



Bio-Medical Waste Management in Hospitals and Nursing Homes of Mumbai City

Dr. Gaurav Lodha^{1st}
Dean, Faculty of Management,
Jodhpur National University
Jodhpur, Rajasthan (India)

M.W. Sheikh^{2nd}
Research Scholar,
Jodhpur National University
Jodhpur, Rajasthan (India)

I. INTRODUCTION

Bio-medical waste is any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining the productions or testing of biological, it includes human anatomical waste, animal waste, microbiology & biotechnology waste, waste sharps, discarded medicines and cytotoxic drugs, solid waste, liquid waste, chemical waste and incinerator ash.

In city of Mumbai Bio-medical waste is generated by Hospitals, Nursing Homes, Diagnostic Laboratories, Research Centers, Clinics and Dispensaries, Companies involved in Manufacturing Medicines, each of these words have a definite meaning. 'A Hospital in Steadman's Medical Dictionary is defined as "an institution for the care, cure and treatment of the sick and wounded, for the study of diseases and for the training of doctors and nurses". According to the Directory of Hospitals in India 1988, "A Hospital is an institution which is operated for the medical, surgical and/or obstetrical care of is Patients and which is treated as a hospital by the Central/State Government/Local Body, Private and Licensed by the appropriate authority".

PRIVATE NURSING HOMES

Private Nursing Homes are generally owned by an individual doctor or a group of doctors. They admit patients suffering from infirmity, advanced age, illness, injury, chronic disability etc. or those who are convalescing, but they do not admit patients suffering from communicable diseases, alcoholism drug – addition or mental illness, there is no uniform definition for nursing homes, they are running on commercial basis, they are becoming more popular and are increasing.

II. LITERATURE REVIEW

For administrative purpose Mumbai is divided into 6 Zones consisting of 3 to 5 wards. The Table below indicates the details of wards are named alphabetically and number of Municipal Hospitals and Other hospitals.

TABLE-1
Zone wise/Ward wise details of Hospitals and Waste Generated

Zone	Wards	No. of Municipal Hospitals	No. of Municipal Dispensaries	Private Hospital & Nursing Homes	Garbage generation per ton per day in ton per day garbage homes
III	K West	1	5	110	600
	K East	0	10	102	700
I	A	1	5	17	400
	B	0	5	5	190
	C	0	5	4	265
	D	0	5	94	375
	E	3	12	16	525 MT
II	F South	2	9	26	512 MT
	G South	0	13	22	365 MT
	F North	1	6	69	366
	G North	0	9	89	670
V	M West	1	6	89	310
	M East	1	4	36	322
III	H East	1	6	13	400
	H West	1	5	9	350
VI	L	1	9	67	512
	N	1	1	110	265



IV	P South	1	2	58	250
	P North	2	9	108	370
	R Central	1	6	129	315
	R North	1	2	53	130
	S Ward	1	6	39	325
VI	T	2	3	87	170

Source: MCGB

Illness creates Dispensary, the sick need medical treatment, nursing care and shelter with the advent of the modern society, the institution developed to cater to the needs a sick was the hospital. According to the census report of 2011, the total population of Mumbai City is 1,24,78,447.

To take care of human health Hospitals and nursing home are mushrooming and growing in the city of Mumbai, Hospitals can be classified on ownership basis into different categories.

- A. Public Hospitals run by Government or local bodies on non-commercial lines.
- B. Voluntary Hospitals: Which are registered under Societies Act. 1860 or Public Trust Act. 1882, they are run with public or private funds on non-commercial basis.
- C. Private nursing homes, these are owned by individuals i.e. Doctors.
- D. Corporate Hospitals, which are registered under the Companies Act. 1956 as Public Ltd. Company, it is run on commercial basis

III. MANAGEMENT AND HANDLING OF THE BIO-MEDICAL WASTE

The Central Government notified the rules for the management and handling of bio-medical waste in July 1998, it was amended on June 2, 2000. This exercise was done because of conferred the powers given under the Environment Protection Act. 1986. The objective was to protect environment and human health from bio-medical waste. The law has clearly categories the bio-medical waste its treatment and disposal. The Table No. 2 below denotes the details.

