

A Plan for Management of Hospital Generated Waste

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Abstract:-The harmful wastes are generated from hospitals sites. As per the utility of hospital, each one has its own profile for the production and carrying of waste according to its locality. Now days it is big issue to manage hospital waste and its transportation from health and environmental risks point of view.

This article gives a about generation of waste from a five hospital nearby region. The plan was suggested for the management of hospital waste from starting point to the collection areas and final disposal. The hospital generated waste should be controlled from the sources of generation to the final disposal. The plan presented here is an important for the proper management of hospital waste. It provides an appraisal of the profile of generation, collection, transportation and storage of healthcare waste in a hospital.

This plan which was efficient and cost effective can be used in any medical establishments.

I. INTRODUCTION

The disposal of waste is not a serious problem so long as population is small and the land available for the accumulation of waste is sufficient. When the capacity of natural process to dilute, dispersed, degrade, absorbed or otherwise dispose of the unwanted residues is well known, that capacity is under tremendous stress given the enormous quantities of waste now generated. India embarked on a program of industrialization on a massive scale in the 1950s. Fifty years later, though more or less self sufficient the country faces the expensive and uphill task of controlling pollution of all kinds – water pollution, air pollution and pollution of the land and soil due to various solid wastes such as Municipal Solid Waste, Agricultural Waste, E-Waste, Bio Medical Waste etc. [1] In many countries knowledge about the potential of harm from health care wastes is now become more prominent to government, medical practitioners and civil society. Increasingly, manager and medical staff are expected to take more responsibility for the waste they produce from their medical care and related activities. The indiscriminate and erratic handling and disposal of waste with in health-care facilities is now widely recognized as a source of unavoidable infection, and is synonymous with public perception of poor standard of health care. [2] The basic principle of good Bio Medical Waste practice is based on the concept of 3Rs, namely, reduce, recycle, and reuse. The best Bio Medical Waste management methods aim at avoiding

generation of waste or recovering as much as waste as possible, rather than disposing. Therefore, the various methods of Bio Medical Waste disposal, according to their desirability, are prevented, reduce, reuse, recycle, recover, treat, and lastly dispose. Hence, the waste should be tackled at source rather than “end of pipe approach.” [3] Only about 10%–25% of Bio Medical Waste is hazardous, and the remaining 75%–95% is nonhazardous. The hazardous part of the waste presents physical, chemical, and/or microbiological risk to the general population and health-care workers associated with handling, treatment, and disposal of waste. [4]

In July 1998, first Bio Medical Waste rules were notified by Government of India, by the erstwhile Ministry of Environment and forest. [5] In India, Bio Medical Waste problem was further compounded by the presence of scavengers who sort out open, unprotected health-care waste with no gloves, masks, or shoes for recycling, and second, reuse of syringe without appropriate sterilization. [6] The segregation, packaging, transportation, and storage of Bio Medical Waste have been improved. Biomedical waste has been classified into four categories based on color code-type of waste and treatment options. In addition, untreated human anatomical waste, animal anatomical waste, soiled waste, and biotechnology waste should not be stored beyond a period of 48 h. In case, there is a need to store beyond 48 h, the occupier should take all appropriate measures to ensure that the waste does not adversely affect human health and the environment. [7]

Need of biomedical waste management in hospitals:

The reasons due to which there is great need of management of hospitals waste such as:

- Injuries from sharps leading to infection to all categories of hospital personnel and waste handlers.
- Nosocomial infections in patients from poor infection control practices and poor waste management.
- Risk of infection outside the hospital for waste handlers and scavengers and sometimes general public living in the vicinity of hospitals.
- Risk associated with hazardous chemicals, drugs to persons handling wastes.
- “Disposable” being repacked and sold by unscrupulous elements without even being washed.

- Drugs which have been disposed of, being repacked and sold off to unsuspecting buyers.
- Risk of air, water and soil pollution directly due to waste, or due to defective incineration emissions and ash.

