

Bio-medical Waste Generation and Management in Various Hospitals in Dhule City of Maharashtra, India

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Abstract

Medical care is vital for our life and health, but the waste generated from medical activities represents a real problem of living nature and human world. Improper management of waste generated in health care facilities causes a direct health impact on the community, the health care workers and on the environment. Every day, relatively large amount of potentially infectious and hazardous waste are generated in the health care hospitals and facilities around the world. This research article is to survey the practice of biomedical waste such as collection, storage, transportation and disposal along with the amount of generated biomedical waste in various hospitals in Dhule city, and create awareness among the staff and patient about biomedical wastes. The survey result on biomedical waste generation, disposal and methods adopted in various hospitals of Dhule city are discussed.

Keywords

Biomedical waste, Hospital waste, Dhule city



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INTRODUCTION

The biomedical waste is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining there to, or in the production or testing of biological components. The proper management of biomedical waste has become a worldwide humanitarian topic today. Although hazards of poor management of biomedical waste have aroused the concern world over, especially in the light of its far-reaching effects on human, health and the environment.¹ According to Biomedical Waste (Management and Handling) Rules, 1998 of India “Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biological.²Hospital is one of the complex institutions which are frequented by people from every walk of life in the society without any distinction between age, sex, race and religion. This is over and above the normal inhabitants of hospital i.e., patients and staff. Biomedical waste is mainly classified as biological and non biological waste, some waste maybe infectious or non infectious. Operation theatre, intensive care units,

dialysis room, Laboratory, corridor etc are main location of source of waste in health care. Improper medical waste management is alarming and it poses a serious threat to public health. Medical waste contains highly toxic metals, toxic chemicals, pathogenic viruses and bacteria (Chintis et al, 2004)³.This can lead to pathological disinfection of the human body (Ray 2005)⁴. Medical waste poses high risk to doctors, Nurses, technicians, sweepers, hospital visitors and patients due to arbitrary Management (Becher et al, 2002)⁵.

World Health Organization states that 85% of hospital wastes are actually non-hazardous, whereas 10% are infectious and 5% are non-infectious but they are included in hazardous wastes. About 15% to 35% of Hospital waste is regulated as infectious waste. This range is dependent on the total amount of waste generated (Glenn and Garwal, 1999)⁶.

The Biomedical waste treatment and disposal are to be done very carefully, as it is infectious in nature. Considering the then level of information and knowledge, the Government of India has specifically laid down the treatment and disposal options. All health care institutions are required to follow this without fail. As per the Rule, the

biomedical waste has to be treated and disposed of in accordance with options suggested under Schedule I, and in compliance with the standards prescribed in Schedule V of the Rule.⁷

Storage and collection of waste in colour-coded containers is based on the treatment adopted. The treatment options for biomedical waste as per the Schedule I of the Rules are incineration, deep burial, autoclave, microwave, chemical treatment, destruction and shredding, and disposal in secured landfills⁸. Disinfection refers to procedures, which reduce the number of microorganisms on an object or surface but not the complete destruction of all microorganisms or spores. Sterilization on the other hand, refers to procedures, which would remove all microorganisms, including spores, from an object. Sterilization is undertaken either by dry heat (for 2 hours at 170°C in an electric oven - method of choice for glass ware and sharps) or by various forms of moist heat (i.e. boiling in water for an effective contact time of 20 minutes or steam sterilization in an autoclave at 15 lb/ sq inch at 121°C for 20 minutes.⁹

Methodology:

Following Hospitals are selected for surveying the biomedical waste in Dhule city

1. Government Hospital (GH) - 560 beds
2. Private Hospital -Siddheshwar Hospital (SiH) 230 beds
3. Private Hospital- Seva Hospital (SH) 150 beds
4. Private Hospital –Niramaya hospital (NH) 120 beds

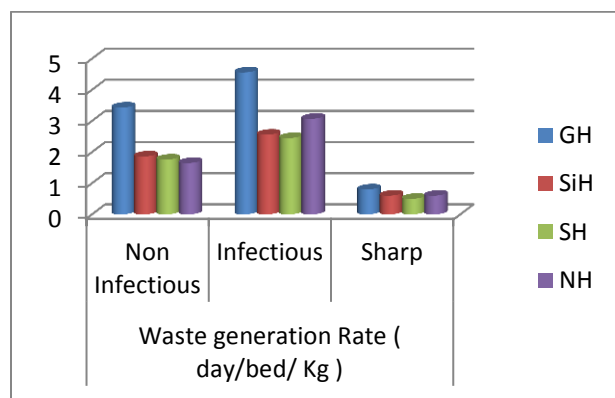
Methods of storage and segregation at ward, department, internal transportation, external transportation and final disposal were studied for all four hospitals by direct observation.

Informal discussion with various hospital functionaries were carried out. Common regional facility for final disposal of infectious waste was also studied. Wastes generated in four hospitals (Table 1) were weighed during a week for each hospital in three shifts for a period of one month. Interview with the committee members of hospitals & workers.

