BIOMEDICAL WASTE: TYPES, RULES AND MANAGEMENT

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Abstract. According to Biomedical Waste (Management and Handling) Rules, 1998 of India "Any waste which is generated during the diagnosis, treatment or immunization of citizenry or animals or in research activities pertaining thereto or in the production or testing of biologicals. Biomedical waste is generated from biological and medical sources and activities, such as the diagnosis, prevention, or treatment of diseases. Common producers of biomedical waste include hospitals, health clinics, nursing homes, medical research laboratories, offices of physicians, dentists and veterinarians and morgues or funeral homes. The safe and sustainable management of biomedical waste (BMW) is social and legal responsibility of all people supporting and financing health-care activities. It has become more important and significant in the present period of pandemic. In the last one and half year geometric increase in the use PPE kit and other materials has exponentially increased the biomedical waste generation not only at hospitals but at our houses also. This is why effective BMW management (BMWM) is not only mandatory for healthy humans and cleaner environment but also essential for livelihood.
Keywords: *biomedical waste, waste management, rules for BMW, chemical reatment*

Introduction

Biomedical waste is drawn by solids, liquids, sharps and laboratory waste, that is generated because the results of tending activities for each masses and animals. it's dangerous thanks to its high harmful potential, not just for individuals, however conjointly for the surroundings, if it's not properly managed. For this reason, medical waste sterilization is a vital method to eliminate risks associated with handling and transport. This necessary advancement furthermore provides a guarantee to hospital administrations that square measure liable for such waste for as long because it presents a danger. Biomedical waste are often classified into four massive categories: clinical waste, laboratory waste, nonclinical waste and room waste. Infectious or venturous hospital waste represents solely a tiny low a part of the whole medical waste; nevertheless, thanks to moral queries and potential health risks, it's a attentiveness of public interest. Most venturous and toxic industrial waste is returning from clinical and hospital. solely a tiny low quantity is from domestic or industrial sources (Government of India, 2016; Sharma, 2007; Acharya and Singh, 2000; Baveja et al., 2000; Rutala et al., 1989).

Types of medical waste

General medical waste

General medical waste is not typically considered hazardous. This includes paper, plastic, and office waste. These can dispose of regularly and don't require any special handling. Infectious Medical Waste: it is waste materials that can pose a risk of infection to humans, animals, and the overall environment. This includes blood-soaked bandages, sharps waste, surgical waste, human or body parts, cultures, and swabs. Each

state has comprehensive rules for the management of infectious waste, including requirements for storage, transport, disposal, licensing, and processing.

Ghazardous medical waste

Hazardous waste is dangerous waste but isn't considered infectious to humans. Believe it or not, sharps falls into this category as well, at least sharps that have not been used, because they have the ability to puncture or harm the user. Chemotherapy agents fall into this category, as well as chemicals, such as solvents, mercury in thermometers, and lead in paint.

Radioactive medical waste

It contains radioactive material. In a medical setting, this includes radioactive therapies for tests like thallium stress tests, and other medicine therapies to treat certain cancers. Nuclear medicine uses radiation to supply diagnostic information about the functioning of a person's specific organs, or to treat them. Medical waste must be collected by a licensed medical waste hauler, as this waste disposal is closely monitored and controlled in most states. The waste must be treated and rendered harmless before it are often recycled or thrown away.

Rules for biomedical waste management

The major salient features of BMW Management Rules, 2016 include the following (Government of India, 1998);

(1) The ambit of the rules has been expanded to include vaccination camps, blood donation camps, surgical camps or any other healthcare activity.

(2) Phase-out the use of chlorinated plastic bags, gloves and blood bags within two years.

(3) Pre-treatment of the laboratory waste, microbiological waste, blood samples and blood bags through disinfection or sterilization on-site in the manner as prescribed by WHO or NACO.

(4) Provide training to all its health care workers and immunize all health workers regularly.

(5) Establish a Bar-Code System for bags or containers containing bio-medical waste for disposal.

(6) Report major accidents.

(7) The new rules prescribe more stringent standards for incinerator to reduce the emission of pollutants in environment.

(8) Existing incinerators to achieve the standards for retention time in secondary chamber and Dioxin and Furans within two years.

(9) Bio-medical waste has been classified in to 4 categories instead of 10 to improve the segregation of waste at source.

(10) Procedure to get authorization simplified. Automatic authorization for bedded hospitals. The validity of authorization synchronized with validity of consent orders for Bedded HCFs. One time Authorization for Non-bedded HCFs.

(11) No occupier shall establish on-site treatment and disposal facility, if a service of common bio-medical waste treatment facility is available at distance of seventy-five kilometres.

