INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

A PATH FOR HORIZING YOUR INNOVATIVE WORK

SPECIAL ISSUE FOR INTERNATIONAL LEVEL CONFERENCE "ADVANCES IN SCIENCE, TECHNOLOGY & MANAGEMENT" (IC-ASTM)

BIOMEDICAL WASTE MANAGEMENT IN AMRAVATI CITY

PROF. A. T. TATHOD[1], PROF. NIKHIL BOBDE[2]

1. Assitance Professor, C.O.E.T.Akola, Mauli College of Engineering Shegaon.
2. Assitance Professor, C.O.E.T.Akola, Mauli College of Engineering Shegaon.

Accepted Date: 05/09/2017; Published Date: 10/10/2017

Abstract: Biomedical waste is one of the major problems in developing countries like India because it causes health impact on human being, plant and on environment. Still Biomedical waste disposed on road side, which increases health impact on man and animal. This work mainly focuses on Biomedical waste management for Amravati city, which consists of collection, segregation, storage, transportation, treatment and disposal. The hospitals are categories in A, B, C, and D groups have been studied to assess the quantity of different types of waste generated, total average waste generated per day and waste generation rate per bed per day. Therefore, on the basis of quantity and type of waste generated the treatment / disposal technique has been suggested. The total average waste generated in hospital-A, B, C, and D is studied as per Amravati Municipal Corporation (AMC) list. The amount of Biomedical waste generated in each hospital is significant, therefore, proper waste management is necessary in due time. It is suggested that a common waste treatment facility for a group of hospitals is best for private hospitals of Amravati.

Keywords: Hospital waste, waste management, treatment and disposal, segregation

Corresponding Author: PROF. A. T. TATHOD

Co Author: - PROF. NIKHIL BOBDE

Access Online On:

www.ijpret.com

How to Cite This Article:

Prof. A. T. Rathod, IJPRET, 2017; Volume 6 (2): 422-428

PAPER-QR CODE

INTRODUCTION

The disposal of waste was not a serious problem so long as population was small and the land available for the assimilation of waste was large. However the practice of dumping waste on roads, unpaved streets, and vacant land in medieval towns served to swell the population of rodents, and fleas associated with them functioned as carriers of germs. The outbreak of plague – the Black Death – killed 50% of the European population in the 14th century and claimed many more lives in subsequent years by repeated outbreaks – a grim testimony to the prevailing standards of sanitations and several centuries later, the outbreak of what was widely thought pneumonic plague in India in September 1994 drew attention to the improper storage, collections, and disposal of solid waste.

('Looking Back To Think Ahead' TERI publications 2008)

Improper management of solid waste has adverse effect on ecology as well for instance; leakages from dump sites contaminate surface water and underground water in the neighboring areas with such toxic elements as copper, arsenic, and uranium, which pose serious risk to health. While 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. ('Looking Back To Think Ahead' TERI publications 2008)

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 population of all kinds

– water pollution, air pollution and pollution of the land and soil due to various solid wastes e.g. MSW, E-waste, and BMW or the Biomedical waste etc. ('Looking Back To Think Ahead' TERI publications 2008)

1.1 Need of the study

In this 21st century, hospitals waste still find it way to road side heaps of rubbish, where it mixes with municipal solid waste rendering its hazardous for the environment and the public. Indian cities are presently practicing random disposal of Biomedical wastewithout any uniform standards and policies. In order to prevent health hazardous, proper Biomedical waste management and codification of its operational directives are required to be formulated urgently which contains health risk. In Amravati city in last few years many super specialty hospital, multi-specialty clinics and nursing homes have been established and no proper care of Biomedical waste is taken.

1.2 Waste Segregation and Storage

The medical waste is divided into different categories, and collected in different colored bins or containers, as to help in segregation of hazardous and non-hazardous waste, needing different types of treatment. The process is known as waste segregation. The correct classification for collection of different waste items in different colored dustbins is to be done by the various hospitals, and it is the duty of the hospital doctor and nurses to ensure correct disposal of different waste items in their respective dustbins or containers. The system of using different colored bins and bags to collect different type of medical wastes is known as color-coding. Such a system, eventually help in separately collecting the non-hazardous medical waste items, such as the uncontaminated packaging material like plastics, paper, cardboard, food and kitchen waste, garden waste etc. (garg, 2001)

Proper segregation of waste helps in the following ways:

It minimizes the amount of potentially hazardous waste that requires the specialized and costly treatment and disposal.

