

Bio-Medical Waste Management in the Hospitals of Kerala: with special reference to the Ayurveda Hospitals in Malappuram District

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Abstract

The health care and bio-medical waste management is very different for hospitals from the waste management of other industries. Bio-medical waste management is one of the biggest challenges of the present days as it is hazardous and is having a direct impact on the health of human beings. It's safe and proper disposal is extremely important. For proper disposal of bio-medical waste, the Ministry of Environment and Forests has published the Bio-Medical Waste Rules, 1998. This review explains the hospital waste management and the environmental problem in India. The present study focuses on the problems associated with the Bio-medical waste management in Ayurveda hospitals in Kerala with special reference to Malappuram District. In the past, medical waste was often mixed with municipal solid waste and disposed in nearby landfills. In recent years, many efforts have been made by the environmental regulatory agencies for the better management of the biomedical waste.

Key Words: Bio-medical waste, waste management, hazard

INTRODUCTION

Bio-Medical Waste is any waste which is generated during the diagnosis, treatment or immunization of human beings or in research activities pertaining there to or in the production or testing of biologicals. The World Health Organization states that 85% waste is actually non-hazardous, whereas 15% is hazardous. Among hazardous waste 10% are infectious and 5% are non infectious. Infectious waste is discarded pus, unwanted microbiological cultures, other human and animal tissues etc.

Most of the waste is generated as a result of human activities. Such waste may be dangerous which requires safe disposal. Industrial waste, sewage and agricultural waste pollute water, soil and air and causes damage to human beings and the environment. Solid waste can be classified into different types depending on their source. It includes (a) House hold waste (b) Industrial waste (c) Bio-medical waste or hospital waste or infectious waste. Hospital waste is considered as hazardous because they contain toxic substances. Liquid waste can be divided into two components (a) Liquid reagents/chemicals discarded and (b) the cleaning and washing water channeled into the drain. Until recently, medical waste management was not generally considered an issue. In the 1980s and 1990s, concerns about exposure to human immunodeficiency virus (HIV) and hepatitis B virus (HBV) lead to questions about potential risks inherent in medical waste. Thus, hospital waste generation has become a prime concern due to its multidimensional ramifications as a risk factor to the health of patients, hospital staff and extending beyond the boundaries of the medical establishment to the general population. Hospital waste refers to all waste, biologic or non biologic that is discarded and not intended for further use. Medical waste is a subset of hospital waste; it refers to the material generated as a result of diagnosis, treatment or immunization of patients and associated bio-medical research. Biomedical waste (BMW) is generated in hospitals, research institutions, health care teaching institutes, clinics, laboratories, blood banks, animal houses and veterinary institutes. Biomedical waste is also known as infectious waste or medical waste. Improper management of infectious waste is hazardous. Un-segregated waste causes environmental issues which leads to the health of the community.

Proper handling, treatment and disposal of bio-medical wastes are important elements of health care office infection control programme. The quantity of the waste generated is equally important. A lesser amount of bio-medical waste is cost effective and less burden. Hence healthcare providers should reduce the waste generation. To protect the environment and community health, the Ministry of Environment and Forest ensure safe and environmentally sound management of waste. Lack of awareness, cost factor and concern are the problems of waste management. Effective and safe management of waste is an environmental and social necessity.

Inadequate bio-medical waste management will cause environmental pollution, unpleasant smell, growth and multiplication of vectors like insects, rodents and worms. It may lead to the transmission of diseases through injuries from syringes; needles contaminated with human discarded blood. It can even endanger the society. Effective segregation only can ensure effective bio-medical waste management. The bio-medical waste must be segregated in accordance to the guidelines laid down under schedule I of Bio Medical Waste Management (Amendment) Rules, 2018.

As per the above rules, the duration of the storage should not exceed for eight to ten hours in big hospitals (More than 250 bedded) and 24 hours in nursing homes. The quantity of bio-medical waste generated will vary depending on the hospital policies and practices and the type of care being provided. The bio-medical waste management goes through the seven steps like Characterization, Quantification, Segregation, Storage, Transportation, Treatment and Disposal.

