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# Effects of Biomedical Waste Generation and Disposal on Environmental Status of Amravati City

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*Abstract- Hospitals are one of the indispensable parts of our society and our life but with hospital we face a very dangerous problem of various waste generations. Waste from the hospitals if handled carefully and scientifically then there will not be any danger to our life but if they are mishandled and unscientifically then they create a very severe problem and hazards to the human life and surrounding environment. In view of all this I have tried to study the medical waste generation, its handling and disposal system of Amravati city by collecting few information with the help of questioners and visit to hospitals.*

**Index Terms- Bio medical waste, Disposal system, Pharmaceutical, Garbage dumps.**

## I. INTRODUCTION

Medical care is vital for our life, health and well being. But the bio medical waste generated from these activities can be hazardous, toxic and lethal. Because of their high potential for diseases transmission. The hazardous and toxic part of waste from health care establishments comprising infectious, bio-medical and radioactive material as well as sharps (hypodermic needles, knives, scalpels etc.) constitute a grave risk, if these are not properly treated/disposed or is allowed to get mixed with other municipal waste. Biomedical Waste can be defined as any unwanted residual matter arising from the hospital or activities related to the hospital. Bio-medical waste is defined as “any solid or liquid waste including its containers and any intermediate product, which is gathered during the diagnosis treatment or immunization of human beings or animals in research pertaining there to, or in the production or testing”. [1] This hospital solid waste can be classified into 8 main categories; general wastes, pathological wastes, radioactive wastes, chemical wastes, infectious and potentially infectious wastes, sharps, pharmaceutical waste and pressurized containers.

A survey done in various city revealed that the quantity of solid waste generated in hospitals and nursing homes generally varies from ½- 4 kg per bed per day. In government hospitals ½-2 kg bed per day, in private hospitals ½-1 kg per day. The total quantity of hospital waste generated in various cities is about 40 tonnes per day. [2][3] The problem of bio-medical waste disposal in the hospitals and other healthcare establishments has become an issue of increasing concern, prompting hospital administration to seek new ways of scientific, safe and cost effective management of the waste, and keeping their personnel informed about the advances in this area. The need of proper hospital waste management system is of prime importance and is an essential component of quality assurance.

Though the major hospitals and health care establishments have started implementing poor waste management systems, there are a number of health care establishments, which dump their wastes in the municipal garbage dumps. Rack pickers, who can sort these wastes manually, to pick up plastics, disposable syringes and needles, other disposables like catheters, IV sets and tubing, regularly, visit these dumping sites. In the case of open dumping sites with open borders, wastes and their emissions are directly discharged in to the natural medium. This increases the contamination spread by air circulation and superficial and ground water flows and the health risks are increased due to men and animals having access to the site.

These wastes pose numerous hazards and must be appropriately managed to avoid damage to the environment and human health. Inadequate 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. Although there are no exhaustive documented studies on health hazards associated with poor hospital waste management, some indicators like progressive increase in hospital infection rate, increasing resistance to wide variety of antibiotics are the pointers to the way in which poor hospital waste management can contribute to the ill health plaguing the health care institutions.



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## II. STUDY AREA

Amravati city is located at 20.93°N 77.75°E. It has an average elevation of 343 meters. [4] It lies 156 km west of Nagpur, and serves as the administrative center of Amravati District and of Amravati Division. The town is located near the passes through the hills that separate the cotton-growing regions of the Purna basin to the West and the Wardha basin to the East. There are two lakes in the eastern part of the city, Chhatra Talao & Wadali Talao. Pohara & Chirodi hills are to the east of the city. The Maltekadi hill is inside the city, it is 60 meters high. Amravati has a tropical wet and dry climate with hot, dry summers and mild to cool winters. Summer lasts from March to June, monsoon season from July to October and winter from November to March. The Amravati Municipal Corporation is headed by a Mayor who is assisted by the Deputy Mayor. Amravati Municipal Corporation was established on 15 August 1983. In August 1983 the area occupied by the Municipal Corporation was 121.65 km<sup>2</sup>. The AMC comprises area of erstwhile Municipal Council, Amravati, and area of erstwhile Municipal Council, Badnera along with eighteen revenue villages namely Navsari, Tarkheda, Shegaon, Rahatgaon, Mhasala, Wadali, Benoda, Jewad, Vadad, Nimbhora (K), Saturna, Akoli, Waruda, Kasbe, Badnera Mahajanpura, Gambhirpura and Amravati Peth. Now the total area of the city is 270 km<sup>2</sup> of which 181 km<sup>2</sup> falls under municipal limits and about 89 km<sup>2</sup> falls out off the municipal limits.

