the environment. The suited management of biomedical waste has become a international humanitarian subject today.

II. DEFINITION

“Biomedical waste” has been defined as “any waste that is generated during diagnosis, treatment or immunization of human beings or animals or in the research activities pertaining to or in the production or testing of biological and includes categories mentioned in schedule I of the government of India.

The Government of India (notification, 2016) specifies that the Biomedical Waste Management is an critical section in cleanliness of clinic and the renovation activities.

This can be solely possible by means of administrating a broad range of activities such as the collection, segregation, processing, remedy and disposal of the clinical waste in an environmentally sound administration thereby, lowering the biomedical waste era and its have an impact on the environment. Today, one of the biggest challenges that India faces is to trade the attitudes of the operators of the scientific care companies to incorporate suitable Health Care Waste management practices in their day to day routine. World Health Organization (WHO) states that 85% of health center wastes are truly non-hazardous, whereas 10% are infectious and 5% are non-infectious however they are covered in hazardous wastes. India’s biomedical waste (Management and Handling) Rules 1998”

III. SOUCRES OF BIO-MEDICAL WASTE

A. Major Sources

- 1) Govt. hospitals/private hospitals/nursing homes/ dispensaries.
- 2) Primary health centers.
- 3) Medical colleges and research centers/ paramedic services.
- 4) Veterinary colleges and animal research centers.
- 5) Blood banks/mortuaries/autopsy centers.
- 6) Biotechnology institutions.
- 7) Production units.



B. Minor Sources

- 1) Physicians/ dentists' clinics
- 2) Animal houses/slaughter houses.
- 3) Blood donation camps.
- 4) Vaccination centers.
- 5) Acupuncturists/psychiatric clinics/cosmetic piercing.
- 6) Funeral services.
- 7) Institutions for disabled persons

C. Bio Medical waste consists of

- 1) Human anatomical waste like tissues, organs and body parts
- 2) Animal wastes generated during research from veterinary hospitals
- 3) Microbiology and biotechnology wastes
- 4) Waste sharps like hypodermic needles, syringes, scalpels and broken glass
- 5) Discarded medicines and cytotoxic drugs
- 6) Soiled waste such as dressing, bandages, plaster casts, material contaminated with blood, tubes and catheters
- 7) Liquid waste from any of the infected areas
- 8) Incineration ash and other chemicals.

IV. ENVIRONMENTAL AND HEALTH RISKS CAUSED BY BIO-MEDICAL WASTE

Biomedical waste is produced in all medical units where human & animal treatment is done, such as hospitals, clinics, dental offices, dialysis facilities, as properly as analytical laboratories, blood banks, university laboratories. Health care waste refers to all materials, organic or non biological, that are discarded in any health care facility and are not intended for any different use .Within a health care facility or hospital, the essential corporations submitted to risks are:

Doctors, medical nurses, healthcare unit employees and maintenance staff;

Patients;

Visitors;

Workers in ancillary services: laundry, scientific components store,

labors which collects and transports waste;

labors with waste treatment and disposal of health unit.

There are three infections which are most commonly transmitted: hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency (HIV) virus. Among the 35 million health care employees worldwide, the estimations show that every year about three million receive hard exposures to blood borne pathogens, 2 million of those to HBV, 0.9 million to HCV, and 170,000 to HIV. Also, the employees involved in the series and cure of the biomedical waste are uncovered to a certain risk.

As a consequence, round the world there is significantly taken into consideration the implementation of immunization programs, alongside with a perfect biomedical waste management. Risks generated by the chemical and pharmaceutical waste are associated to the achievable traits of characteristics, such as: toxic, genotoxic, corrosive, and flammable, explosive, teratogenic.

The sources of pharmaceutical waste are represented by:

pills administered intra venous;

breakage of containers;

in part used vials;

unused medications;

expired medicines.

Larger amounts of such biomedical waste which are unwanted or expired chemical and pharmaceutical products are harmful. These can motive poisoning by absorption thru the skin or mucous membranes, with the aid of inhalation or by using ingestion. Chemicals and prescription drugs might also additionally determine lesions of skin, eye, and respiratory mucosa. The most common injuries are the burns. Chemical waste eliminated by way of drainage gadget may

have toxic results on ecosystems and water where are discharged. Similar consequences may also have the prescription drugs which contain antibiotics or different drugs, heavy metals, disinfectants and antiseptics.