TABLE-2
Segregation of bio-medical waste and the treatment

Option No.	Waste Category	Treatment method and disposal
Category 1	Human anatomical waste (Human body parts)	Incineration or deep burial
Category 2	Animal Waste (body parts, fluid, blood) animals used for research at veterinary hospital companies, hospitals	Incineration or deep burial
Category 3	Microbiology and biotechnology waste (wastes from Laboratory cultures or Industrial Laboratories, production of biological, toxins)	Local autoclaving microwaving or incineration
Category 4	Waste sharps (needles, Syringes, Scalpels blade, glass)	Disinfection by chemical treatment/auto calving microwaving mutilation/shredding
Category 5	Discarded medicines and Cytotoxic drugs	Incineration or destruction or drugs disposal in secured landfills
Category 6	Solid waste (items contaminated with blood, body fluids cotton, dressings, soiled plaster casts)	Incineration/autoclaving/microwaving
Category 7	Solid waste (Disposables, tubing, catheters, intravenous sets etc)	Disinfection by chemicals treatment auto calving/microwaving/mutilation/shredding
Category 8	Liquid Wastes (generated by Laboratory, washing, cleaning Housekeeping)	Disinfection by chemical treatment and discharge into drains
Category 9	Incinerator ash (ash from incinerations of any bio-medical waste)	Disposal in Municipal Landfills
Category 10	Chemical Waste (Chemical used in production of biological, chemicals used in disinfection, as insecticides, etc.)	Chemical treatment/and discharge into drains for liquids and secured landfill for solids

IV. STEPS INVOLVED IN DISPOSAL OF BIO-MEDICAL WASTE

STEP NO. 1 SEGREGATION OF WASTE IN HOSPITALS.

Segregation of waste generated should be done at source most of the waste is non-infectious, but 10 % of the waste could be infectious and hazardous. It is mandatory to segregate infectious and non-infectious waste.

STEP NO. 2 COLOR CODING

It depends on the category of waste, e.g. yellow code plastic bag contains, human anatomical waste i.e. category No. 1. Animal waste category 2 microbiology and biotechnology waste category and which is meant for incineration or deep burial.

Red color, Plastic bags are used for solid waste and for solid waste disposable meant for autoclaving or chemical treatment.

Black color, plastic bags are used for discarded medicines and cytotoxic drugs mentioned as category 5 and 9 incinerator ash.

STEP NO. 3

Transportation of bio-medical waste.

STEP 4 TREATMENT OF WASTE

Number of techniques exists for treatment to make the waste non-hazardous and non-infectious.

- A. **Waste autoclaving:** The waste autoclaving is the destruction of micro-organisms by steam under pressure. It is an effective method for treating infectious waste before disposal, blood bags, urine bags are autoclaved and then shredded to prevent reuse.
- B. **Microwaving:** Microwaves utilize electro waves and penetrate into material. Microwaving makes it possible to treat waste at site and the waste does not require shredding, it completely kills the bacteria and all pathogenic organisms
- C. **Incineration:** It is a thermal process for burning waste at a very high temperature. The aims of incineration are to ensure complete combustion of the waste.
- D. **Deep burial:** Deep burial is an effective option to dispose waste, if the institution has sufficient land, but this is allowed in towns with a population of less than 5 lakhs only. Human body parts can be buried with plenty of lime at suitable burial site.
- E. **Liquid Waste:** Liquid waste should be appropriately treated before discharge into the stream or river. It is treated with chemical disinfectants and then only flushed into the sewage.

V. METHODOLOGY

A recent survey of 5 major Hospitals in Mumbai and about 20 Small Hospital and Nursing Homes was undertaken to study how bio-medical waste is collected and disposed off. The details from Hospitals were collected with the help of Questionnaires.

Following information is compiled depicted below in Tabular form.

