

## Assessment of Healthcare Waste Generated by Government Hospital in Agra City, India

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### Abstract

Health care wastes include anatomical, pathological and clinical infectious/ hazardous organic and inorganic waste. The waste is disposed off in unscientific manner. The study has been conducted in the government health care establishment only to reveal the per day waste generation on each patient, present mode of waste management within the units bed, our suggestions which have helped the units to improve their waste management practices, in the city of Agra.

*Keywords:* Waste management, Health care waste, Management, Government hospital

### Introduction

Bio-medical waste can be defined as the total waste stream that is generated from health care establishments, health related research facilities, laboratories and emergency relief donations. Hospitals, clinics, laboratories, medical research centers, pharmaceutical manufacturing plants, pharmacies, blood banks, veterinary health care centers and home health care activities are some of the generators of health care waste.

Bio-medical waste generated from diagnosis activities can be broadly categorized as general waste and hazardous waste. This, however, remains true only when proper segregation and separation of waste is practiced, according to the type at the source. There are different estimates regarding the share of hazardous and non-hazardous constituents of health care waste. Tietjen *et al.* (2003) also held that 85% of the waste produced in hospitals and clinics is non-contaminated and possess no risk of infection.

On the other hand, WHO (2000) reported that from the total waste generated by health care activities, 80% is general waste and the balance is considered as hazardous, as it tends to be infectious, toxic or radioactive.

The total 10,000 approximately beds of health care units are located in Agra. Out of which 35% is from government sector and rest 65% is from private sector. Approximately 25,000 kg of hospital waste is produced every day out of which 70-75% is non-infectious wastes, 20-25% infectious wastes and 05-10% is hazardous waste. Out of which most of the hospitals, nursing homes and pathological laboratories dispose off the waste in their neighborhoods, due to lack of awareness, inadequate services, limited utilization of existing facilities, lack of adequate institutional arrangements, operation inefficiencies and nodal authorities inefficiency in performing their task effectively etc. but few take proper care of their waste.

The present study aims to the total waste generated in government hospital and their effective management of proper disposal of the waste.

#### **Materials and methods**

The study was carried out in three government hospitals i.e. Sarojini Naidu Medical College, and Hospital, Lady Loyal Hospital and District Hospital, Agra. The total waste was calculated by taking sample of everyday during study period (i.e. April, 2006). Sample was collected 24 hrs from each sampling unit in different colour coded polythene bags i.e. Yellow, Red and Blue. Yellow bag contained human tissue, organs, body parts, animal tissues, carcasses, bleeding parts, fluid, blood and experimental animals used in research, veterinary hospital waste, animal houses, waste from laboratory, cultures and stocks etc. Red bag contain human and animal cell culture, waste from production of biological toxins, items contaminated with blood and blood fluid including cotton, dressing, soiled plaster casts, linen, bedding and wastes generated from disposal item other than sharps etc. Blue bag contained needles, syringes, scalpels, blades, glass, tubing, catheters, intra-venous sets etc. Total waste per day and per bed per day at each study site was calculated by division of total waste per month per day and waste per day division of total no. of bed of each site.

#### **Results and discussion**

Table 1 and 2 show the hospital waste generation in three government hospitals in Agra city. In these hospitals, the total medical waste composite such as radioactive waste 2%, bottle broken glass 16%, needles sharpeners 6%, body parts 5%, miscellaneous 1%, plastic 10%,

cardboard 2%, bandage swabs, cotton, cloths 9%, paper 3% and other wastes 46%. The waste generation per month was observed to 14489.3 kg, 758.4 kg and 15016.37 kg at S.N. Medical College and Hospital (S.N.M.C. and H.), M.G. Road, Lady Loyal Hospital (L.L.H.), Raja ki Madi and District Hospital (D.H.), Sayee Ki Takia of Agra city (Figure 6) and the average waste generation per day at source was found to be 25.28 kg, 482.9 kg and 500.54 kg at L.L.H., S.N.M.C. and H. and D.H. as shown in Figure 3. An average waste generated per bed per day was found 4.49 kg/bed/day at S.N.M.C. and H., 0.12 kg/bed/day at L.L.H. and 4.20 kg/bed/day at D.H. respectively (Figure 4). The health care waste produced in different health care unit are found within limit (0.5-2 kg/bed/day) described in CPCB guideline Kishore and Ingle (2004), Acharya and Singh (2000) and Patil and Shekdar (2001). Rampal *et al.* (2002) also observed the generation of solid waste per capita per day and average solid waste generation per day along with qualitative composition of solid waste; moreover Sharma (2002) also reported that between 75% and 90% of the waste produced by healthcare facilities is general waste, comparable to domestic waste.