GOVERNMENT OF INDIA MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE NOTIFICATION New Delhi, the 28th March, 2016 notifies that this declaration belongs to all Ayush hospitals as well. The entire bio-medical waste generated in the state of Kerala is scientifically segregated at source, transported to IMAGE – CBWTF (The one and only Common Bio-medical Waste Treatment Facility in Kerala) is a set up where bio-medical waste generated from a number of healthcare units, is imparted necessary treatment to reduce adverse effects that this waste may pose and is treated as per norms. IMAGE is a prestigious project of Indian Medical Association, Kerala State Branch developed for the scientific handling and management of bio- medical waste generated from healthcare facilities in Kerala.

CBWTF, as an option has also been legally introduced in India. The Bio-medical Waste (Management & Handling) Rules, 1998, gives an option to the bio-medical waste generator that such waste can be treated at the common bio-medical waste treatment facility. The Second Amendment of the Rules in June, 2000, further eased the bottleneck in upbringing the CBWTF by making Local Authority responsible for providing suitable site within its jurisdiction (www.imageima.org).

Research Analysis

The Government has formulated the bio-medical waste management, (Amendment) Rules, 2018 in order to specify the procedures in the management and the disposal of waste in the Ayush hospitals. The rules are applicable to all hospitals, nursing homes etc. in the country and also apply to all persons who generate, collect, receive, store, transport, treat, dispose or handle bio-medical waste in any form.

Bio medical Waste Management Process:

The bio-medical waste handling, segregation, disinfection, storage, transportation and final disposal are vital steps for safe and scientific management (Acharya and Singh Meeta 2000). The most appropriate way is that it has to be segregated into containers or bags at the point of generation (Rules 2018).

Classification and Management of Bio Medical Waste:

Bio-medical waste in the hospital management can be classified, segregated & packed in four categories, that is, Yellow, Red, White and Blue. The diagram given below shows the various treatments and disposal options.

Classification and management as per BMW rules 2016-schedule 1: 1 Yellow 2- Red.

Category 1 Yellow

- a. Human anatomical waste.
- b. Animal anatomical waste.
- c. Solid waste.
- d. expired or discarded medicines.
- e. Chemical waste.
- f. Chemical liquid waste.
- g. Discarded linen.
- h. Microbiologically bio-technology & clinical laboratory waste.

Treatment and disposal options.

- a. Incineration/ plasma/ pyrolysis deep burial.
- b. In absence of above autoclaving/ micro-waving /hydroclaving followed by shredding mutilation or combination of sterilization and shredding.
- c. Treated waste to be sent for energy recovery.

Category 2 Red.

Contaminated waste (Recyclable).

- a. Waste generated from disposable items such as tubing bottles intravenous tubes and sets. Catheters urine bags syringes (without needles and fixed needles syringe) vacutainers with their needles cut gloves.

Autoclaving or microwaving /hydroclaving followed by shredding. /mutilation or combination of sterilization and shredding.

- b. Treated waste to be sent to registered or authorized recyclers. 44 energy recoveries for plastics to diesel or fuel oil or for road making whichever is possible.

Plastic waste should not be sent to land fillers.

Classification and management as per BMW rules, 2016 Schedule 1: 3 White and 4 Blue

Category 3 White Translucent.

- a. Waste sharps including metals: needles syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades or any other contaminated sharp object that may cause puncture and cuts.
- b. This includes used, discarded and contaminated metal sharps.

Treatment and disposal options

- a. Autoclaving or Dry Heat Sterilization followed by Shredding/, mutilation /encapsulation in the metal container or cement concrete.
- b. Combination of shredding come autoclaving sent for final disposal to iron foundries. (having consent to operate from PCB)
Or sanitary landfill or designated concrete waste sharp pit.

Category 4 Blue.

