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Biomedical Waste Management in the District of Mandya, Karnataka

H.A. Praveen Tissera	Scholar, Department of Civil Engineering, A.I.T., India.
Rajesh Gopinath	Assistant Professor, Department of Civil Engineering, A.I.T., India.
Yatish	Assistant Manager-Environment TATA Consulting Engineers Ltd., India.

ABSTRACT

The present study reviews the 'Biomedical waste' management practice currently prevailing in the district of Mandya (Karnataka). For the present survey, 1 government hospital, 35 nursing homes, 6 registered clinics and 3 diagnostic centers were studied for and documented, according to a pre-tested observation checklist with based on interaction with the health care personnel. The study confirmed that the waste management practices were inadequate and rudimentary. While the disposal of solid biomedical waste in hospital was carried by landfilling, the liquid biomedical waste generated was discharged directly to public sewers. The study also probed the level of awareness on waste management among the biomedical waste producers, and found it to be very inferior. Finally based on the findings, the current study postulates guidelines for sustainable biomedical waste management towards its proper handling, packaging, transportation, treatment and disposal. The study recommends focus on periodic monitoring, producer commitment, infrastructure availability, process planning, education and training, and a higher community awareness level, to make the biomedical waste management successful in Mandya.

KEYWORDS: Mandya, Biomedical, waste, management

INTRODUCTION

According to Ministry of Urban Development (India), 'Bio-medical waste' is defined as "any solid and/or liquid waste including its container and any intermediate product, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research pertaining thereto or in the production or testing thereof1.

Healthcare is one of the most essential services in any growing society, as Medical facilities are vital for our well-being. However, the Bio-medical wastes generated from medical establishments comprises of hazardous, infectious and radioactive materials and sharps, which if not properly treated/disposed or is allowed to get mixed with the other municipal solid waste (figure1), has a high potential in spread of infection and transmission of contagious diseases through vectors2.

The causative routes encompass injury among medical/non-medical personnel; from the sharps, unauthorized recycling of disposable items, toxic emissions from defective/inefficient incinerators and indiscriminate disposal of incinerator residues. The rag pickers and waste handlers are often worst affected, because unknowingly or unwillingly, they rummage through all kinds of poisonous material while trying to salvage items which they sell for refuse3.



Figure 1: Mixing of garbage & Healthcare waste, with stray animals feeding on it.

Source: Photograph snapped by Author

In the absence of reliable and extensive data, it is however difficult to quantify the extent and variety of risk involved. It is only recently that methods to manage this waste in a scientific manner have been initiated in India. In India, the Ministry of Environmental and Forest, Government of India, New Delhi, notified bio-medical waste (management and handling) Rules 19981.

Under this rule, every health care facility should frame an institutional policy, develop an organizational structure, possess relevant authorization, and maintain documentation of waste generation. Also the rule necessitates availability of segregation schemes (figure 2), modes of waste transportation, its on-site treatment-disposal options, and finally drafting instrument parameters to assess treatment efficiency, environmental monitoring, and occupational safety and health provisions with records of periodic training4.



Figure 2: Labeling of Waste Storage Containers.

Source: Photograph snapped by Author

LITERATURE REVIEW

Shalini Sharma and S.V.S.Chauhan (2008) in their study of assessment of bio-medical waste management in 3 apex government hospitals of Agra between 2004-2005, collected data with the help of personal observations and questionnaires. The study indicated lack of knowledge and awareness even among qualified hospital personnel5. Manoj Bansal et al (2011) assessed the

awareness and existing practices regarding biomedical waste management in urban and rural health facilities of Gwalior district from January to June 2008. It found the practices to be were grossly inadequate, particularly in rural area6. Hence, the management of bio-medical waste is hence a subject of considerable concern to public health administrators and the general public.

CASE STUDY

Mandya is the smallest district of Karnataka state. It comprises of 1 Government general hospital, 35 nursing homes, 6 registered clinics and 3 diagnostic centers. The objectives of the present study included probing the practices of managing Bio-medical waste, to quantitatively and qualitatively assess its rate of generation, to determine the level of awareness on waste management, and to propose suitable suggestions for an effective management. The study was undertaken in hospitals falling under the Mandya city limits, for a period of 06 months. The study covers 1 Government hospital, 25 Nursing homes, 3 Diagnostic centers and 2 clinics. Data collection involved taking prior permission from the hospitals for the study. This was then followed by documentation of the waste management practices, according to a pre-tested observation checklist developed for this purpose. Observations were documented separately by interacting with the concerned health care personal. The Government general hospital with bed strength of 400 numbers was selected for studying aspects of generation, collection, segregation and storage, transportation and treatment. The nursing homes were also studied to find out the management practices within their premises.

RESULTS AND DISCUSSIONS

The waste stream from medical facilities could be classified into three major categories. Hospital Waste, which included all the waste generated from a facility (including cafeteria, office, and construction wastes), Medical Waste, which is also a subset of hospital waste and included wastes generated as a result of patient diagnosis, treatment, or immunization of human beings or animals, and finally Potentially Infectious Waste, which being a subset of medical waste included portion of medical waste that has the potential to transmit an infectious disease.