It facilitates proper packaging and labeling of wastes.

It reduces occupational health and safety risk to the health care worker and rag pickers.

It improves infection control within the hospital.

It helps in establishing uniform waste management practice and to comply with national laws and legislation. According to the notification 1998 [4] for the disposal of biomedical wastes, such waste are to be segregated in the bins or containers of different colors namely; Yellow, Red, Blue/white and Black as per the specification

2. Transportation of Biomedical waste

The medical waste, except the general and non-hazardous wastes, should never be transported with general municipal wastes, and these should be kept separate at all stages. Special vehicle must be used so as to prevent access to and direct contact with the waste by the transportation operators, scavengers and the public. The transport containers should be properly enclosed. The effects of traffic accidents should be considered in the design, and the driver must be trained in the procedures he should follow if there is an accidental spillage. It should be possible to wash the interior of the body thoroughly. (CPCB, 1998) While transporting solid waste (Banerjee, 1999) infectious and non-infectious should be transported separately. Infectious wastes should be transported in closed leak proof truck. These wastes should be placed into rigid or semi rigid container before transporting offsite. Cars used for transportation of the wastes should be sterilized regularly.

2.1 Thermal Processes

Thermal processes use heat to decontaminate or destroy medical waste. Most microorganisms are rapidly destroyed at temperatures ranging from 490C to 910C and most living organisms are killed at 1000C. There are two categories of thermal processes, namely low-heat systems and high-heat systems. Low - heat systems use steam, hot water, or electromagnetic radiation to heat and decontaminate the waste. They typically operate at temperatures of less than 1500C, which is insufficient to combust, or destroy the materials. High-heat systems employ combustion, Paralysis and high-temperature plasmas to decontaminate and destroy the waste. These systems operate at temperatures ranging from as low as 6000C to more than 55000C.

3. Treatments and Disposal of Biomedical

Wastes

Category	Waste type	Treatment and disposal
1.	Human	Incineration/Dee
2.	Animal	Incineration/Dee
3.	Microbiolo	Local

	gical and	Autoclaving/micr	
4.	Wastes	Disinfection;	
	sharp	Autoclaving/micr	
5.	Discarded	Incineration/Sec	
6.	Solid	Incineration/Aut	
7.	Disposable	Disinfection,	
	solid waste	mutilation/Shred	
	liketubes,	ding	
	catheters		
	,blood		
	orurine		
	bags,		
	gloves etc.		
8.	Liquid	Disinfection	and
9.	Incinerated	Landfill	

4. BIOMEDICAL WASTEMANAGEMENT 4.1Existing scenario:

The Global Eco Save System is collecting the Biomedical waste every day from different hospital in the color coded bags. (I.e. red, yellow & black as per standards of CPCB.)

Plate no. 02shows the vehicles are collecting the BMW in the color coded bags from the hospital

4.2Proposed method:

The infectious waste should be placed in yellow or red color coded container or bags. Infectious wastes have to be disposed within 48 hours.

Sharp waste should be placed in puncture proof container or bags.

Container or bags should also be labeled with the bio- hazardous symbol.

Personnel involved in infectious waste handling should be provided with suitable protective apron, face mask, gloves etc.

Polyethylene bags placed in the bins have to be changed with each shift. Polyethylene bags carrying waste have to be sealed/ tied at the top whenever the waste is being transported within or outside the hospital.

The recommended method for the disinfection and destruction of infectious waste are autoclaving and hydroplaning by each hospital. Disposable item like the gloves, syringes, IV bottles, catheters etc. have to be shredded, cut or mutilated at source of production in hospital.

Destruction of needles immediately after use through needle cutter or needle destructor. Biomedical waste collected in three different colors of bags should be transferred in same colored bins placed outside the hospital.