V. NEED FOR BIO-MEDICAL WASTE MANAGEMENT

There is requirement to manage the biomedical waste due to many reasons. Although, there is an accelerated world cognizance amongst health experts about the hazards and also appropriate management techniques, however the stage of cognizance in India is observed to be unsatisfactory. First of all, accidents from sharps lead to infection to all health care providers. There are many infections that may arise in the patients from mistaken management of clinical wastes. The administration of biomedical waste has additionally emerged as vital when it comes to hygiene. There are many dangers related with mistaken disposing off the waste which can make the lifestyles of the human beings involved in taking and giving health care services depressing. "Disposable" being repacked without even washing and offered by means of fraudulent elements additionally pointed the demand for the administration of biomedical waste. Similarly, there are sure tablets which have been disposed off are being repacked and offered off through monks to fulfill their selfish greed. Further the publicity of damaging pollutants from a number types of pollution induced due to the negative administration of biomedical waste marks the necessity for the acceptable management of biomedical waste. The absence of applicable waste management, lack of focus about the fitness risks from biomedical wastes, inadequate monetary and human resources, and terrible control of waste disposal are the most integral troubles related with healthcare waste that makes the need of biomedical waste administration a necessity. Inadequate Biomedical waste management and improper management cause environmental pollution, disagreeable smell, growth and multiplication of vectors like insects, rodents and worms and may additionally lead to the transmission of diseases like typhoid, cholera, hepatitis and AIDS via accidents from syringes and needles contaminated with human. So, there is a high need for the administration of biomedical waste.

VI. MANAGEMENT BIO-MEDICAL WASTE RULES

A. Categories of Bio-Medical Waste Schedule-I

Waste Category	Type Of Waste	Treatment And Disposal Option
Category No. 1	Human Anatomical Waste (Human tissues, organs, body parts)	Incineration@ / deep burial*
Category No. 2	Animal Waste (Animal tissues, organs, body parts, carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals and colleges, discharge from hospitals, animal houses)	Incineration@ / deep burial*
Category No. 3	Microbiology & Biotechnology Waste (Wastes from laboratory cultures, stocks or specimen of live micro organisms or attenuated vaccines, human and animal cell cultures used in research and infectious agents from research and industrial laboratories, wastes from production of biological, toxins and devices used for transfer of cultures)	Local autoclaving/ microwaving / incineration@
Category No. 4	Waste Sharps (Needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)	Disinfecting (chemical treatment@@ / autoclaving / microwaving / shredding###
Category No. 5	Discarded Medicine and Cytotoxic drugs (Wastes comprising of outdated, contaminated and discarded medicines)	Incineration@ / destruction and drugs disposal in secured landfills
Category No. 6	Soiled Waste (Items contaminated with body fluids including cotton, dressings, soiled plaster casts, lines, bedding and other materials contaminated with blood.)	Incineration@ / autoclaving / microwaving
Category No. 7	Solid Waste (Waste generated from disposable items other than the waste sharps such as tubing, catheters, intravenous sets, etc.)	Disinfecting by chemical treatment@@ / autoclaving / microwaving and mutilation / shredding# #
Category No. 8	Liquid Waste (Waste generated from the laboratory and washing, cleaning, house keeping and disinfecting activities)	Disinfecting by chemical treatment@@ and discharge into drains
Category No. 9	Incineration Ash (Ash from incineration of any biomedical waste)	Disposal in municipal landfill

B. Colour Coding and Type of Container Schedule-II

Colour Coding	Type of Container	Waste Category	Treatment options as per Schedule I
Yellow	Plastic bag	Cat.1,Cat.2, Cat.3 and Cat.6	Incineration/ deep burial
Red	Disinfected container/ plastic bag	Cat.3, Cat.6, and Cat.7	Autoclaving/Micro waving/ Chemical Treatment
Blue/ White Translucent	Plastic Bag/ puncture proof container	Cat.4 and Cat.7	Autoclaving/Micro waving/ Chemical Treatment and destruction/ shredding
Black	Plastic bag	Cat.5, Cat.9, and Cat.10 (solid)	Disposal in secured landfill

