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RESEARCH ARTICLE

A study on Medical Laboratory Waste Management in a Psychiatric Hospital of North East India

Dr. J Hazarika,
Assistant Professor, Department of Microbiology, LGB Regional Institute of Mental Health, Tezpur, Assam.

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Corresponding Author

Dr. J Hazarika

Abstract

Hospitals generate large amount of waste. Pathology, microbiology, blood bank and other diagnostic laboratories generate sizable amount of biomedical waste (BMW). Various forums have discussed problems of BMW in the background of overall hospital waste management without paying much deserved attention towards waste generated in Laboratory services. Present study was carried out from Laboratory areas of Psychiatry hospital of North East India for a period of one year. During the baseline survey of laboratory waste in the hospital, quantity & types of waste generated, sharps management, awareness about BMW and waste minimization and recycling procedures & policies were studied with a view to determine weaknesses in the system. In our survey it is seen that, management, handling and treatment of Biomedical Waste are done as per Bio-Medical Waste Rules, 1998. The medical staffs at the high end of hierarchy seem to have proper theoretical knowledge and positive attitude but less practical knowledge. The whole plan works as a system aiming at comprehensive waste management. It should be supported through appropriate education, training and the commitment of the healthcare staff, management and healthcare managers within an effective policy and legislative framework.

INTRODUCTION

According to Bio-Medical Waste (management and handling) rules, 1998 of India, Bio Medical Waste (BMW) means any solid, fluid, or liquid waste including its containers and any intermediate product 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 and includes ten categories for same (Sharma AK1998). Hospitals generate large amount of waste. Pathology, microbiology, blood bank and other diagnostic laboratories generate sizable amount of biomedical waste (BMW). This can pose a serious health hazard to the clientele, community and environment at large. All pathology, microbiology laboratories and blood banks are governed by the regulations of biomedical waste (BMW) management rules, 1998. Various forums have discussed problems of BMW in the background of overall hospital waste management without paying much deserved attention towards waste generated in Laboratory services. Although authorization for handling and management is required for the laboratories with attendance of more than 1000 per month; even smaller laboratories need to follow and practice guide lines required in the management of BMW generated by them(Sharma AK1998).The knowledge regarding general information about biomedical waste was assessed the average score was highest in medical staff (4.46), followed by paramedical staff (4.02) and least in nonmedical staff (3.45) in a study conducted by Deo et.al.(2006).Of the ten categories of BMW described in schedule I of BMW rules 1998, all except category 2,5 and 9 are generated in various sections of Laboratory medicine{Ministry of Environment and Forests, notification

N.S.O.630(E).Biomedical waste (management and handling)rules 1998.Gazette of India,1998}.Handling, segregation, mutilation, disinfection, storage, transportation and final disposal are vital steps for safe and scientific management of biomedical waste in any establishment (Acharya et. al. 2000). Microbiologists often are expected to take a lead in programs such as hospital infection control and biomedical waste management. A waste survey was undertaken about the information of the waste planning process; as to improve hospital waste management, it is important to begin by surveying the facility of current hospital waste practices. This survey should provide information on types and quantity of wastes, which are arising at each point of production, and methods of storage, handling, treatment and disposal. During the baseline survey of laboratory waste in the hospital, quantity & types of waste generated, sharps management, awareness about BMW and waste minimization and recycling procedures & policies were studied with a view to determine weaknesses in the system. The whole plan works as a system aiming at comprehensive waste management.

MATERIALS AND METHOD

Present study was carried out for a period of one year during 2014-2015. Data were collected from Laboratory areas of Psychiatry hospital.

- Methods of storage and segregation at department level, internal transportation, kerb side storage, external transportation and on site final disposal / offsite disposal were studied by direct observation and infrastructure for the same was studied.
- Types of waste generated and quantity of waste are estimated by discussions, interviews and by physical checks. The average values are presented in prescribed from.
- A Scientifically prescribed Performa was used to obtain data about awareness of Biomedical Waste Management from 25 medical staff (medical teachers, medical officers and postgraduate medical students), 35 paramedical staff (staff nurses and technicians), and 40 nonmedical staff (ward boys, keeper staff and Sweepers).A prestructured pretested questionnaire was used. It had six questions regarding general information of Biomedical Waste like identification of biohazard symbol, places of generation and legislation related to biomedical waste. For analysis, a scoring system was used wherein ‘1’ point was given for correct answer that follows BMW rules and ‘0’ point was given for wrong answer that doesn’t follows BMW rules.

During the baseline survey of laboratory waste in the hospital, quantity & types of waste generated, current practices for infection control, sharps management and waste minimization and recycling procedures & policies were studied with a view to determine weaknesses in the system.

RESULTS AND DISCUSSION

The waste generated in the Psychiatric Hospital is very less in compared to other type of Hospitals where other departments like Anatomy, Surgery, Obstetrics and Gynaecology exists. The practical operational aspects regarding management of Laboratory Wastes at a Psychiatric Hospital has been described under each step starting with the generation and ending with final disposal of wastes. Pathology, Microbiology and Biochemistry departments generate sizable amount of biomedical waste. Hospital Waste management committee looks after the overall activity of Bio-medical waste management process.

(A)Generation of Waste: About 85% of hospital wastes are non-hazardous, whereas 10% are infectious and 5% are non-infectious but they are included in hazardous wastes. Both Non-hazardous and hazardous wastes generated in Laboratories.

(B)Segregation of Waste: Segregation or the separation of different types (categories) of waste by sorting at the point of segregation has been considered as the ‘‘key” for the entire process. Conversely small errors at this stage can create lot of subsequent problems. Category No.1 (Human anatomical waste), Category No.2 (animal waste), Category No.5 (Discarded Medicines and Cytotoxic drugs) and Category No.9 (Incineration Ash) waste are not found in this study. Segregation of waste is done properly as per BMW rules 1998.The following are the waste generated in each section of Laboratory is as in table 1.

