

## A study on waste generated by health care units in Gwalior district, India

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### SUMMARY

In the present work two large hospitals of Gwalior viz., J.A. Group of Hospitals and Cancer Hospital have been studied taking into consideration the various aspects of hospital wastes. The study was conducted only to reveal the per day waste generation in two hospitals. In the waste management processes, segregation and storage were not properly followed in these hospitals. However, collection and transportation activities to final disposal were practiced. The policy of quality control system in waste management needs to be improved.

### Key words :

Biomedical waste,  
Hospital,  
Healthcare units,  
Waste  
management

Hospitals are the institutions that provide medical, surgical, or psychiatric care and treatment for the sick or injured persons. But during the diagnosing and treating the sick or injured, wastes are produced that may be hazardous to the human health. Health care waste is the total waste that is generated from hospitals, medical research centre, laboratories, clinics, blood banks, veterinary health care etc. Biomedical waste includes sharps, soiled waste, disposables, anatomical waste, cultures, discarded medicines, chemical wastes etc. (Pandit *et al.*, 2007).

According to WHO from the total of waste generated by health care activities, almost 80% is general waste comparable to domestic waste the remaining approximately 20% of wastes are considered to be hazardous materials that may be infectious, toxic or radioactive.

Present study has been made to study the status of hospital waste and to disposal in Gwalior.

### MATERIALS AND METHODS

The survey was carried out in 2 hospitals namely, J.A. Group of Hospitals including (J.A. Hospital and Kamalaraja Hospital) and Cancer hospital, Gwalior. The average solid waste was calculated by taking samples of solid waste, from each study site randomly for a period of 21 days. Samples were collected in polythene bag in the afternoon. Average generation of various infectious and non infectious items per sampling unit was calculated by analyzing solid

waste generated in each sampling unit. Average solid waste generation per day at each study site was calculated by multiplying average solid waste/capita/day with average number of patient / day of each site.

### RESULTS AND DISCUSSION

Hospital waste management is of vital importance as its improper management poses risks to health care workers, waste handlers, patients, community in general and largely the environment.

The different types of wastes generated in the studied hospitals included paper, soiled dressings, sponges, body tissue, waste ampoules, disposable syringes, draper, catheters, drainage sets, colostomy bags, surgical gloves, contaminated glasswares, plastics, specimen containers, specimen slides, cartons, crates, packing materials, metal containers, food containers, solution bottles, pharmaceutical bottles and waste from x-ray department. In these hospitals, these wastes were not segregated in different types.

The average solid waste generation per capita/day was observed 2.02 kg and 1.25 at J.A. group of Hospitals and Cancer Hospital, respectively and the solid waste generation per day at the source was found to be 303 kg and 62.5 kg at J.A. group of hospitals and Cancer hospital as shown in Table 1. Average collection of recyclable plastic waste consisted of glucose bottles, spirit bottles and H<sub>2</sub>O<sub>2</sub> bottle which were observed to be 45.02 kg at J.A.

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**Table 1 : Healthcare waste generated by healthcare units in Gwalior city**

Name of healthcare units	Average no. of patients per day	Average waste/capita/ day	Average solid waste generation, kg/ day at source	Average collection of recyclable waste at source (kg/ day)			Average non recyclable waste (kg/ day)
				Plastic ware	Glass ware	Total	
				(B)	(D)	SW= BxD	
J.A. group of Hospitals	150	2.02	303	30.44	14.58	45.02	257.98
Cancer Hospital	50	1.25	62.5	9.36	10.62	19.98	42.52

Group of Hospitals and 19.98 kg at Cancer Hospitals and average non-recyclable waste generation was 257.98 kg at J.A. Group of Hospitals and 42.5 kg at Cancer Hospital. Composition of different infections wastes and that of non-infections wastes generated by J.A. group of Hospitals and Cancer Hospital are given in Table 2 and 3, respectively.

Managing waste has two vital parts: firstly management of hazardous wastes of different types generated from different sources, which involve careful collection, segregation, transportation and final disposal, and secondly effective training and supervision of various categories of personnel involved in whole waste management system. For streamlining the process, wastes have to be classified and are to be stored in different colour coded containers or bags so that staff is able to recognize the appropriate container for each particular type of waste. Segregation is an important pre-requisite in the entire process of waste management as it allows special attention to the relatively small quantities of infectious and hazardous waste. Domestic waste produced by the attendants of patients also gets mixed with bio-medical waste.

