

# HOSPITAL WASTE MANAGEMENT IN A TERTIARY CARE ARMY HOSPITAL

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## ABSTRACT

This direct observational descriptive study was carried out in a tertiary care army hospital from 5th December 2003 to 19th December 2003 to assess its prevailing practices of health care waste management and to estimate hospital waste generated per bed per day. Presently the waste is being segregated and collected in different colour coded receptacles only at the nursing stations and carried in open unhygienic trolleys. The sanitary workers were not using protective devices while handling waste in the hospital. The waste generation was calculated by placing coloured receptacles in selected zones and constant observation for seven days each as mentioned above. Results showed that total waste generation was about 3.434 kg/bed/day (out of which 0.309 kg was infectious, 0.103 kg sharps and 3.022 kg non-infectious) and that final disposal of infectious and non-infectious waste was getting mixed-up while loading in the municipality carriage system. The awareness of sanitary workers regarding colour coding was fair but not up to the mark and they were also unaware of potential hazards of health care waste while handling it. Eighty one percent of sanitary workers were vaccinated against tetanus and typhoid but none of the 86 workers were vaccinated against Hepatitis B. Two single chambered, brick made, gas fired so called "incinerators" with enormously low temperature are being used for burning which are emitting smoke and obnoxious gases directly into the atmosphere, affecting the health of the people and environment. Liquid waste is thrown down the municipal sewerage system without any prior treatment, which is adding up to the water pollution. The study concluded that although some basic steps have been taken towards the effective waste management but still there is a long way to go. Several recommendations have been made to stream line the waste segregation, collection, transportation and final disposal along with the improvement in the awareness of sanitary workers about the potential hazards of health care waste and to get 100% vaccination against tetanus, typhoid and hepatitis B. In the end it is also recommended that national guidelines on hospital waste management must be practically implemented without any further delay.

**Keywords:** Hospital, waste, management, incinerator

## INTRODUCTION

Hospital waste poses a serious public health problem in our country. Health care activities for instance, immunization,

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diagnostic tests, medical treatment, laboratory examinations protect and restore health and save lives but on the other hand are also becoming a potential source of human and environmental health hazards by producing enormous amount of health care waste and there by-products, which if not properly disposed off, can lead to the spread of health

hazards [1]. There has been growing public interest in health care waste management together with other environmental problems because of recent increase in the incidence of Hepatitis B and Hepatitis C in our country [2]. Thus the potential damage to health due to improper hospital waste management is an area of concern nowadays.

Health care waste includes all the waste generated by health care establishments, research facilities and laboratories. In addition, it includes the waste originating from "minor" or "scattered" sources such as that produced in the course of health care undertaken in the home (dialysis, insulin injections, etc). Seventy five percent to ninety percent of the health care waste produced by different kind of health care providers is non risk or general waste comparable to domestic waste like kitchen waste, fruit peelings, commercial and clerical waste like papers, packing material, other things with no hazardous affects while remaining 10 - 25% of the health care waste is regarded as risk waste or hazardous waste like pathological waste, infectious waste, sharps, pharmaceutical waste, genotoxic waste, chemical waste, waste with high content of heavy metals, pressurized containers, radioactive waste [3]. The safe disposal of health care waste and cleanliness in the hospitals are imperative for safety of the patients, hospital staff and dependent community.

The present study was undertaken to assess prevailing practices of health care waste management in a tertiary care army hospital and to estimate hospital waste generated per bed per day.

## MATERIALS AND METHODS

This was a direct observational descriptive study aiming at the assessment of the prevailing health care waste disposal system in a tertiary care army hospital. A tertiary care army hospital at Rawalpindi was selected for study, which is a 640-bedded

tertiary care hospital. The study was approved by the ethical committee of Armed Forces Post Graduate Medical Institute Rawalpindi as well as by the University of Health Sciences, Lahore. In order to carry out the study, following wards/departments of the hospital were considered for inclusion in the study:

- a. Wards
  - Surgical
  - Medical / Child Oncology
  - Gynaecology / Obstetrics
  - E.N.T.
  - Orthopedics
- b. Departments
  - Pathology Laboratory
  - Radiology
  - Operation Theatre
  - Trauma Center

Five beds each of the above mentioned wards were earmarked and observed continuously for seven days with three differently coloured covered receptacles [3] {for separate refuse i.e. non-sharp infectious waste, sharps (infectious or otherwise) and general waste} lying by side of each bed. Each receptacle was lined with a polythene bag and used as per following protocol:

- a. Red Container
 

All the infectious waste, which includes soiled surgical dressing, cotton swabs, blood, body fluid, pus, sputum, culture of infectious agents and other contaminated waste.
- b. Blue Container
 

All sharps irrespective of whether infectious or otherwise which includes needles, hypodermic needles, scalpel and other blades, knives, infusion sets, saws and broken glass.
- c. Grey container

All the non- infectious waste, which includes paper, cigarette packets, cardboard, packing material, left over food, fruit and garbage etc.

The same protocol was adopted for the departments but with only one set of the three differently coloured covered receptacles lined with a polythene bag.