The city is having couple of government hospital and as many as 500 plus small to medium private hospital spread in the city out of which we selected few hospitals for data collections and analysis. Few are as follows- Arihant Hospital Dr. Bharat Shah, Belokar Hospita, Belokar Hospital, Deshmukh Eye Hospital, Dhole Hospital, Dr Monali Dhole Gyancologist, Laparoscopic Surgeon Dr Kela Hospital, Dr Murkey Hospital, Dr. Arora Cancer hospital, Dr. Chandak's Hospital, Dr. Kulkarni's Accident hospital, Dr. Nagalkar hospital, Hitech Critical Care & Bonde hospital, Parashree Speciality Hospital, Sushrut Hospital, Vyankatesh Hospital, Omkar hospital, Belokar hospital, Adwani hospital, Shobha patode hospital, Jahagirdar hospital, Manawar hospital, Vimal Thorat hospital, Dhahale hospital, Bhatiya hospital, Shatish Tiwari hospital, Bankar hospital. etc.

## III. MATERIAL AND METHODS

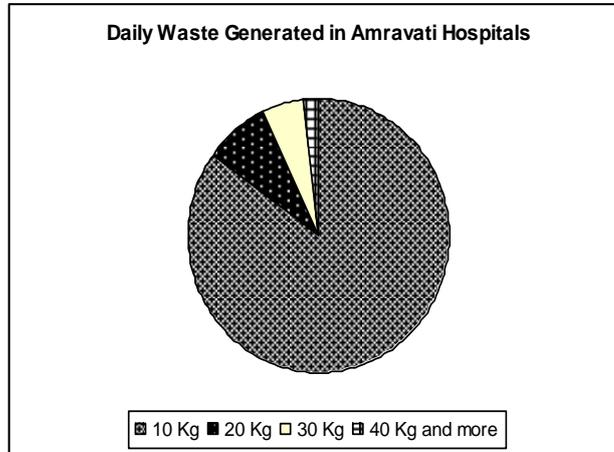
The methodology followed and adopted for preparing the inventory and fulfilling the above objectives are as follows.

- Collection of information through questionnaire.
- Visits and interactions with concerned private hospitals in Amravati city.
- Study of existing storage, collection, transportation, processing and disposal facilities of private hospitals in Amravati city of biological and biomedical waste. as well as future plan for betterment of the management system.
- The data collected by questionnaire was tabulated and analysis by various statistical method as per need.

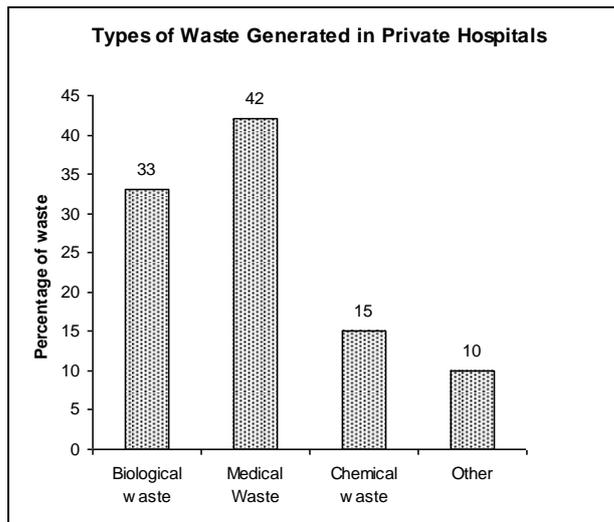
## IV. RESULT AND DISCUSSIONS

Hospitals being the centre of cure are also an important centre of infectious waste generation. In present study deals with the study of the fate of the hospital waste at city level. An exhaustive survey and detailed investigation of the waste generated, recycled and their disposal procedures adopted in the leading private hospitals in Amravati city was carried out using questionnaire. The data collected through various (n=25) questionnaire. was visually analyzed, tabulated and then statistically analyzed, graphically represented were ever necessary and the observation and conversation with the respondent few findings are put forth-

- From the observation the medical waste generated in the hospital is basically from four sources Operation Theatre, Labour Room, Laboratory, Injection Room, Ward, OPD Store dressing room etc. and the information and the detail nature of the biomedical and other waste is given below in the table 1.
- The biomedical Waste generated in the hospital is managed at the three levels for disposal as it is firstly segregated, secondly the waste is properly Collected and stored in covered bins, later it is transported in closed containers and lastly before final disposal the waste is treated, disinfected and mutilated at proper isolated place.
- From the present study it is calculated that the waste generated in the hospitals included 33% of Biological waste, 42% Medical Waste, 15% Chemical waste and nearly 10% other wastes. (fig 2)
- In the private hospitals of Amravati on and average 85% hospital generate 10kg or less medical waste daily , while 8% hospitals generate 20Kg and 2% hospitals generate 40Kg or more medical waste daily. This overall medical waste is coming for disposal in environment and creating a serious problem for environmental health of Amravati city.



A. All the medical waste which is generated in these private hospitals are segregated properly by the hospital authorities. But this waste is properly collected in appropriate bags by only 75% hospitals, while 20% hospital collect them in certain boxes and 5% hospitals dispose the waste in common disposal system showing there lack of information and knowledge. So only 75% hospitals have appropriate color bags to collect the medical waste.