Challenges in the implementation of new Biomedical Waste 2016 rules:

One of the biggest challenges the government hospitals and small Health care facility will face, during the implementation of Bio Medical Waste 2016 rules will be due to the lack of funds. To phase out chlorinated plastic bags, gloves, blood bags and to establish a bar code system for bags/containers the cost will be high and time span for doing this i.e. two years is too short.

Currently, in India, there are 198 Common Biomedical Waste Treatment Facility in operation and 28 are under construction.^[7] There is a great need for rapid development of many more Common Biomedical Waste Treatment Facility to fulfill the need of treatment and disposal of all Bio Medical Waste generated in India. Incinerator emits toxic air pollutants, and incinerator ash is potentially hazardous.

II. METHODOLOGY

The new rules are stringent and elaborate and should bring about a change in the way; the Bio Medical Waste is being managed in India. Under the new rules, coverage has increased to include various health-care related camps such as vaccination camps, blood donation camps, and surgical camps.^[7]

The Bio Medical Waste consist of

- Human anatomical waste like tissues, organs and body parts.
- Animal wastes generated during research from veterinary hospitals.
- Microbiology and biotechnology wastes.
- Waste sharps like hypodermic needles, syringes, scalpels and broken glass
- Discarded medicines and cytotoxic drugs.
- Soiled waste such as dressing, bandages, plaster casts, material contaminated with blood, tubes and catheters.
- Liquid waste from any of the infected areas.
- Incineration ash and other chemical wastes.

15 – 20% of the waste in a health care facility is Bio Medical Waste, rest 80% of general health care waste is comparable to normal domestic waste and can be handled by the urban waste management system.

Classification of Health – Care Waste:

Table No. 1 shows waste category its description with example

Table No. 1 Classification of Health – Care Waste

Waste Category	Description and Example
Infectious waste	Waste suspected to contain pathogens example lab culture, swabs excreta.
Pathological waste	Human tissue, Example Body Parts, blood, fetus.
Sharps	Needles, infusion set, scalpels, knives.
Pharmaceutical Waste	Expired Drug.
Genotoxis Waste	Cytotoxic drugs often used in cancer Therapy.
Chemical Waste	Lab reagent, film developer, disinfectant.
Wastes with high content of Heavy metals	Batteries, Broken Thermometer, B P apparatus.
Pressurized Container	Gas Cylinder, Aerosol can.
Radioactive waste	Unused liquids from radiotherapy, excreta from patient treated with radionuclide's.

Categories of Bio Medical Waste:

Table No 2 shows category number, waste category type its treatment and disposal.

Table No 2 Categories of Bio Medical Waste

Category No	Waste category Type	Treatment and Disposal
Category No 1	Human Anatomical Waste (human tissues, organs, body parts)	Incineration /Deep burial
Category No 2	Animal Waste (animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals, colleges, discharge from hospitals, animal houses)	Incineration /Deep burial
Category No 3	Microbiology & Biotechnology Wastes (Wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of bio-logical, toxins, dishes and devices used for transfer of cultures)	Local autoclaving/ Microwaving/ Incineration
Category No 4	Waste sharps (needles, syringes, scalpels, blades, glass etc. that may cause puncture and cuts. This includes both used and unused sharps) disinfection	Chemical treatment/Auto Claving / Microwaving and Multilation /Shredding
Category No 5	Discarded Medicines and Cytotoxic drugs (wastes comprising of outdated, contaminated and discarded medicines)	Incineration/Destruction and drugs disposal in secured landfills
Category No 6	[Soiled] Waste (Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines beddings, other incineration	Autoclaving/Microwaving
Category No 7	Solid Waste (wastes generated from disposable items other than the waste	Disinfection by chemical