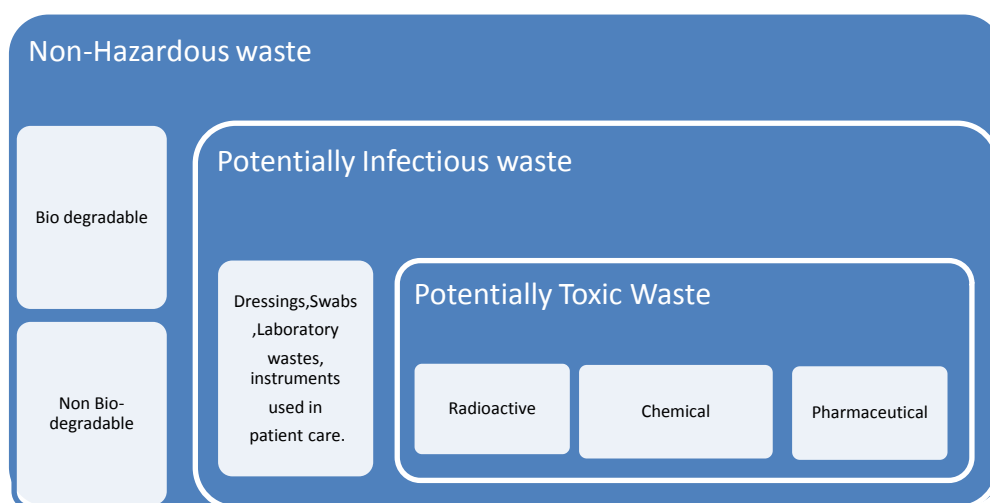
- a. Glassware:

Broken/ discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.

- b. Metallic Body Implants.

Disinfection

- a. Through autoclaving or microwaving or hydroclaving and then sent for recycling or (by soaking the washed glass waste after cleaning with detergent and Sodium Hypochlorite Treatment)
- b. Disinfection followed by recycling



Management of hospital waste includes human anatomical waste, animal anatomical waste, soiled waste, expired or discarded medicines, chemical waste, and chemical liquid waste, and discarded linen microbiologically, biotechnology & clinical lab waste. In the

case of Ayurveda hospitals the hospitals have discarded linen, Kizhi (medicated potly) clothings, Langotti, Vasthi (medicated enema) nostle, Catheters, Urine bags ,Syringes(without needles) etc.

Current Scenario& the quantity of the waste generated:

The Biomedical waste treatment &handling (Regulation) Act of 1998 passed by Parliament was made to ensure the proper disposal of Biomedical waste .Kerala is having the highest number of healthcare institutions in India. About 27% of all the HCEs (Healthcare Establishments) in India are located in Kerala. The total number of hospital beds in Kerala is 1.3 Lakhs (No: of beds in Govt.43, 273, No. of beds in Private 80000).The total waste generation rate in Kerala is 0.5 to 2.0Kg per bed per day. It is noted that 30-35% of the total solid waste generated in HCE is Bio Medical Waste. As per the records in the Indian Medical Association in Kerala, the total Bio-medical waste quantity generated in whole Kerala is 50-60 tons per day (including the registered AYUSH Hospitals).

Affiliation Status on 31 Dec 2018

Private HCI	10782
Govt	658
ESI	16
Total HCI	11446

The solid waste from the hospitals consists of bandages, linen and other infectious waste (30-35%), plastics (7- 10%), disposable syringes (0.3-0.5%), glass (3-5%) and other general wastes including food (40-45%).The IMAGE Plant (CBWTF) at Palakkad presently has the capacity to treat about 40 tons of Biomedical waste per day. 80-85% of the total Bio –Medical Waste in Kerala is being disposed through IMAGE. The number of CBWTF’s in India is 168 in as per the affiliation status as on 31.12.2017 the number of Private Affiliated HCI is 10762,the number of Govt. HCI is 658.The details from the IMAGE Centre shows that the bio-medical waste handled in 2016-2017 is 13,132 Tones.

