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Management of Biomedical Wastes

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Description

All people who support and finance health-care activities bear social and legal responsibility for the safe and sustainable management of biomedical waste (BMW). For healthy persons and a cleaner environment, effective BMW management (BMWM) is required. Biomedical waste (BMW) is any waste generated during the diagnosis, treatment, or immunization of human or animal research subjects, or during the creation or testing of biological or health-related products. It takes a cradle to grave approach to BMW, which includes classification, quantification, segregation, storage, transportation, and treatment. The 3Rs philosophy, which stands for reduce, recycle, and reuse, is the foundation of good BMW behavior. Rather of disposal, the finest BMW management (BMWM) systems strive to avoid waste formation or recover as much trash as feasible. Prevent, reduce, reuse, recycle, recover, treat, and finally discard are the many strategies of BMW disposal, in order of their desirability. As a result, waste should be dealt with at the source rather than at the "end of the pipe." Any facility where BMW is treated, disposed of, or processes related to such treatment and disposal is referred to as a BMW treatment and disposal facility. Only approximately 10%–25% of BMW is dangerous, with the rest 75%–95% being nonhazardous. The hazardous waste poses a physical, chemical, and/or microbiological risk to the general public and health-care personnel as a result of waste processing, treatment, and disposal.

Excessive waste has been generated at the centers of care as a result of the growth in procedures performed at various health care facilities. Health-care workers with sufficient knowledge of biological waste management norms and regulations, as well as a grasp of segregation, will be able to dispose of trash more efficiently in their particular businesses. Acceptable biomedical waste management starts with waste generation and continues with waste segregation at the source, storage on site, disinfection, and transfer to the final disposal site. As a result, the employees of health-care institutions must have proper knowledge, attitudes, and behaviors. Although several research on biomedical waste management have been undertaken around the country, the majority of them have taken place in advanced health care facilities and tertiary care facilities. As a result, there was an immediate need to review BMW awareness practices and concerns at all levels of HCFs, from large health institutes to tiny clinics. As a result, efforts have been made in both the commercial and public sectors to investigate biomedical waste management at all levels of health care, from the most basic (sub-center) to the most advanced (medical college, district hospital) [1-3].

The several novel technologies for BMW disposal are divided into four categories: thermal, chemical, irradiative, and biological processes. The majority of these are currently being researched. Low, medium, and high thermal processes are the three types of thermal processes. Microwaves and autoclaves are examples of low-heat technologies that operate between 93°C and 177°C. Steam is utilized as a sterilizing procedure in autoclaves. Gravity/downward displacement and prevacuum/high vacuum are the two methods for removing air pickets in autoclaves. These are preferable because air evacuation is more effective in autoclaves with a prevacuum or several vacuum cycles. If waste must be made unrecognizable or the volume of waste must be reduced, a shredder or grinder should be employed. Because the evacuated air may contain germs, it is cleaned before being released into the environment by passing through a high-efficiency particulate absolute (HEPA) filter. All infectious waste is sterilized in an autoclave, including cultures, human waste, laboratory trash, soft waste (gauze, bandages, and gowns), sharps, and medical tools.

Reverse polymerization and thermal depolymerization are two medium heat processes that operate between 177°C and 540°C. This includes using high-energy microwaves in a nitrogen atmosphere to break down organic materials in BMW. The internal energy of the waste increases as it absorbs microwave energy, and chemical disintegration occurs at the molecular level. Because nitrogen creates an oxygen-free atmosphere, combustion is prevented. The garbage is then mutilated with shredders. Pyrolysis – oxidation, plasma pyrolysis, induction-based pyrolysis, and lase-based pyrolysis are examples of high heat technologies that operate between 540°C to 8300°C. Inside the pyrolysis chamber, organic solid and liquid waste evaporate at a high temperature (about 594°C), leaving inert ash, glass, and metal pieces behind. The second phase involves burning of the vapors in a chamber at 982°C–1093°C, with clean exhaust steam emitted subsequently [4,5].

Conflict of Interest

None.

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