	5 [sharps] such as tubing's, catheters, intravenous sets etc.)	treatment autoclaving/ Microwaving and mutilation/Shredding
Category No 8	Liquid Waste (waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities)	Disinfection by chemical treatment and discharge into drains
Category No 9	Incineration Ash (ash from incineration of any biomedical waste)	Disposal in municipal landfill
Category No 10	Chemical Waste (Chemicals 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

Blue/White Translucent	Plastic Bag/Puncture Proof Container	Cat. 4 and Cat. 7	Autoclaving/Microwaving/Chemical Treatment and destruction/shredding
Black	Plastic Bag	Cat. 5 Cat. 9 and Cat 10 (Solid)	Disposal in secured landfill

Biomedical Waste Management Process:

- Waste Collection
- Segregation
- Storage
- Treatment
- Transport to final disposal site
- Final disposal

The segregation, packaging, transport, and storage of Bio-Medical Waste are necessary. The four categories have been made to bring about ease of segregation. One of the main principles of disposal of Bio-Medical Waste is that segregation has to be done at the source of generation of the waste. To overcome confusion created by large number of categories, this has been simplified to make it convenient and manageable for all Health Care Workers. Then the color coding (i.e., yellow, red, white, and blue) of the bags/containers is linked to a particular type of waste and its specific treatment option. For example, the disposal of chemical solid waste and cytotoxic waste to be done in yellow bag which goes for incineration/plasma pyrolysis/deep burial

Color Coding:

Table No 3 shows Color coding and type of container for different waste category and its treatment option as per schedule.

Table No 3 Color Coding

Color Coding	Type of Container	Waste Category	Treatment option as per schedule
Yellow	Plastic Bag	Cat. 1, Cat 2, Cat 3 and Cat 6	Incineration/deep burial
Red	Disinfected container/ Plastic bag	Cat. 3, Cat 6, and Cat 7	Autoclaving/Microwaving/Chemical Treatment

Preliminary Survey:

Preliminary survey was carried out to locate location and number of hospitals and health care center in Nerul, Navi Mumbai. A list of hospitals was prepared according to its location. Preliminary survey for 20 hospitals is carried out to find number of beds and specialty of hospital. Out of these five multispecialty hospitals are considered to prepare a plan for management of generated waste from these hospitals.

Separation of Bio Medical Waste:

A four color Yellow, Red, White and Black plastic bag of large size are supplied to the hospitals as per table no 3. Bio medical waste generated from hospitals is separated category wise as per table 3 and put in these four color plastic bag.

Analysis of Bio Medical Waste:

This data is analyzed as per the color coding plastic bag, so that it can be treated as per the treatment option as per schedule.

III. RESULTS AND DISCUSSION

The data collected for all five hospitals is plotted on pie chart as per color coding plastic bag as shown below.

Hospital A:

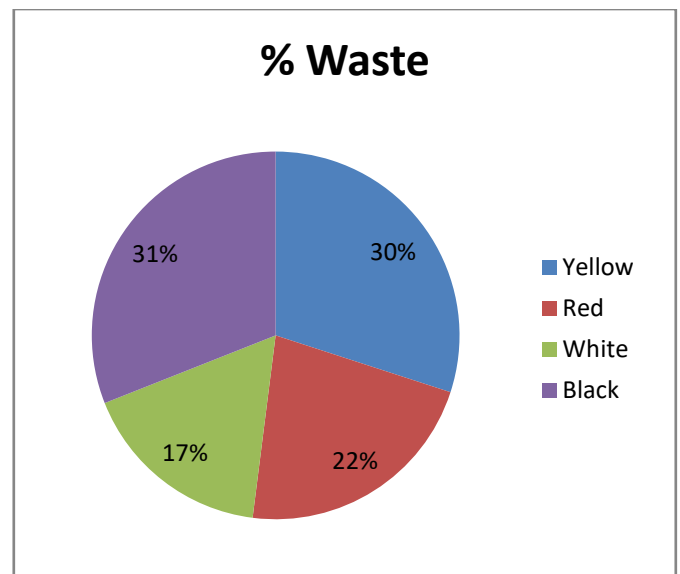


Figure 1: Bio Medical Waste Collected for Hospital A

Yellow bag contain 30% of total waste, red bag contain 22% of total waste, white bag contain 17% of total waste and Black

bag contain 31 % of total waste. These bags contain bio medical waste as per category mentioned in table 3. Treatment will be provided accordingly.