Proper segregation of waste is not practiced in these hospitals. Different colour coded bags are not used for different types of wastes although bins are displayed at some sites. No labelling or marking, *viz.*, hazardous/infectious waste is being practiced in J.A.Group of Hospitals. The general waste is collected in common containers in the wards which also contains part of bio-medical waste. Incinerator is available in both the hospitals but regular use of it is not practiced. Most of the time the bio-medical waste is also collected in separate containers. It is documented that such a practice of non-segregation may increase the costs of final disposal of waste because the infective and non- infective wastes get mixed up and hence the wastes that could not be disposed off by land-fill need incineration, thus reducing risks and cost of waste management. Studies in USA revealed that of all the workers who come in contact

with medical waste, those in the sanitary service report highest on the job injuries; the annual rate varied from 10-20 per 1000 workers in other categories to 180-200 per 1000 workers in sanitation department (refuse collectors (James, 1992).

In developed countries due to increased use of disposables, the waste produced has been up to 5.24 kgs. In hospitals of United Kingdoms, France, Norway, Spain, Netherlands, USA and Latin America, waste produced is 3.3 kgs, 2.5 kgs, 3.9 kgs, 4.4 kgs, 4.2 kgs, 4.5 kgs and 3.8 kgs per bed per day, respectively (WHO, 1985).

Most hospitals in India generate 1-2 kgs per bed per day except the tertiary care hospitals (e.g. AIIMS) which produce waste on higher side. Wastes generated in developing countries like India contain much less disposables and plastics than those generated in developed countries due to difference in life style and use of more disposable items.

Untreated waste is transported from wards through garbage chute which consists of a network of pipelines from various floors into tuggers which are prepositioned. Waste obtained from OPD and Emergency etc. is transported manually to common collections points where collections is made directly into tuggers (Pandit *et al.*,

**Table 2 : Composition of infectious health care waste (% weight) generated by healthcare units in Gwalior city**

Infectious waste	Weight percentage component	
	J.A. group of Hospitals	Cancer Hospital
Average generation of infectious waste, kg/day	155	21
Name of the item, % by weight		
Metallic ware	11.66	6.95
Rubber	32.44	48.87
Cloth ware	19.24	20.17
Plastic ware	17.09	11.23
Gynae waste	9.11	9.55
Glass ware	10.46	3.23

2007). One of the disadvantages of garbage chute is that it is difficult to keep it clean.

There are not many national level studies on the quantum of waste generated per bed per day. The results are almost concordant with limited number of studies from hospitals in other cities of India. Studies conducted at AIIMS, New Delhi revealed that the quantum of waste generated is 2.2 kgs per bed per day, In Jaipur, tertiary care hospital produces 1.5 kg per bed per day( Pathak 1983).In Mumba, Tata Memorial Hospital produces 1.13 kgs per bed per day. In Amritsar large tertiary hospital produces 1.05 to 1.3 kg per bed per day. Government and private hospitals in Delhi produce 1.4-1.0 kg per bed per day.

**Table 3 : Composition of non-infectious waste (% weight) generated by healthcare units in Gwalior city**

Non-infectious waste	Weight percentage component	
	J.A. group of Hospitals	Cancer Hospital
Average generation of non-infectious waste, kg/day	145	9
Name of the item, % by weight		
Metallic ware	5.89	10.75
Plastic ware	12.34	10.42
Glass ware	14.23	8.97
Rubber	19.85	24.85
Paper	14.74	12.34
Polythene	12.44	17.98
Food material	15.56	10.46
Inert material	4.95	4.23

For the wastes intended for off-site disposal, generators must segregate sharps and fluids from other wastes. Packaging material must be rigid, leak resistant, impervious to moisture and strong enough to resist tearing and bursting. Containers holding untreated medical waste must be labeled as “infectious waste or medical waste” or with the universal “bio-hazard” symbol. Packing must

be marked to identify the generator, the transporter and the date of shipment.

### **Conclusion:**

Waste production in J.A. Group of Hospitals was 2.02 kgs per bed per day while Cancer Hospital produced 1.50 kg per bed per day. Though there is regular waste collection, yet, all the waste management activities like collection, segregation, transportation, treatment and disposal need to be done on scientific basis. Segregation should start at the source of generation. Containers of recommended colours should be used for different types of wastes. Proper labelling and marking of infectious waste should be done. Since this is the first study of its kind in Gwalior, more emphasis is needed to devise the improvised policy of waste management practices and its quality control system in hospitals of the state.

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