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A STUDY ON PROBLEMS OF MANAGEMENT OF BIO MEDICAL WASTES AND THEIR REMEDIAL MEASURES

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ABSTRACT

The collection, storage and disposal of medical solid wastes are a growing environmental problem in Indian cities which needs immediate attention before it goes out of hand. While the government of India is making efforts to expand medical services by allowing private hospitals in the country, the management of medical wastes has received little attention despite their potential environmental hazards and public health risks. This paper discusses the results of a study on management of medical wastes in the Government Hospital; Erode of 583-bedded capacity has taken as a case study. The quantity of Waste arising from the hospital is 319.5 Kg/day. As no proper Segregation at source is practiced in this hospital, it has paved the way for increased medical waste stream due to mixing of general and medical waste. The study revealed that medical wastes are not properly managed in most hospitals and dispensaries. The medical facilities are characterized by inadequate and in appropriate refuse storage facilities, lack of refuse collection services, improper disposal methods and inadequate and inappropriate gear for refuse handlers. A number of remedial measures to improve the situation including the construction of commercial incinerator in the city are suggested.

INTRODUCTION

The rapid urbanization and urban development has lead to overcrowding of town and cities. The stress and strain of modern life has caused set backs / effects of both general and serious nature. To restore the community health, there has been a tremendous growth of hospitals in both private and government sector. Sophisticated instruments are being used for diagnosis and treatment. This advancement results in increase in per capita per patient generation of Bio-medical waste. Though hospitals are meant to restore human health, the disposal of hospital waste is a matter of concern. Bio-medical waste has recently emerged as an issue of major concern not only in hospitals, nursing home but also to environmental law enforcement agencies, media and the general public. All types of health care facilities, laboratory, clinics, nursing homes and medical, dental and veterinary hospitals generate a waste stream. Some of these wastes are threat to human being and environment. The Hospital waste contains infectious wastes, which is not properly dispose pose a great health risk to the public (Mato and Kassenga, 1997; Mato and Kaseva, 1999). Of most concern to-date is the disposal of sharp instruments particularly used

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needles, surgical blades, and expired drugs. In addition to its infectivity its high toxicity and radioactivity has increased public concern about treatment, transportation and ultimate disposal. In order to minimize the problems cited above a proper and workable waste management system is a pre-requisite in the hospitals (Patil and Shekdar, 2001; Mehrdad et al. 2004; Da Silva et al. 2005). This involves the determination of sources, waste characterization, generation rates, handling practice, storage, transportation and disposal. At the moment, there is no substantial work done on hospital waste management in cities. Now, medical wastes are just mixed up with other domestic wastes and disposed crudely in municipal dumping sites. This paper addresses medical waste management problems in the Hospital based on one-month survey and finally proposes short-term and long-term solutions to the problems identified during the survey.

DESCRIPTION OF THE STUDY AREA

Area under study, Erode is a rapidly growing medium urban area with a population of about 1.5 lakhs. There are 68 hospitals in Erode and one Government hospital is situated in centre of city and it was found to be a large hospital with a capacity of 583 beds.

EXISTING METHOD OF TREATMENT & DISPOSAL IN THE HOSPITAL

Collection of Waste

Plastic bins are used to collect both general and bio-medical waste. Each ward is provided with two bins. One bin is kept in nurse room where paper waste, sharp waste, sometimes infected waste are collected and other bin is kept outside the ward for collection of food waste, dressing waste. But during transportation, both general and bio-medical wastes are mixed up and collected in one bin.

Transportation of collected waste

Wastes collected in these hospitals are transported manually by wheelbarrow to the disposal site.
Treatment and disposal

Both general and medical waste dumped in a particular place and this is collected daily by municipality by means of lorry. Municipality provides separate trip for collecting Hospital waste to avoid mixing of this hazardous waste with others and finally this hospital waste is being burnt in the disposal site using kerosene. The waste generated due to infections are burnt in the hospital itself to avoid its mixing with others wastes. The non-disposable needles are sterilized and reused.

MATERIALS AND METHODS

Method of sample collection

The various types of bio- medical waste generated in this Government hospital were collected with the help of doctors and staff members in that hospital. First a survey was done on the type of waste generated from each ward, type of disposal, time of disposal, quantity of disposal etc. Absolute quantity of waste produced daily were collected, measured and weighed.

Analysis of Bio-medical and General waste

Each ward is provided with two containers, one for general and other for bio-medical waste. The quantity generated was measured with help of sanitary assistants. The details of waste arising from different wards are shown in Fig 1. The Percentage gross total quantity of General waste generated in the Hospital and the Percentage gross total quantity of medical waste generated in the hospital are given in Fig 2 and Fig 3. The compositions of general waste are also shown in Fig 4.