Hospital B:

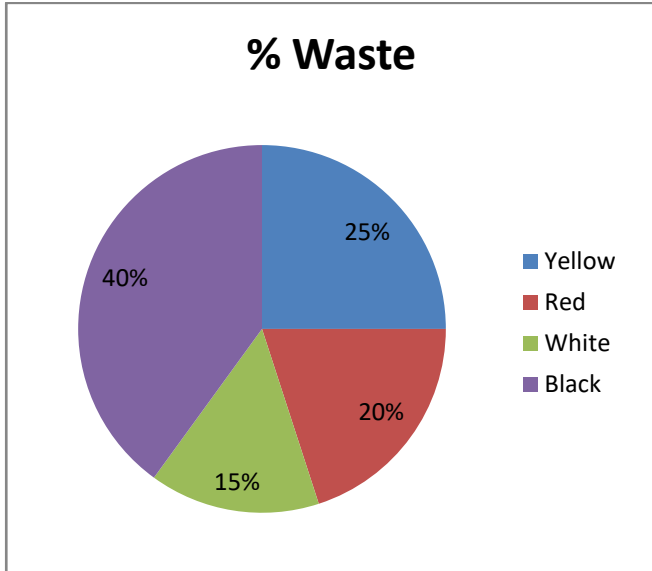


Figure 2: Bio Medical Waste Collected for Hospital B

Yellow bag contain 25% of total waste, red bag contain 20% of total waste, white bag contain 15% of total waste and Black bag contain 14 % of total waste. These bags contain bio medical waste as per category mentioned in table 3. Treatment will be provided accordingly.

Hospital C:

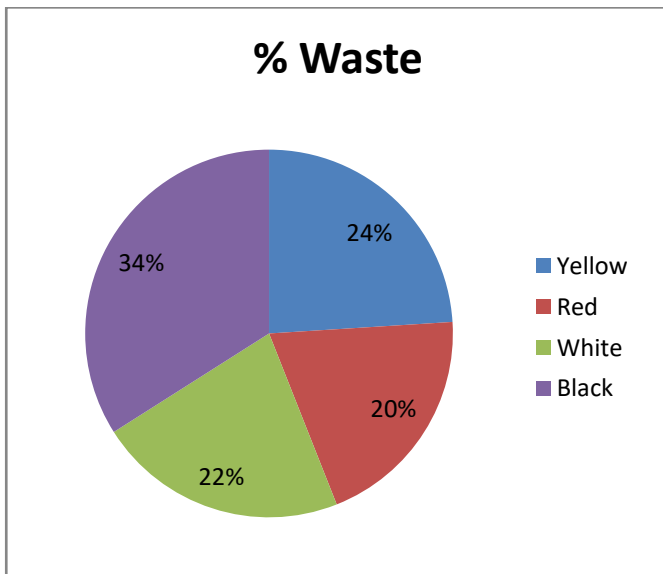


Figure 1: Bio Medical Waste Collected for Hospital C

Yellow bag contain 24% of total waste, red bag contain 20% of total waste, white bag contain 22% of total waste and Black

bag contain 34 % of total waste. These bags contain bio medical waste as per category mentioned in table 3. Treatment will be provided accordingly.

