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Biomedical Waste Management : Odisha Perspective

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ABSTRACT

Management of biomedical waste is a burning issue not only in India but also around the globe. With increase in population, the quantity of biomedical waste is also growing. It is absolutely necessary to improve the process of collection, segregation, storage, transportation, treatment and disposal of the waste in a safe manner to avoid contamination. The waste should be tackled at source rather than end of pipe approach. This paper examines the current status of level of biomedical waste in Odisha. It also addresses the impacts of these biomedical wastes and the strategic measures taken up by the State Government of Odisha.

Keywords Biomedical waste, Segregation, Disposal, Contamination, Treatment.

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INTRODUCTION

Medical care is vital for our life and health but the health care institutions which are responsible for care of morbid population are producing voluminous quantity of rubbish, garbage and biomedical waste matter everyday. 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. Indiscriminate disposal of biomedical Waste (BMW) or hospital waste and exposure to such waste possess serious threat to environment and human health that requires specific treatment and management prior to its final disposal. To be more specific, in India biomedical waste management is deficient at both micro and micro levels. Therefore, there is an urgent need for improving systems capacity and greater resource commitment.

Biomedical waste

Biomedical waste (BMW) is any waste produced

during the diagnosis, treatment, or immunization of human or animal research activities pertaining there to or in the production or testing of biological or in health camps (Laboratory diagnosis, bio safety and quality control). Out of total biomedical waste produced only 10% –25% is hazardous which includes : Dressings and swabs contaminated with blood, pus and body fluids. Laboratory waste including laboratory culture stocks of infectious agents. Potentially infected material : Excised tumors and organs, placenta removed during surgery, extracted teeth. Potentially infected animals used in diagnostic and research studies. Sharps, which include needle, syringes, blades. Blood and blood products.

Sources of biomedical wastes

The main sources of biomedical waste are hospitals, medical clinics, laboratories and pharmaceutical factories (Dhruv et al. 2014). Other sources include : Blood donation camps, Slaughter houses, Cosmetic services, Vaccination centers, Funeral services.

Biomedical waste management

Biomedical waste management is the sustainable treatment of wastes generated from different health care units to make it safe for subsequent handling and disposal. The various methods of BMW disposal, according to their desirability, are prevent, reduce, reuse, recycle, recover, treat and lastly dispose (Chartier et al. 2014).

Steps involved in biomedical waste management

Segregation of waste at source

It is the process of placing the right kind of waste into specified color coded bags. This not only separate and reduce the incinerable and autoclavable wastes but also reduce the cost of operation by separating and reducing wastes other than biomedical wastes.

Waste collection and transportation

Segregated wastes are collected in non-chlorinated, bar-coded and color coded plastic bags from different health car units and shifted to common collection point by health care establishments. Then the operator transports the collected wastes in GPS-enabled closed container vehicles and unload in separate treatment area.

Waste treatment

Waste treatment can be effectively performed by three operations running parallel to each other

A disinfecting unit-It is one that will effectively kill all the micro-organisms. Autoclaving, Microwaving, Hydroclaving and Chemical disinfection processes are the most prevalent technologies used for disinfection of pathogens from the biomedical wastes.

A destruction unit-It is one that will completely destroy the wastes into safe end products. High temperature incinerators are used to achieve this. Incineration is a process of combustion producing combustion gases and non-combustible residues and ash. Combustible gases after treatment are vented into air through Air Pollution Control Devices (APCs) and non-combustible residues are disposed of securely into a landfill.

Waste storage

It is an option for effective storage of certain hazardous wastes like mercury and cytotoxins that do not have a cost-effective treatment technology as yet.

Waste disposal

It is primarily performed by deep burial of wastes into secure landfills. In cases of disinfection waste material, post-disinfection needs to be land filled and in case of incineration the non-combustible residue and ash needs to be disposed of into a secure landfill. Ash residue from high temperature incineration and other material residues from the process is collected into containers/bags and is stored at temporary ash storage shed and is disposed into secured landfill periodically after sufficient accumulation.

Table 1. Bacteriological profile of biomedical wastes

Bacteriological profile	No. of cases (%) (n=136)
Coagulase negative staphylococci	12 (8.82)
Enterocooci	05 (3.67)
Escherichia coli	31 (22.79)
Staphylococcus aureus	25 (18.38)
Klebsiella sp.	12 (8.82)
Pseudomonas sp.	40 (29.4)
Proteus vulgaris	08 (5.88)
Citrobacter sp.	03 (2.20)

Case study

Bacteriological profile of biomedical waste

A case study was conducted in Sharda hospital, Greater Noida with an aim to find out bacteriological profile of biomedical waste (Table1). A total of 500 biomedical waste samples were studied out of which 136 samples of biomedical waste showed growth of bacteria. *Pseudomonas* species was the predominant bacteria isolated from these cultures (Vichal et al. 2011).

Biomedical waste management: A case study of Gandhinagar Hospital, Jammu

A case study was carried out in Gandhinagar Hospital, Jammu for three months. Samples of wastes generated from hospital were monitored and it was found that : The average solid waste generated per bed/day and per bed/month has been calculated as 632.04 g and 18960.7 g. The quantitative analysis of the waste reveals that the biodegradable waste accounts 67.28% followed by non-biodegradable wastes 32.72% (Fig.1, Asif and Deepika 2014).