5. Transportation Existing scenario:

BMW of Amravati is transported to the treatment plant by the different vehicles every day.

The treatment plant is situated at Badnera, Amravati which is 20 km. away from Amravati the vehicles use are labeled as 'BIOMEDICAL WASTE'

Photo no. 03 shows the transportation of BMW towards the treatment plant.

Proposed method:

Medical waste should never be transported with general municipal waste, and these should be kept separate at all stage.

Segregated wastes have to be transported within the facility from the point of generation to the final waste disposal.

Segregated waste have to be transported in two shifts (morning and evening) for hospital-A to treatment site

Segregated waste have to be transported by trolley, wheel barrow etc. within hospital-A to treatment site.

Segregated waste have to be transported in morning hour by special vehicles from hospital- A, B, C, and D to the treatment plant.

Infectious wastes should be transported in closed leak proof trucks and vehicle should be labeled as "BIO-MEDICAL WASTE ".

5.1 Treatment Technology Existing scenario:

The waste is segregated at the treatment plant and then treated as per the requirements

The different methods of treatment to be adopted for the BMW are Incineration for infectious waste, shredding for the sharp waste and no treatment for the noninfectious waste. The treatment process is as per the CPCB Standards.

Proposed method:

Controlled-air Incinerator is best treatment method for Biomedical waste because sterilization efficiency is more than other treatment technology.

Treated waste from incinerator is mostly ash, may contain toxic substance but treated waste characteristics of other treatments are wet waste, dehydrated waste, shredded waste.

Incinerator should be installed within hospital campus for hospitals which are having bed strength more than 100.

Emissions from bio-medical waste incinerator are particulate matter, toxic metals, toxic organics, carbon monoxide, and gases but it could be controlled by pollution control system (wet scrubbers, fabric filters or dry scrubbers). A common waste treatment facility (CWTF) for a group of hospitals at two or three location to cater the need of cluster is best for private hospitals of Amravati city because total waste generated in the hospitals of Amravati city is approximately 3500-3700 kg/day.

CWTF may have more than one treatment option, to take care of various categories of waste from different health care units.

CWTF is likely to be more economical than individual waste treatment facilities. The local bodies should provide the facilities. The service charges may be levied on the hospital to meet out recurring expenditure.

6. Recommendation

a) Training should be given to ward boys, ayes, sweepers etc.
b) Proper segregation of Biomedical waste should be done in hospitals.
c) Infectious waste should be sterilized by autoclaving or hydroplaning in all the hospitals Needles should be destructed by needle cutter in all hospitals.
d) Controlled-air Incinerator is best treatment method for hospital-A
e) A common waste treatment facility for a group of hospitals at two or three location to cater the need of cluster is best for private hospitals of Amravati.
f) Needle cutter should be used in injection room and laboratory of Hospital-D.
g) Autoclaving should be used before final disposal of infectious waste of Hospital-D
h) IMA & the local body have to make the plan for providing waste treatment & final disposal,
i) To safeguard the population against danger of infection through hospital wasted also to improve the aesthetics of town

7. **Conclusion**

Thus a 50kg/hr Biomedical waste incinerator system has been designed for the destruction of Biomedical waste generated by hospitals in Amravati. The system includes controlled –air incinerator, automatic feeding system packed-bed wet scrubber emission control equipment and the control system. The equipment and the materials are chosen on the basis of local availability. The pilot waste incinerator will be built and performance tested. It is expected that good quality hospital incinerator can be built and installed at least four hospitals of Amravati to fulfill the demand of BMW treatment. And also the proposed plan for Biomedical waste treatment plant is suggested in the case study.

8. REFERENCES

1. Akhter N., Z. Hussain, J. Trankler and P. Parkpian, (2002), Biomedical wasteManagement and Its Probable Health Effect A Lesson Learned From Bangladesh, Indian Journal of Environmental Health, Vol. 44 (2), 124-137.
2. Banerjee, S.K. and KaushikiBagchi, (1999), Hospital Solid Waste And Its Management Approach- A Case Study of a Hospital In Calcutta, Indian Journal of Environmental Protection, Vol. 19 (12), 932-938.
3. Central Pollution Control Board (2000),