RESULT AND DISCUSSION

Table 1 Rate of Waste Generation and Hospital Waste in Dhule city

Hospital Code	No of Bed	Waste generation Rate (day/bed/ Kg)			
		Non Infectious	Infectious	Sharp	Total
GH	560	3.43	4.56	0.8	8.79
SiH	230	1.86	2.56	0.6	5.02
SH	150	1.76	2.45	0.5	4.71
NH	120	1.65	3.07	0.6	5.32



Non-infectious, infectious and sharps wastes from outpatient and in-patient services in hospitals were collected separately and weighing with accurate scales each types of waste were recorded on special data form. Following these procedures, the wastes were transported to a special site for storage and final disposal. The data collected through the questionnaires and the quantities of infectious, non- infectious and sharp wastes were tabulated and analyzed in terms of kg/bed/day. These data were used to determine the quantities of wastes generated by each ward of the hospital. The data was

tabulated, coded and analyzed. Segregation of waste at source including radioactive, infectious, non-infectious and sharp waste with proper color coding were done in all hospitals and stored in separate containers. Pharmaceutical waste and cans packed under pressure were disposed along with infectious waste in all hospitals. Liquid pharmaceutical waste was poured into the sewer.

The study revealed that the total amount of waste generation rate (Table 1) in all hospitals was 23.84 kg/day, which includes 8.70 kg (37.82%) of Non-infectious waste 12.64 kg (54.95 %) infectious waste and 2.5kg (10.86%) of sharp waste. The average of waste generation rate in the hospitals was estimated to be 5.96 kg/bed/day which included 2.17 kg/bed/day non-infectious waste, 3.16Kg/bed/day infectious waste and 0.62 kg/bed/day sharp waste.

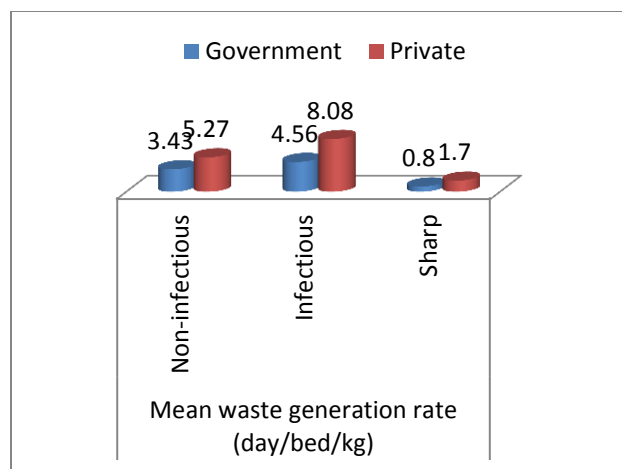
The results revealed that in all hospitals, the wastes were collected at the morning of each

day, and then collected wastes were transported to a temporary storage area by the hospital staff. The medical wastes were collected by trolley. The staff employed for handling the wastes in all hospitals used personal protective equipment with Apron, gloves mask and boots Containers (trolley) with coding and capacity 250 liters that have cover were used in all hospitals. At the morning waste are moving it outside of wards in hospitals and cleaning staff knot bags and collected all bags that existed in different coding containers (A for infectious, B for non-infectious and C for sharps) manually and transported to the containers located outside of ward and then moving these containers to storage room. It is observed that in some hospitals cleaning workers collected all infectious and non-infectious waste and closed the corner of wards before transporting wastes to containers outside wards. In this study, private hospital used incineration for almost sharps, placenta and waste of patients that

have Hepatitis. Incinerator had problems with regard to temperature, height of the smoke stack and rate of smoke production, and some personnel and workers had complained about smoke and bad smell due to incineration of waste. Waste transportation from hospitals was done in Dhule. Municipality and the waste containers had 250 liters capacity and person who carrying infectious waste have protective Clothes Including boots, musk, gloves, uniform with white colure that carrying waste of hospital every day. Sharps and infectious waste were buried in the final disposal site in specific burial sites outside of the city. Non-infectious waste was treated and as house garbage by Municipality. All hospitals disposed of their non-infectious wastes at the site of municipal garbage and the infectious and sharps wastes were buried in pits and covered with clay and lime at specific landfills sites or burial site of the city.

Table 2 Waste generation rate (kg/bed/day) in Dhule city hospital

Hospital	Mean waste generation rate (day/bed/kg)			
	Non-infectious	Infectious	Sharp	Total
Government	3.43	4.56	0.8	8.79
Private	5.27	8.08	1.7	15.05
Total	8.7	12.64	2.5	23.84



waste management thus will cause environmental pollution, unpleasant smell, growth and multiplication of vectors like insects, rodents and worms and may lead to the transmission of diseases like typhoid, cholera, hepatitis and AIDS through injuries from syringes and needles contaminated with human

CONCLUSION

According to survey of biomedical waste in Hospitals of Dhule city it was found that conditions of biomedical waste management in the Siddheshwar hospital Dhule were better as compared to other three hospitals. Hospital personnel were trying to meet the current needs and standards. It was observed that most of the authorities, administrators and other hospital staff were not concerned about the damage to the society and the environment around them due to in appropriate handling and disposal of biomedical waste. Lesser amount of biomedical waste means a lesser burden on waste disposal work. Cost saving and efficient waste disposal system is necessary. Hence, hospital should providers always try to reduce wastegeneration in day-to-day work in hospitals. Inadequate Bio-Medical

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