Table 1: Waste inventory of different sections of Laboratory and sample collection centre

Department	Waste Items
Sample collection centre	Vacutainer needles, syringes, cotton swabs, lancet
Pathology	Vacutainers, slides, Hb tubes, capillaries, lancet, ESR tubes, chemicals, immersion oil, blood, stains, Needle, syringe after use, Rappers of the consumables, Cotton swab after use, drop out blood, Urine and stool containers.
Microbiology	Vacutainers, test tubes, glass bottles, saline bottles, plastic bottles, testing containers, slides, infectious samples, bacteriological medium with growth, culture plates, blood, immersion oil, stains, blood, serum stored, tips, ELISA plates, reagents, Urine and stool containers, filter paper, paper strips, Rappers of the consumables.
Biochemistry	Vacutainers, test tubes, glass bottles, plastic tips, autoanalyzer cups, Plastic bottle, Rappers of the consumables, chemicals, blood.

(C)Collection of Waste: Collection of Bio-medical Wastes is done as per biomedical waste (Management and handling) rules in colour coded plastic bags/container. The container for collection is strategically located at all points of waste generated site of Laboratory. The process of collection is documented in a register, the coloured polythene bags are replaced and the garbage bin is cleaned with disinfectant regularly. The quantum of waste produced in a period of one year in different sections of the Laboratory is detailed in Table: 2.

Table: 2 Waste generated in the Department of Pathology, Microbiology, Biochemistry and Sample Collection centre

Department	Cat3(wt in gm/kg)	Cat4(wt in gm/kg)	Cat6(wt in gm/kg kg)	Cat7(wt in gm/kg)	Cat 8 (litres)	Cat10(wt in gm/kg)
Sample collection centre	0	1.5kg	150gm	100gm	0	50 gm
Pathology	0	500gms	100gm	80 gm	5	300gm
Microbiology	1kg	300gms	50gms	70gm	3	300gm
Biochemistry	0	200gms	60gms	50gm	5	350gm
Total/day	1kg	2.5kg	0.36kg	0.3kg	13+200 litres lab washing	1 kg
Total/month	30 kg	75 kg	10.8kg	9kg	6390 litres	30kg
Total/Year	360kg	900kg	129.6kg	108kg	76680 litres	360kg

(D)Storage and transport of Waste: Wastes are kept at the site of generation and transit to the point of treatment and final disposal. Wastes are finally disposed within 12-24 hours in the Hospital. The transport is done though covered trolleys from different area of waste collected site and deposited in area near the incinerator site. Personal protective equipment and accessories are provided to the workers according to the requirement. The general waste is deposited at the municipal dumps which are transported in the vehicle by Municipality authorities.

(E)Treatment and Disposal of Hospital Waste: General wastes are put into green coloured polythene bags are deposited at the municipal dump. It is subsequently collected by the local municipal authorities for disposal in every day. The waste collected in yellow coloured bags is transported to the site of incineration. The incinerator is

maintained by the Engineering services department and is manned by supervisor and workers. The ash produced by incineration is sent for secured land filling. Regular monitoring of the process is carried out by the engineers as per Pollution Control Board norms and feedback provide to officer in charge. The waste collected in blue bags is transported to the site of autoclaving and shredding for treatment. Autoclaving and Chemical treatment are done for Category3, Category 6 and Category7 waste. Secured sanitary landfill is considered for medical wastes which do not require incineration or disinfection. Category 5, Category 9 and Category 10(solid) wastes are disposed in secured landfill. Liquid and chemical wastes are disinfected and then discharged into drains/sewers where it is taken care of by the principle of dilution and dispersal. Needles and syringes are destroyed with the help of needle destroyer and syringe cutters at the point of generation. Sharps are kept in puncture resistant containers to avoid injuries and infection to those handling them. After disinfection and mutilation of sharps they are disposed in secured landfills.

Awareness of Biomedical Waste Management: When the knowledge regarding general information about biomedical waste was assessed the average score was highest in medical staff (4.45), followed by paramedical staff (4.02) and least in nonmedical staff (3.44) as shown in table 3.The knowledge regarding the general information about biomedical waste management was better in educated class like doctors followed by paramedical persons like nurses and technicians. Non medical employees were having least knowledge about it. The medical staffs at the high end of hierarchy seem to have proper theoretical knowledge and positive attitude but less practical knowledge.

Table 3: Scores of hospital employees with respect to General information on Biomedical Waste Management

Score	Category of employees					
	Medical		Paramedical		Nonmedical	
	No.	%	No.	%	No.	%
0-2	6	24	12	34.28	30	75
3-4	10	40	13	37.14	8	20
5-6	9	36	10	28.57	2	5
Average score	4.45		4.02		3.44	

In our study, it is observed that Laboratory Waste management is done according to Biomedical Waste Rules 1998. Waste generated in this study is very less in compared to other types of Hospitals. In order to be able to comprehend and implement the Bio-Medical Waste (Management and Handling) Rules' 1998, it is mandatory to provide training to all categories of staff i.e. resident doctors, nurses, paramedical staff, hospital and sanitation attendants, patient and their attendants, canteen staff for operation of Bio-Medical Waste treatment facilities.

CONCLUSION:

The whole plan works as a system aiming at comprehensive waste management. In conclusion, to improve the waste management system, the medical staff should be more involved in waste management system and importance of this subject should be emphasized on everyone including public, patients and hospital staff. Media can also generate awareness amongst the citizens about various types of waste and their safe disposal and treatment.

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