From the study, it was observed that in Government General Hospital the number of outpatient and inpatient strength during the period of study was irregular, hence the daily waste generation rates were found to be non-uniform during the week. The quantity of Liquid Waste generated in Government General Hospital Premises was found to be around 2,12,500 L/day. The Liquid Waste so generated constituted Laboratory Washings, and Sanitary wastewater, and was discharged directly to public sewers without any treatment. The liquid waste constitutes laboratory washings, and sanitary wastewater. As pre the norms for discharging into public sewer the BOD and COD values should be in the range of 30mg/l and 250 mg/l. But the liquid waste generated in the hospital had higher BOD and COD values in the range of 443mg/L and 704mg/L respectively. In case of nursing homes, the waste generation rates differed from one to another depending upon bed strength and medical practices of the establishments. The solid bio-medical waste generated was collected and transported (figures 3 & 4) off-premises everyday morning by Maridi Eco-therm Industries Pvt. Ltd, Bangalore, as a safe disposal option.



Figure 3: Transport vehicle (common facility).
Source: Photograph snapped by Author



Figure 4: Unsafe means for Collection of Waste in Govt. General.
Source: Photograph snapped by Author

The total quantity of Solid waste generated in the Government General Hospital premises was quantified as to be 62.5 Kg by using equation 1.

Total quantity of Solid waste generated in the Government General Hospital premises = (No. of houses × Average No. of people × Average quantity of Waste generated per person per day) …..Eqn. 1

The study also found that the average quantity of Solid waste generated in Government General Hospital premises was 223.28 Kg/week. Therefore, total quantity of solid waste generated in government general hospital premises was deduced as 301.78 Kg/day. This was estimated by using equation 2.

Total quantity of solid waste generated in government general hospital premises = (Average quantity of waste generated in hospital per day + Average quantity of waste generated in houses per day + Average waste generated in kitchen.) …..Eqn. 2

The collection of Solid Hospital wastes from each department was done daily morning by the workers using Wheel Cart. It was observed that while collecting the wastes, the workers were not using protective equipment. Storage aspects were inculcated by each department on the same day the waste was generated. However, it was not done using the color-coded bins as prescribed by Karnataka State Pollution Control Board.

All the wastes which are generated during treatment was mixed together and stored in a single bin. Further these collected wastes were sent to a landfill (figure 5) built inside the hospital premises, having dimensions 10m × 4m × 4m. Ultimately, after the landfill was completely filled, the wastes were taken out and sent along with the Municipal Garbage. Also it needs to be mentioned here that neither partial nor complete treatment was provided. For example, the sharps (figure 6) which fall under the category 4 necessitating mutilation were also directly sent to landfill.



Figure 5: Onsite Land-fill.
Source: Photograph snapped by Author



Figure 6: Sharps collection in Govt. Hospital.
Source: Photograph snapped by Author

TABLE – 1
OBSERVATIONS AND RECOMMENDATIONS

Error in Practices	Reasons	Corrective Actions
Mixing of wastes is done in single bins.	Inadequate awareness on Segregation of wastes	Use Color coded bins.
Mixing of recyclable & non-recyclable plastics.	No separate blue color coded containers / bins kept for the purpose.	To use separate blue color coded containers labeled for recyclable and non-recyclable wastes.
Sharps disposed onto landfill.	Lack of awareness among staff	Staff training
Waste laden Colored plastic bags disposed into landfill.	Lack of awareness on environmental hazards of plastic	Staff training and storage for recycling.
Inappropriate colored containers in location.	Staff does not have clear understanding about color codes.	Proper training of personnel to be carried out.

CONCLUSIONS

Most of the healthcare establishments and municipal authorities in Mandya city were found not to adhere to bio-medical waste management and handling rules. While in Government General Hospital the management was not as per the 1998 rules, the nursing homes on other hand were comparatively satisfactory. However it was also observed that these nursing homes were not maintaining any record relating in accordance to rules and regulations. The disposal of solid waste in Government General Hospital was initially sent to an on-site land fill, which eventually was sent along with the municipal garbage. While the liquid waste generated in Government General Hospital was discharged directly to public sewers, 70% of nursing homes utilized septic tank and soak pit for its disposal, and remaining 30% discharged to the public sewer. To ensure successful implementation and operation, the five areas that need focus are the commitment from the owner, infrastructure availability, process planning, education, and training and involvement of community by awareness drives.

REFERENCES

[1]Bio-medical waste management and handling rules (1998), MoEF., Govt. of India. [2]Medical waste management in United States (1990), 1st interim report to Congress, USEPA, no.530-sw-90-051b. [3]Manual on hospital waste management (2000), Central pollution control board. [4] Biomedical waste management (2004), EMRI. [5] Shalini Sharma and S.V.S. Chauhan, (2008), "Assessment of bio-medical waste management in 3 apex Government hospitals of Agra", J. Env. Bio. 29(2), 159-162. [6]Manoj Bansal et al (2011), "Biomedical waste management: awareness and practices in district of Madhya Pradesh", Nat. J. of Community Medicine, 2(3), 452.