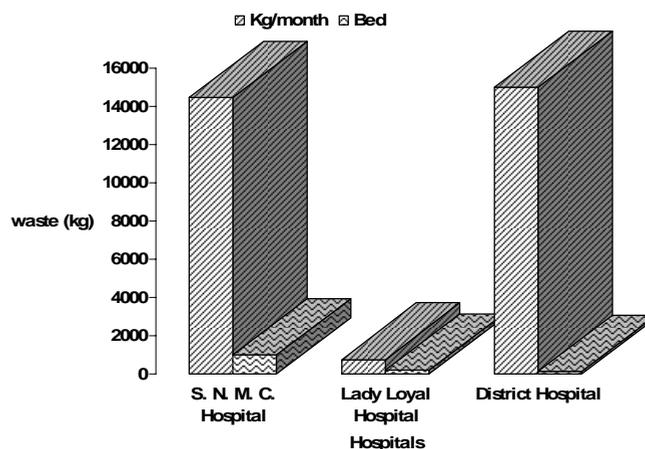
The average generation of waste/month by the government three healthcare units in Agra was observed in yellow bag, red bag and blue bag. The yellow colour bag waste generated/month was observed 514.92 kg at L.L.H., 5811.77 kg at DH and 7751.3 kg at SNMC and H and the total waste generated/day in between 17.13 kg at L.L.H., 193.7 kg at DH and 258.3 kg at SNMC and H respectively (Figure 1 and 2). The red colour bag also containing total waste generated/month was observed 156.5

**Table 1.** Health care waste generated by government health care units in Agra City.

Name of health care unit	Total no. of beds	Total waste generated per month	Average waste generation per day	Average waste generation per bed per day
<b>S. N. M. C. Hospital</b>	976	14489.3 kg	482.9 kg	4.49 kg
<b>Lady Loyal Hospital</b>	200	758.4 kg	25.28 kg	0.12 kg
<b>District Hospital</b>	119	15016.3 kg	500.54 kg	4.20 kg

**Table 2.** Health care waste generated per month and per day by government health care units in Agra City.

Colour code	Waste	S. N. M. C. Hospital	Lady Loyal Hospital	District Hospital
<b>Yellow</b>	Total waste generated/month (kg)	7751.3	514.12	5811.77
	Total waste generated/day (kg)	258.3	17.13	193.7
<b>Red</b>	Total waste generated/month (kg)	4352	156.5	5011.35
	Total waste generated/day (kg)	145.06	5.21	167.04
<b>Blue</b>	Total waste generated/month (kg)	2386	87.8	4160.6
	Total waste generated/day (kg)	79.53	2.92	138.68



**Figure 1.** Monthly hospital waste generated (kg) from three governmental hospital in Agra City according to total beds.

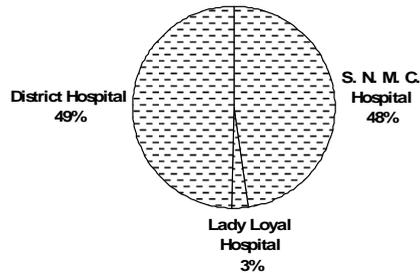


Figure 2. Average waste generated (kg) per day from three governmental hospital in Agra City.

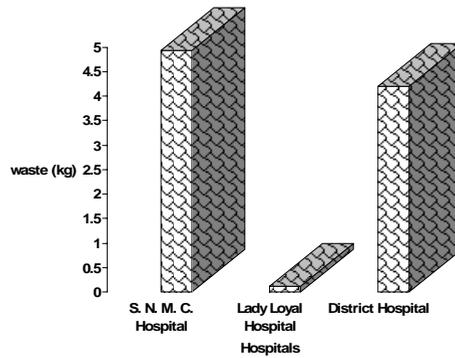


Figure 3. Average waste generated (kg/bed) per day from three governmental hospital in Agra City.