Common Bio-Medical Waste Treatment Facilities (CBWTF)

Common Bio-Medical Waste Treatment Facilities (CBWTF) is a set up where biomedical waste generated from member health care facilities is imparted necessary treatment to reduce adverse effects that this waste may pose on human health and environment. Installation of individual treatment facilities by every health care units requires high capital investment, separate human power and infrastructure for propel

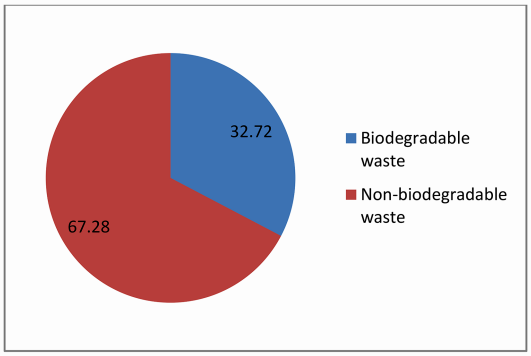

Fig. 1. The quantitative analysis of the waste.

operation and maintenance of treatment systems. The concept of Common Bio-Medical WasteTreatment Facilities (CBWTF) not only addresses such problems but also prevents proliferation of treatment facilities (Bio-Medical Waste Management Rules 2016).

In India, total bio-medical waste generation is 484 TPD from1,68,869 healthcare facilities (HCFs) out of which 447 TPD is treated. There are 198 common bio-medical waste treatment facilities (CBMWF) in operation and 28 are under construction 21,870 healthcare facilities (HCFs) have their own treatment facilities and 1, 31, 837 HCFs are using the CBMWFs.

Odisha scenario

Due to increase in number of health care units in Odisha, huge amount of biomedical waste such as body parts, organs, tissues, blood and body fluids along with soiled linen, cotton, bandage and plaster are produced. Disposal of this biomedical waste requires special attention since this can create major health hazards (State Pollution Control Board, Odisha).

In our State, the health care units have been asked to obtain authorization from the Odisha State Pollution Control Board (OSPCB) for disposal of waste in an organized way. As per inventory the health care facilities under authorization administration of SPCB is given below :

Government HCFs	Private HCFs & Others (Public Sector, Trust & Central Govt.)
1646	1978

On the basis of Annual Report of 2018, total biomedical waste generation is 14564.0 kg/day from 3259 HCFs and out of which 3391.0 kg/day is treated at common facility and total biomedical waste treated and disposed by captive treatment facilities is 11173.0 kg/day. Earlier the waste management facility was available in three medical college and hospitals namely Shishu Bhavan, Capital Hospital, Rourkela Government Hospital (RGH) and all district headquarter hospitals (DHHs). Whereas, now it is provided to all 27 Sub-Divisional Hospitals, 79 Area Hospitals and 377 CHCs besides 1,226 PHCs. There is one private Common BMW Treatment Facility at Tangiapada, Khurda. The biomedical waste treatment and disposal facilities available at three Government medical colleges and hospitals, and one Government hospital are being utilized by nearby HCFs.

Policy options

Government of India in the Ministry of Environment and Forest had promulgated Biomedical Waste (Management and Handling) Rules, 1998 thereby providing a regulatory framework for management of BMW generated in the country. The said Rule was amended subsequently and at present BMW Management Rule 2016 is in force. In accordance with the said Rule, State Government has constituted an Advisory Committee under the Chairmanship of State Health Secretary to review all matters related to implementation of the said Rules. Accordingly Government of Odisha have constituted the State level Advisory Committee vide Order No-ME-1-IIM-03/2019-6446/H. Dtd-07.03.2019 of Health & Family Welfare Department, Odisha.

Action taken by State Pollution Control Board, namely, SPCB has published notices in local newspaper to draw attention of the occupiers of Health Care Establishments (HCEs) and operators of Common Biomedical Waste Treatment and Disposal Facilities (CBWTDFs) regarding statutory provisions of the Rules and furnishing necessary compliance. All the occupiers of HCFs and operators of CBWTDFs were requested to phase out use of chlorinated plastic bags, containers and gloves through paper notice. All the occupiers of HCFs were requested for establishing a Bar-Code System and the operators of CBWTDFs were requested for establishing a Bar-Code System and GPS through paper notice. All the existing BMW incinerator operators were requested to comply with the emission standardsfor treatment and disposal of bio-medical waste prescribed under Schedule-II of the BMWM Rules, 2016 for retention time in secondary chamber and Dioxins and Furans through paper notice. All the occupiers of HCFs were requested through paper notice not to develop onsite treatment facility if a CBWTDF is located at 75 km distance. One time authorization is granted to the non-bedded HCFs after notification of the Biomedical Waste Management Rules, 2016. Regular training and awareness program has been conducted. Regular inspection is carried out for verification of the provisions of the Rules. The facility after due verification of necessary capacity to handle biomedical waste in accordance with these Rules, grant/renewal of authorization is decided with due procedure.

CONCLUSION

Safe and effective management of biomedical waste is not only a legal necessity but also a social responsibility. Awareness campaigns regarding biomedical waste management should be organized to make people aware about the hazardous effects of inappropriate disposal of biomedical waste. Every personnel working at health care units should have proper knowledge about safe disposal of biomedical waste so that they could be able to guide others to follow best management practices while disposing. Lastly, proper segregation of biomedical wastes generated at different health care units is suggested.

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