B. Similarly in the private hospitals, only 67% hospitals have trained and separate persons appointed for the collection of medical waste. While the remaining 33% hospital dose not have trained and separate persons for the same.

C. From our findings and observations 33% of the hospitals have there own separate room or compartment for the management of medical waste. All hospitals have their own incineration and autoclave for processing of medical waste.

D. In Amravati nearly 73% hospitals ensure the precautionary mechanism for the persons who collect the medical waste in the hospitals. While only 46% of the hospitals have given special training to the appointed person who handle the medical waste of the hospital.

E. Amravati city has a uniform medical waste treatment and disposal system but the collection and transportation of these wastes is done by various agencies. As 66% of the medical waste is collected and transported by Global eco system, while 20% the medical waste is collected and transported by Municipal corporation and rest of the 14% waste is collected and transported by private contractors in the city.

### V. CONCLUSIONS& RECOMMENDATIONS

The modern hospitals and health care institutions including research centers use a wide variety of drugs including antibiotics, cytotoxics, corrosive chemicals, radio active substances, which ultimately become part of



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hospital waste. All round technological progress has lead to increase availability of health related consumer goods, which have the propensity for production of increased wastes. The issue of improper Hospital Waste Management in India was first highlighted in a writ petition in the Hon'ble Supreme Court; and subsequently, pursuant to the directives of the court, the Ministry of Environment and Forests [2], Govt. of India notified the Bio-Medical Waste (Management and Handlings) Rules on 27th July 98; under the provisions of Environment Act 1986. These rules have been framed to regulate the disposal of various categories of Bio-Medical Waste as envisaged therein; so as to ensure the safety of the staff, patients, public and the environment. But in Amravati city the Bio-Medical Waste Management policy is very rarely observed in few hospitals, on the basis of present research few suggestions are given as measures to improve medical waste disposal system :-

- There should be Change the age old “mind set” and attitude through knowledge and training of people concerned with disposal system.
- various categories of waste being generated in the hospitals must be identified
- .Segregation and collection of various categories of hospital waste in separate containers/bags is advisable, so that each category is treated in a suitable manner to render it harmless.
- It is necessary to Identify and utilize proper “treatment technology” depending upon the category of waste.
- City should create a system where all categories of persons from doctors, patient, common people, persons handling waste etc are not only responsible, but also accountable for proper hospital waste management.
- One has to change the using patterns from single usage to multiple usage where ever possible for various materials generated in hospital.
- Segregate waste at point of generation as :
- Infectious (b) Non-Infectious/Garbage (c) Sharps/Needles
- collect waste in color coded containers/bags as below chemical

**Yellow – Infectious waste for incineration. Black – Garbage for dumping in municipal bin. Blue (inner perforated) – Sharps/needles.**

- Sterilize all sharps and plastic waste by method or autoclaving.
- Shredding of plastic waste should be practiced in the hospitals
- Use of syringe and needle destroyer should make compulsory.
- Incineration of blood soaked dressings/body parts is very essential.
- Always cover waste collection containers.
- Waste should transported through covered trolleys / vans.
- Workers in the medical profession including doctors nurses ward boys cleaners transporters and handlers should be provided protective wear (mask, gloves, plastic aprons, gum boots) .
- Immunization of all concerned persons is must.

Finally one has to make every municipal authority, within the territorial area of the municipality, responsible for the implementation of the all the rules lay down by Government and there should be proper infrastructure development for collection, storage, segregation, transportation, processing and scientific disposal of bio medical wastes. So there is an urgent need for raising awareness and education on medical waste issues.

#### ACKNOWLEDGMENT

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**APPENDIX**

**Table: 1 Areas of waste generation and kinds of waste generated in the Hospitals**

S.No.	Areas of Waste generation	Activities performed	Types of Waste generated
1	Operation Theatre	Ophthalmic surgeries. Minor and major Surgical Procedures Accidental operative procedures	Blood and body fluids, soiled waste, swabs, cotton, syringes and needles, blades, gloves and masks
2	Labour Room	Gynecological surgeries and treatment including Child birth and family planning operations	Placenta, blood and body fluids, soiled waste, cotton, swabs, syringes and needles, blades, tubings and IV sets masks and gloves
3	Pathological Laboratory	Culture preparation, sample collection. Microscopic observation and testing of all diseases	Blood and body fluids, syringes and needles, gloves, slides, sputum and sputum cups, chemical waste and liquid waste
4	Injection Room	Immunization and treatment injections	Syringes and needles, ampoules, vials, broken glasses, gloves and vaccine waste
5	Ward of hospitals	In-patient services	Blood and body fluids, syringe and needle, slides, ampoules, vials, chemical waste, liquid waste, broken thermometer and soiled waste
6	OPD	Out-patient services, routine examination of patients	Blood and body fluids, syringes and needles, slides, ampoules, vials, broken thermometer, plaster cast chemical waste and liquid waste
7	Store	Store	Discarded medicine