Hospitals	Type of Hospital	No. of Beds	Types of Medical Waste	Approximate Waste generated in Kgs.	Waste Segregation	Staff Trained to Handle Waste Yes/No	Method of disposal BMC+ Contract
A P.Hinduja	Specialty	300	Waste	500 Kgs. per day	Done with colored coded bags	Yes	BMC + Contract
B Nanavati	Specialty	352	Waste	80-400 Kgs. per day	Done with colored coded bags	Yes	BMC + Contract
C Fortis	Tertiary Care	148	Waste	12-15 Kgs. per day	Done with colored coded bags	Yes	BMC + Contract
D Sterling Wock	Secondary Care	45	Hazardous & Non Hazardous	10-15 Kgs. per day	Done with colored coded bags	Yes	BMC + Contract
E Lila Nursing Hospital	Tertiary Care	50	Hazardous & Non Hazardous	15-20 Kgs. per day	Done with colored coded bags	Yes	BMC + Contract

The second survey of Small Hospitals, Nursing Homes indicates the following:-

1. Small Hospital, Nursing Homes also includes Clinics and pathological Laboratories.
2. The diagnostic/Pathological Labs. Are involved in collected of blood, urine, stool samples and analyzing or culturing it, they use different chemicals and drugs for analyzing the material. The liquid waste flows down the drainage and is cleaned with water and disinfectants and solid waste finds its way through Municipal disposal system, they are packed in plastic bags.
3. Small Hospitals and Nursing Homes generates waste which is in small quantity between 5 to 10 Kgs. Per day, it includes, Hazardous and Non-Hazardous Waste like cotton, badges, sharp like needles, syringe, IV Tubes, plastics



bottles of saline etc., most of the hospitals rapped them in plastic bags and is handed over to Municipal disposable system or local dust bin.

4. Small Hospital the awareness about pollution and Environment issues is less, staff is not trained proper segregation of bio-medical waste is not done. They do not used and private contract to clear the waste.

VI. CONCLUSION

Collection of bio-medical is a challenge in Metropolitan City like Mumbai. Mumbai has about -1,24,78,447 population according to the census of 2011, we have many big Hospitals, Government Hospitals, Private Hospitals and Nursing Homes, bio-medical waste both hazardous and non-hazardous is generated and disposed off daily by Municipal Authorities and Private Agencies as per the rules and laws, but the survey indicates that still some more measures are required the large hospitals follows the rules, but the small Nursing Homes neglects and are not serious, the untreated medical waste is capable to pollute soil, water and air and can spread diseases, as such in city of Mumbai pollution level is high, diseases like Aasthama, Lung diseases, T.B. are on increase, cases of Dengue, Malaria are reported frequently, what is required is proper trained staff and nurses to handle the waste generated at Nursing Homes and Laboratories, proper and periodical inspections, maintenance of records should be made compulsory.

The Municipal authorities and Pollution Control Board should insist the private hospitals, to train their staff on handling of bio-medical waste, creating awareness among Para-medical staff is necessary, Hospitals and private Nursing Homes uses water a natural resource, water contamination is more possible than other types of pollutions, as the discharge of all the hospitals is in the municipal drainage system, which effects human beings and the natural flora and fauna which also includes the marine life around Mumbai.

REFERENCES

1. S.A.Kelkar Adjunct Professor I.I.T. Bombay, Hospital Information System, 2010 - PHI Learning (P) Ltd. New Delhi ISBN - 978-81-203-4083-1
2. B.M.Sakharkar Director, Prof. Datta Meghe Institute of Medical Sciences, Nagpur, Principles of Hospital Administration and Planning, Second Ed. 2009 Jaypee Brothers Medical Publishers (P) Ltd. ISBN 81-7179-853-5
3. Managing a Modern Hospital, Edited by A.V.Srinivasan, Hospital Administration and HRM, 2009 II Ed. Response Business Books from SAGB ISBN 978-7619-3629-9 (PB)
4. R.C.Goyal, Holy Family Hospital, New Delhi, 4th Ed. 2006, Prentice - Hall of India (P) Ltd.
5. S.M.Jha Prof. Department of Commerce & Business Administration V.N.Mithila University, Dharbhanga, Hospital Management, Second Ed. 2011 Himalaya Publishing House ISBN
6. Dr. S.Porkodi, Patient Care Services and Hospitals, 1st Ed. 2010 Excel Books ISBN 978-81-7446 805-5