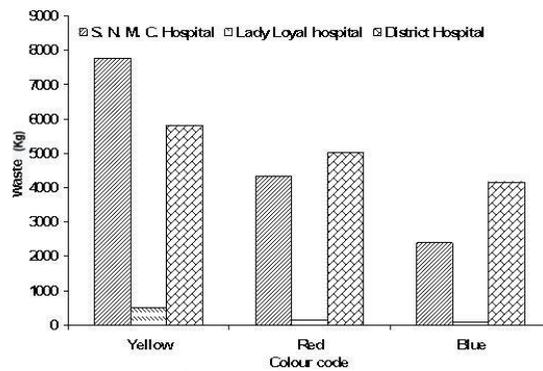


Figure 4. Monthly total waste generated (kg) from three governmental hospital in Agra City.

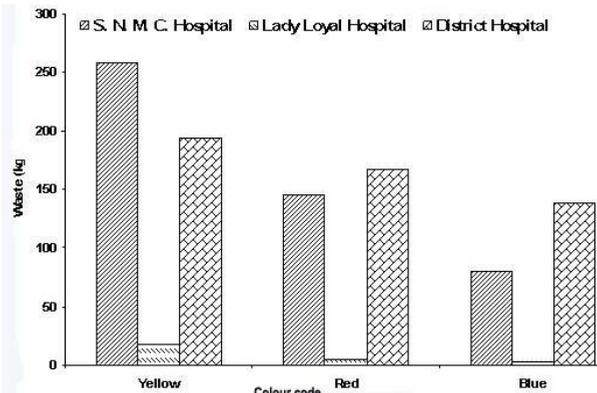


Figure 5. Daily total waste generated (kg) from three governmental hospital in Agra City.

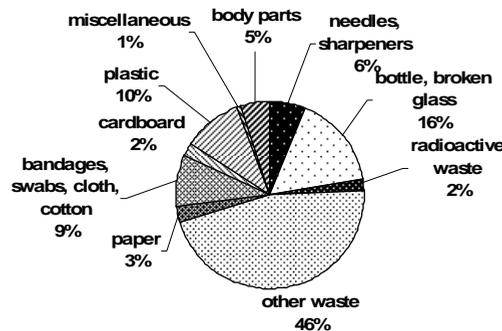


Figure 6. The total medical waste from all hospitals according to waste composition.

kg at L.L.H., 4352 kg at SNMCH and 5011.33 kg at DH and the total waste generated/day 5.21 kg at L.L.H., 145.06 kg at SNMC and H and 167.04 kg at DH respectively (Figure 5). The blue bag observed total waste generated/month was observed 87.8 kg at L.L.H., 2386 kg at SNMC and H and 4160.6 kg at DH and the total waste generated/day 2.92 kg at L.L.H., 79.53 kg at SNMC and H and 138.68 kg at DH respectively (Figure 1 and 2). This

waste dumped without proper disposal or incinerated. Fikru (2004) also observed that the open burning of waste in holes or similar enclosures (45%) and incineration (43%) were the most common types of waste disposal methods for sharps waste and in 33% of the health facilities, the dumping of waste in unsupervised areas and/or open burning as well as the inappropriate use of incinerators were the commonest malpractices that often met the eyes.

Yemane and Millogo (2000) also reported that 38% of the waste management consisted of burning, 32% done using holes or similar enclosures; sharps and other wastes were dumped using open ground or otherwise unsupervised containers in 30% of the health care facilities. Furthermore, the report revealed that among the health centers using incinerator, 50% of them dumped sharps openly and rather nonchalantly, resulting in the conspicuous presence of sharps laying here and there around the health centers in 49% of the places visited. Disposing used syringes in open places and the belief that used syringes are not harmful were found to have been widespread among the communities studied and awareness on where to dispose of used needles and syringes were found to be very low was described by Yimer (2005). Consequently, sharps were observed relegated in open containers, exposing personnel and the rest of the public to needle stick injuries in 61% of the facilities.

### Recommendations

- Any method used for waste segregation needs: To appoint a well knowledgeable staff for separate collection, transport, treatment and proper disposal of infectious health care waste.
- To store waste at site, including the specification of the bins (colour, size, type etc. according The Biomedical Waste (Management and Handling) Rules 1998/2000).
- To develop a time table for proper waste collection and transportation at dumping site.
- Proper procedures to consider for waste storage and treatment
- Protective clothes to wear and safety measures to be practiced by waste collectors.

- Recycle non-hazardous waste by separating the waste into organic and inorganic factors, selling the inorganic waste and making compost from organic waste.
- Regular monitor, the waste management practices in the hospital and evaluate the performance of the system time to time.
- Contact the municipality for separate collection of hazardous and non-hazardous waste. If municipal service is not available, make arrangement for treatment and disposal of hazardous waste

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