Approximately 75 to 85% of the bio-medical waste is non- hazardous and non- infectious as any other general waste. The remaining 10 to 15% are infectious or hazardous waste which can be injurious to humans or animals and the remaining 5 to 10% is hazardous. It is important that the mixing of whole waste becomes harmful. Apart from these, the WHO classified medical waste into eight categories such as general wastes, Pathological, Radioactive, Chemical, Infectious to potentially infectious wastes, Sharps, Pharmaceuticals, Pressurized containers. But as per the Ministry of Environment and forest, Govt. of India (1998) has notified Bio-Medical Waste (Management &Handling) Rules-1998 which describes 10 categories.

Constitution of hospital waste:

Ingredients	Average (% by wet weight)	Standard Deviation
Paper	7.96	1.37
Plastic, PVCand rubber	6.89	1.67
Bandages, cotton clothes etc.	38.33	11.92
Disposable syringe	2.46	3.48
Glass	5.23	2.45
Inert	5.42	2.31

Problems associated with bio-medical wastes

Bio-medical waste is produced in all conventional medical units where treatment of (Human or Animal) patients is provided. The health care waste is exposed to a certain risk for doctors, medical nurses, patients, visitors and workers. The treatment and disposal techniques involve autoclaving, incineration, Thermal inactivation; Gas or Vapor sterilization etc. The unauthorized treatment of biomedical waste lead to virus, bacteria and parasite attacks which lead to different diseases.

Study Sample

The study was conducted in different healthcare settings in Malappuram District which carry more than 200 beds. Data were collected from various hospitals.

Results of the Study

Shortcomings in the existing system

The medical facilities are growing day by day. Waste Management has become overburdened. The mixing of infectious waste with that of the noninfectious waste became a problem. As far as Kerala is concerned IMAGE is the only center where this CBMWTF exists. The question today is whether Kerala is equipped to meet and manage the bio-medical waste generated in the State. As the affiliation for Ayush hospitals came in 2016 only, most of the Ayurveda hospitals have yet to take affiliation. The shortcomings in the existing systems are:

1. The Ayurveda Hospitals in Kerala is yet to get affiliated in IMAGE. There are hospitals that are not registered in IMAGE yet.
2. General awareness among the hospital staff is lacking.
3. The existing system won't collect the treatment waste completely even though it comes under biomedical waste (ie. in touch with the human body)
4. The hospitals should concentrate more on color-coding, it's storage, personal protective equipment etc.

Threats due to poor waste management

The poor waste management leads to risk towards the health of the general people, patients, and professionals directly or indirectly. The healthcare workers should take adequate precautions from the handling of infectious sharps.

Recommendations and follow up actions

The healthcare facilities should ensure segregation & colour coding primarily. The management should be alert to provide timely training to ensure personal safety of the workers & for the proper segregation. The management should also ensure the delivery of personal safety equipment to all the waste handling staff. All the hospitals should have the affiliation with IMAGE for the safe treating of bio-medical waste. The Govt. regulatory bodies should ensure a few more CBMWTF for the safe handling of waste for a safe, secure & pollution free Kerala.

Conclusion

Safe and effective management of waste is not only a legal necessity but also a social responsibility. Lack of concern, motivation, awareness and cost factor are some of the problems faced in the proper hospital waste management. Proper waste management is possible only through systematic planning of an effective waste management system, spread of awareness among the various categories of people involved, ensuring participation of everyone, proper training of personnel, segregation and pre-treatment at first stage, appropriate Storage, and timely disposal. A strategy needs to be articulated based on reduce, recover, reuse and dispose. To conclude, health care management should go beyond data collecting, execution of principles and acquirement of better

paraphernalia on all records and thus all clean. The quantity of waste generated is equally important. A lesser amount of biomedical waste means a lesser burden on waste disposal work, cost saving and a more efficient waste disposal system. Hence, the healthcare providers should always try to reduce the waste generation in day to day work in the clinic or at the hospital. It can be concluded from the present study that there are poor levels of knowledge and awareness about Bio Medical waste generation hazards, legislation and management among health care personnel's. Regular monitoring and training are required at all levels.

It is just not the laws abide compliance but the social responsibility of every Healthcare Establishment to say **“No to hazard of biomedical waste.”**

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