Hospital D:

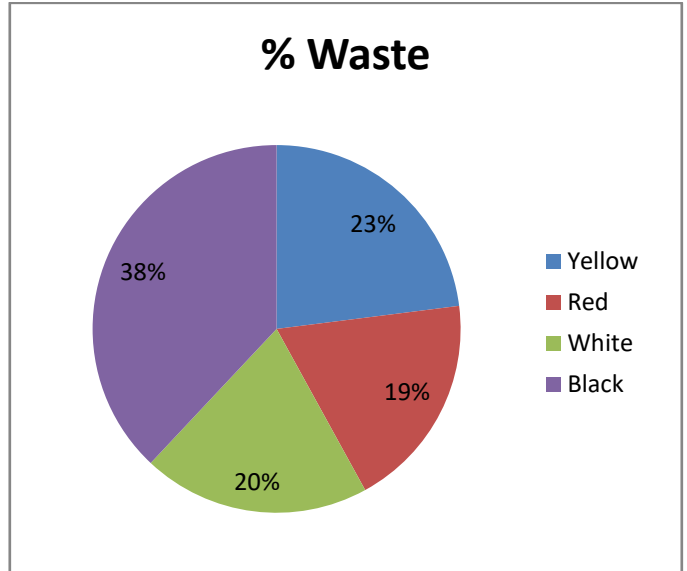


Figure 1: Bio Medical Waste Collected for Hospital D

Yellow bag contain 23 % of total waste, red bag contain 19 % of total waste, white bag contain 20 % of total waste and Black bag contain 38 % of total waste. These bags contain bio medical waste as per category mentioned in table 3. Treatment will be provided accordingly.

Hospital E:

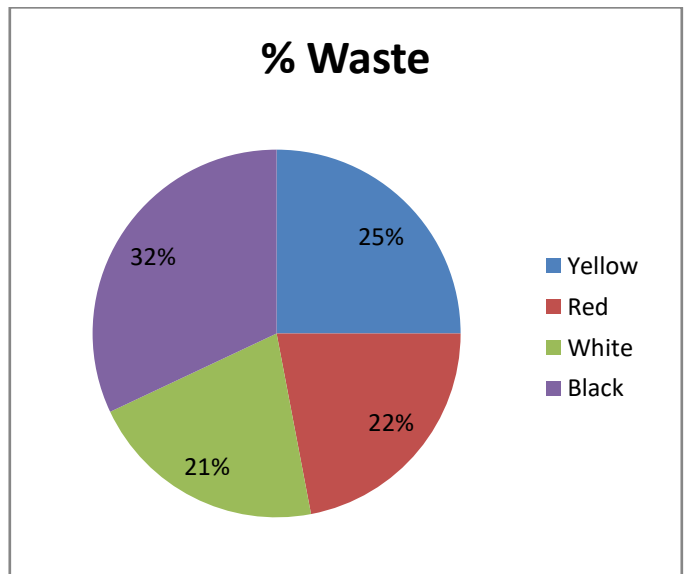


Figure 1: Bio Medical Waste Collected for Hospital E

Yellow bag contain 25 % of total waste, red bag contain 22 % of total waste, white bag contain 21 % of total waste and

Black bag contain 32 % of total waste. These bags contain bio medical waste as per category mentioned in table 3. Treatment will be provided accordingly.

IV. PLAN

As per the study of five hospitals and data collected of Bio Medical Waste from these hospitals flowing plan is suggested for hospital.

1. Test of the awareness of the healthcare staff of the hospital generated waste.
2. Review of the items of medical supplies used by the hospital.
3. Determination of the weight of the generated hospital waste.
4. Review of policy and procedure on the handling of healthcare waste and lists of items designated as hazardous healthcare or other types of waste.
5. Assessment of the number, location, condition, proper color coding and content of the means of collection.
6. Mapping and inspection of the storage areas and the route of transportation.
7. Regular monitoring of measures suggested

V. CONCLUSION

The flow of bio medical waste should be well controlled from the sources of generation to the final treatment. The plan presented here is an important step for the proper management of bio medical waste. It provides an appraisal of the profile of Waste Collection, Segregation, Storage, Treatment, Transport to final disposal site and final disposal.

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