RESULTS AND DISCUSSION

The study presents the status of existing waste management in the Government hospital Erode with the capacity of 583 beds, which generates total waste stream of about 319.5 kgs per day including wastes from outside patient department. Out of 319.5 kgs 162 kgs comes under the category of general waste and 157.5 kgs of waste comes under medical waste category. It was found that 0.55 kg of waste per bed per day was collected. It is because of improper segregation and collection of waste at the source, both general and medical waste get mixed increasing the medical waste stream in the hospital. It was understood from the study that there was no proper and hygienic handling disposal practices were done in the hospital. Methods of proper treatment and safe disposal of bio-medical waste were identified and proposed. From this survey it was found that currently no centralized facilities available for proper waste disposal. Segregation of waste at source is not properly practiced in this hospital. For effective management of waste, the waste should be segregated at the source itself. Separate bins are to be used to collect medical and general waste with proper colour

Table 1. Proposed container color-coding for medical waste and general waste

Type of waste	Quantity per day (Kg / day)	Color coding
General waste	162	Green
Sharps	16	White /
Translucent puncture proof bag / container	59	Yellow
Infectious waste		
Chemical and liquid waste	31.5	Black
Infectious / Potentially infectious plastics	51	Red

1. Green colour bags and containers are to be used to store the general wastes.
2. Sharps may damage the bags, so puncture proof containers are to be used.
3. Infectious wastes are to be collected in Yellow bags.
4. Black containers are suggested for collection of chemical waste and
5. Red colour containers for infectious / potentially infectious plastic.

If all the measures suggested by us are adopted, the effect of waste and its hazardous can be minimized.

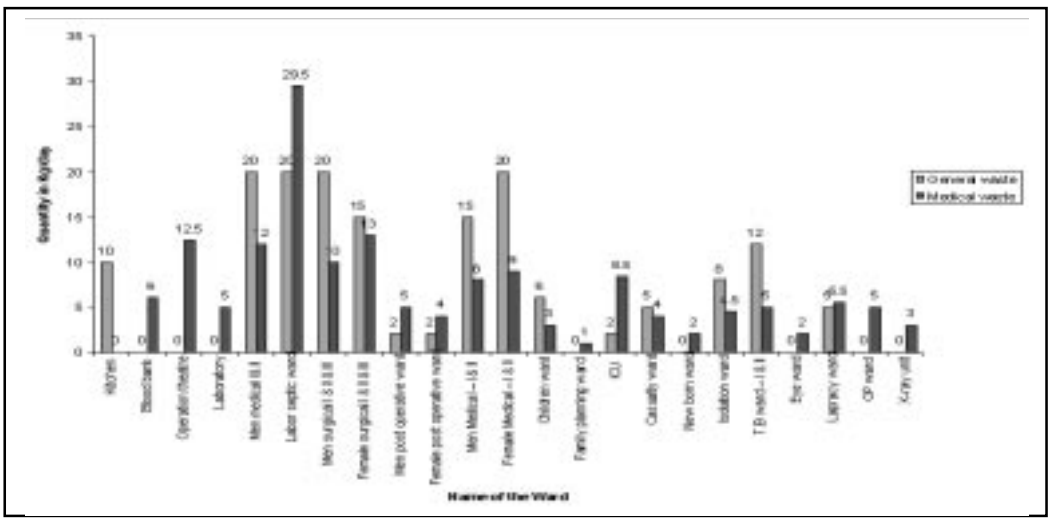

Fig. 1 Quantity of bio-medical waste Management

coding, green for general waste and yellow for infectious wastes as per Table 1. Potentially infected plastics should be collected in separate bin of red colour.

CONCLUSION

Since environmental pollution has become a major concern with respect to the future of life on our planet. It is legal duty of the management of the health care institution to ensure that bio-medical waste are managed properly without putting extra burden on health care staff in their duties and causing any adverse impacts on human health or environment. Based on the results the following suggestions were listed as follows:

- The doctors and nurses should take the responsibility to classify correctly the bio-medical waste at the source, which allows subsequent waste segregation to occur properly.
- Simplified colour coding system of hospital waste management can be introduced instead of introducing complex system with too many colour coded bags or bins simplified colour coding system as:

1. Yellow bag / bin that needs to incinerate or deep burial containing human microbiological waste, sharp waste, discarded medicine, cytotoxic drugs, and soiled waste.
2. Red bags / bins that needs to autoclave, chemical Disinfection or microwave containing plastic waste, disposable items like tubes, catheter, blood or uro bags, gloves etc.
3. Black bags / bins that are to be send for secured Landfilling or burial, containing chemical solid waste and incinerated ash.