VII. BIO-MEDICAL WASTE MANAGEMENT

The key steps that are used in the management of the biomedical waste are Waste minimization, Segregation, Collection, Storage, Transportation, Treatment and Disposal. Apart from these, non-infectious wastes be segregated as a separate class and these wastes shall now not be blended with other categories. The segregation of biomedical waste need to be examined because facility widespread operating tactics for biomedical waste segregation have a direct impact on kind and value of biomedical waste treatment. Each class of waste has to be saved segregated in a applicable container or bag as the case may be. Such container or bag have to have sure properties it have to be without any leakage; it should have ability to comprise the designed extent and weight of the waste except any damage; the container have to have a cover, ideally operated through foot; when a bag or container is crammed at 3/4th capability it need to be sealed and an gorgeous label has to be attached; taking into account the European and National Legislation, an enough symbol need to be pictured for all type of biomedical waste, in accordance to their code: 1) infectious waste; 2) pathological waste; 3) sharps; 4) pharmaceutical waste; 5) genotoxic waste; 6) chemical waste; 7) waste containing high content of heavy metals; 8) radioactive waste. Arrangement for separate receptacles in the storage area with distinguished show of colour code has been made in with respect to the legislation: yellow for hazardous biomedical waste and black for the non-hazardous waste. This activity has three components: collection of unique kinds of waste from waste storage baggage and containers inner the hospital, transportation and intermediate storage of segregated waste inner the premises and transportation of the waste outside the premises toward the cure or remaining disposal. There is need to transport biomedical waste for the treatment or disposal facility web site in a protected manner. The car must have certain temperature.& need to be protected and secured against unintentional opening of door, leakage etc.; the indoors of the container without sharp edges or corners in the aim to be easily washed and disinfected; there must be adequate arrangement for drainage and collection of any leakage.

VIII. TREATMENT AND DISPOSAL TECHNOLOGIES OF BIO-MEDICAL WASTE

The various technologies employed for treatment and disposal of biomedical waste are:

A. Incineration

Incineration technique is used to be the first choice for most hazardous biomedical waste and is nonetheless used widely. Incineration is a high temperature, dry oxidation process, which reduces organic and flammable waste to inorganic incombustible count number and outcomes in a very tremendous reduction of waste extent and weight. This technique is used for the waste that cannot be recycled, reused or disposed off in a land fill site. The blessings of incinerator consist of suitable disinfection effectively and drastic discount of weight and quantity of waste.

B. Autoclaving

The autoclave must be committed for the functions of disinfecting and treating biomedical waste. It operates on the precept of a strain cooker. It uses steam at a high temperature. The autoclave ought to definitely and persistently kill the accredited biological indicator at the most plan ability of each autoclave unit.

C. Microwaving

The microwave is based on the precept of technology of high frequency waves. These waves motive the particles within the waste fabric to vibrate, producing heat. With the help of the action of about 2450 MHz and a wavelength of 12.24cm most of micro-organisms are destroyed. With the help of the microwaves, the water contained inside the waste is rapidly heated and the infectious factors are destroyed by using warmness conduction.



IX. CONCLUSION

There is an integral need for high quality Biomedical Waste Management in health care hospitals to stop its consequences on personnel involved and the environment. Medical waste needs to be categorized according to their source, typology and hazard factors related with their handling, storage and disposal. There is a need for the improvement in the key steps in the administration of the biomedical waste: Waste minimization, Segregation, Collection, Storage, Transportation, Treatment and Disposal. There should be appropriate measures to be implemented in hospitals and related units to cope up with the distressing effects of waste generation. The absence of suitable waste management, lack of cognizance about the fitness risks from biomedical wastes, insufficient monetary and human resources, and terrible control of waste disposal are the most indispensable troubles linked with waste that makes the need of biomedical waste administration a necessity. There is appropriate bio medical waste administration to shield against fitness trouble of human & environment.

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