(12) Operator of a common bio-medical waste treatment and disposal facility to ensure the timely collection of bio-medical waste from the HCFs and assist the HCFs in conduct of training.

Materials for biomedical waste management

Many hospitals and laboratories have the resources to implement internal waste treatment processes to both reduce the volume of the medical waste in general and decontaminate certain infectious waste so that it can be disposed of as non-infectious. In general these can be divided in to two categories i.e. on site and offsite.

Onsite medical waste treatment

Autoclaving

Thermal treatment is typically used for sharps and certain other types of infectious waste. An autoclave is in essence an outsized autoclave that uses high temperatures and steam to deeply penetrate all materials and kill any microorganisms. These appliances range from 100 liters to 4,000+ liters in volume for bulk waste treatment. Modern autoclaves are also automated to minimize human involvement and therefore reduce needle-stick injuries and contamination. Decontaminated sharps and other medical waste that's been autoclaved can then be handed over to some medical waste removal vendor9 Maryland) to be disposed of as non-infectious waste. Some medical wastes like chemotherapy waste, as well as pharmaceutical waste can't be decontaminated in an autoclave.

Chemical treatment

It is used to deactivate liquid waste, chemical treatment is designed to decontaminate or deactivate certain wastes on site rather than packaging and sending them to a separate facility. Since liquids are highly vulnerable to spills, it's typically best to possess them treated as on the brink of the generation site as possible. Chemical treatment also can be applied to some non-liquid infectious wastes, but they might typically got to be shredded first to make sure that each one portions of the waste are exposed to the chemicals. Depending on the type of waste, chemicals like chlorine, sodium hydroxide or calcium oxide can be used. However, these chemicals may often produce undesirable by-products, as well as off-gas dangerous VOCs when applied. The treatment has to be executed carefully and by knowledgeable staff. An alternative of this treatment is to use solidifying agents to turn liquids into solids and direct them to some medical waste removal vendor for disposal.

Microwave treatment

It is similar to an autoclave, which also uses heat to decontaminate medical waste. These systems work best for waste that is not 100% dry or solid, as the moisture allows the heat to penetrate deeper, and the steam sterilizes. Therefore, before microwaving, most sorts of medical waste got to be shredded and mixed with water to realize the specified effect. The bonus is that shredding reduces the quantity of the waste, so it can later be land-filled.

Offsite medical waste treatment

Incineration

It is typically used for pathological and pharmaceutical waste. Incineration of medical waste should be performed in a controlled facility to ensure complete combustion and minimize any negative effects for the environment. The great thing about incineration is that it kills 99% of microorganisms and leaves very minimal waste. Incineration is a waste treatment process that involves the combustion of organic substances contained in waste materials. Incineration and other high-temperature waste treatment systems are described as "thermal treatment". Incineration of waste materials converts the waste into ash, flue gas and heat. The ash is mostly formed by the inorganic constituents of the waste and may take the form of solid lumps or particulates carried by the flue gas. The flue gases must be cleaned of gaseous and particulate pollutants before they are dispersed into the atmosphere.

In some cases, the heat generated by incineration can be used to generate electric power. Incinerators reduce the solid mass of the original waste by 80-85% and the volume by 95-96%, depending on composition and degree of recovery of materials such as metals from the ash for recycling. This means that while incineration does not completely replace land filling, it significantly reduces the necessary volume for disposal. Garbage trucks often reduce the volume of waste in a built-in compressor before delivery to the incinerator. Incineration has particularly strong benefits for the treatment of certain waste types in niche areas such as clinical wastes and certain hazardous wastes where pathogens and toxins can be destroyed by high temperatures. Examples include chemical multi-product plants with diverse toxic or very toxic wastewater streams, which cannot be routed to a conventional wastewater treatment plant (Bano et al., 2017; Vilavert et al., 2015; Mattiello et al., 2013; Nema and Ganeshprasad, 2002).

Land disposal

Land disposal is typically used for shredded, treated and decontaminated waste. In certain cases, it can also be used for hazardous waste or other untreated waste that cannot be decontaminated by other means. Specialized sanitary landfill sites exit to reduce the risk of soil and water contamination and provide a safe space for medical waste disposal.

Conclusion

There is a clear scarcity in the education and social system about the bio medical waste. Academic institutions, hospitals, NGO’s and government should pay more attention towards policies for the disposal of wastes and proper management to ensure improvement and adequacy in the medical waste management practices. Moreover there is need to be incorporated into regular worker training, continuing education, and management evaluation processes for systems and personnel. A waste management unit should be placed not only at hospitals but at all places particularly in the present scenario.

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Conflict of interest

There are no conflict of interest involve any parties in this research study.

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