- Labeling is essential in the correct identification and safe management of medical waste. All labeling and sign posting should be clean and use the inter-

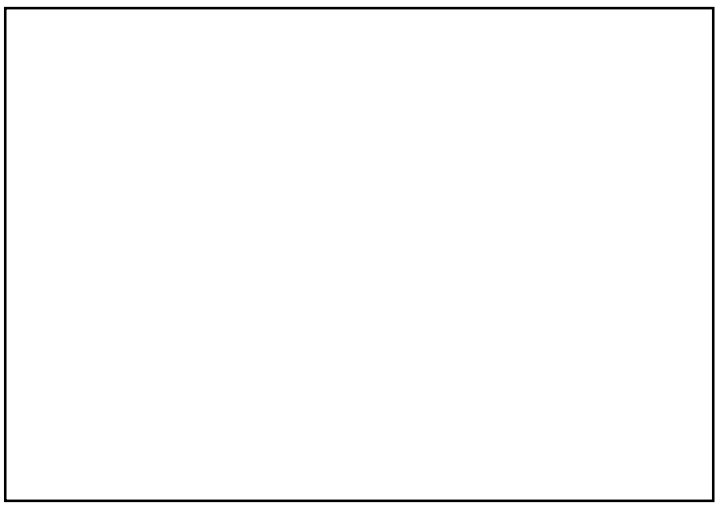

Fig. 2 Percentage gross total quantity of General waste generated in the Hospital

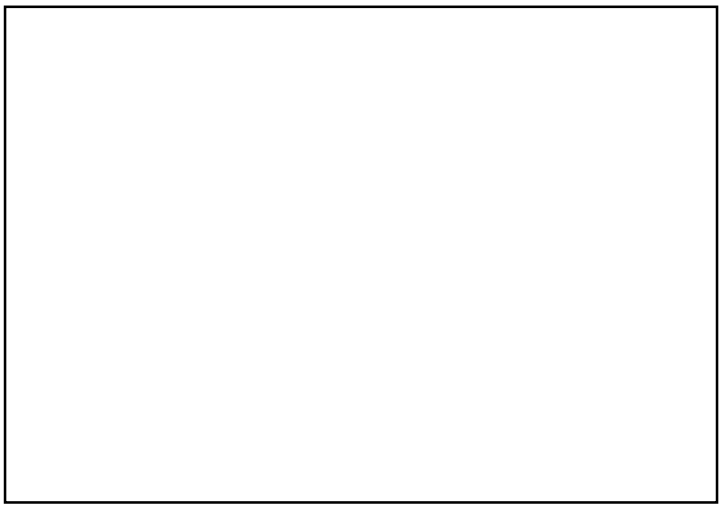

Fig. 3

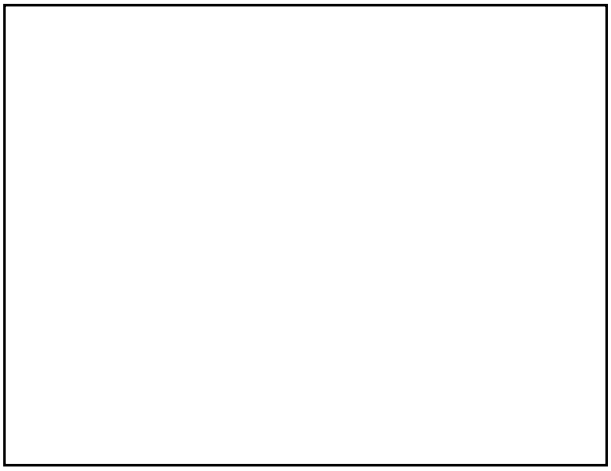

Fig. 4 Composition of general waste

national symbols and colour coding as given in schedule.

- Sharp management should be practiced by providing puncture resistant containers or mutilate sharps at the point of generation using needle destroyers.
- Each step of waste management can be evaluated by methodical examination of all the regulated medical waste by a waste audit.
- Waste minimizing activities such as waste reduction, reuse and recycling should be adopted for beneficial and safe waste management.
- A detail plan should be prepared indicating each step of management extending from procurement of material, waste generation, collection, handling, storage, transport, treatment and disposal.
- All personnel in health care establishment should be made aware of the potential risk of mishandling of hospital waste by conducting training programmes.
- It is firmly believed that collective community effort rather than individual attempts would make handling and disposal of bio- medical waste economically and operationally viable.

REFERENCES

Da Silva, C.E., Hoppe, A.E., Ravanello, M.M. and Mello, N. 2005. Medical wastes management in the south of Brazil, Waste Management. 25 (6) : 600-605.

Mato R.R.A.M. and Kaseva, M.E. 1999. Critical review of industrial and medical waste practices in Dar es Salaam City. *Resources, Conservation and Recycling*. 25 : 271-287.

Mato R.R.A.M. and Kassenga, G.R. 1997. A study of management of medical solid wastes in Dar es Salaam and their remedial measures. *Resources, Conservation and Recycling*. 21 : 1-16.

Mehrdad Askarian, Mahmood Vakili and Gholamhosein Kabir, 2004. Results of a hospital waste survey in private hospitals in Fars province, Iran. *Waste Management*. 24 : 347-352.

Patil A. D., Shekdar A. V. 2001. Health-care waste management in India. *Journal of Environmental Management*. 63 : 211-220.