Some sanitary assistants and sweepers were trained and engaged in waste collection and sequential procedures thereby adopted in the whole process. The patients, their attendants, nurses and the paramedical staff were also given detailed instructions about the waste collection procedures in the language they understood. For the patients, instructions were translated into 'Urdu'.

The waste so collected was weighed prior to its removal by the concerned trained staff. A weighing scale of a total of 10 Kg capacity was used during the process. The weighing took place twice a day i.e. in the morning and evening.

Data regarding this study was collected through the distribution of a structured questionnaire to the hospital administrative staff. The questionnaire was formatted in a simple fashion to make it easier while answering the questions. The questions were composed of a total of 32 questions in simple language.

- a. Personal visits to the hospital were made regularly and waste management staff and sanitary junior commissioned officer were personally interviewed.
- b. Personal observations were made and each information given in the questionnaire was counter checked.
- c. A personal visit to the waste disposal site was made to see the ultimate disposal of health care waste over there.

## STATISTICAL ANALYSIS

For data analysis SPSS version 10.0 was used. percentages were used to describe the results.

## RESULTS

### Composition of Hospital Waste

This tertiary care army hospital is 640-bedded hospital. The total waste generated per day was 2198 kg. Out of total waste 9% (197.82 kg/day) was infectious, 3 % (65.94 kg/day) was sharps and 88% (1934.24 kg/day) was non-infectious waste. The breakdown for three above mentioned categories per bed per day is 0.309 kg infectious waste, 0.103 kg sharps and 3.022 kg non-infectious waste (table).

### Present System of Waste Management in the Hospital

Although there is a system of waste collection exists in the hospital but still it was not strictly as per requirement. No waste collection bag was properly labeled. Sweepers collect waste materials from the respective wards and departments.

### Colour Coding System

Colour coding system mostly exists in the hospital. The red buckets were being used for infectious waste/sharps and grey for non-infectious waste whereas replacements were being collected in blue coloured bins. They were using the coloured polythene bags for colour coding despite coloured containers.

### Waste Collection in Wards

Non- infectious waste was being collected in steel bowls/differently coloured plastic bins placed at the bedside in the wards, which was emptied in a single large bucket periodically. Infectious waste material was being collected separately in almost all wards in the hospital.

Segregated collection of sharps was being carried out in most of the wards at nursing station. The syringe cutters were available in all wards and the syringes were being cut after use and collected in replacement buckets but the needles were off and on left as such without being cut into two to render them useless for the scavengers and those cut were directly disposed off to incinerator. Most of the sharps like infusion bottles, discarded syringes, IV sets and vials etc were returned to Medical Store daily for re-couplement of the requirement of the wards / departments with new stores.

Expired/left over medicines were mostly returned to medical stores for final disposal. These were usually replaced with fresh stock from the concerned firm.

All the wards had generally similar waste management practices. Wards were generally clean. The staff was partially aware and trained for waste disposal procedures.

### Waste Handling Staff

Sweepers and Ayas were mainly responsible for collection of waste in wards/ departments. They were not wearing any protective clothing or gloves during handling of waste and only 81% of them were vaccinated against typhoid and tetanus but not even a single individual was immunized against Hepatitis B Virus.

Sweepers used to take the waste twice to the central place, once in the morning at 0830 hours and in the evening at 1800 hours. The sweepers also drained the urine bag in the steel basin and then poured it down to the toilets used by the patients.

### Waste Transportation in the Hospital

During transportation of waste, wheelbarrows were old, not covered and were being loaded over its capacity from where spillage of the waste was certain in between the collection point and storage point. The receptacles were at times not lined

**Table: Composition and per bed generation of waste in a tertiary care army hospital**

Category	Kg/day	%age/day	Kg/bed/day
Infectious Waste	197.82	9 %	0.309
Sharps	65.94	3 %	0.103
Non-Infections Waste	1934.24	88 %	3.022
Total Waste	2198	100 %	3.434

with plastic bags. In contravention to the Government provisions for safe & hazardless disposal of hospital waste, empty infusion bottles/ bags were deposited, at medical store of the hospital, by all wards / departments periodically.

The sweepers were handling all types of waste without any precautionary measures. No special puncture proof containers or packing system were provided for collection of sharps. There were no special trolleys or drums available for safe transportation to avoid any spillage.

### Waste Storage in the Hospital

Although waste segregation point is clearly marked and separate enclosures are available for hazardous and non-hazardous wastes coloured red and green respectively, these are practically not being utilized. As such it was freely accessible to the animals, birds, insects etc. The platform for storage of all types of waste was built-up close to the 'insecure' casual type of incinerator at the back of operation theatre and officers ward. As the hospital waste was taken out only once daily by the Cantt board vehicle, all types of waste was scattered here and there. There was no control of mixing infectious and non-infectious waste.

### Incineration

This tertiary care army hospital was having two single chambers, brick made, gas fired incinerators with enormously low temperature, which were operated one by one on daily basis, for infectious waste. In this process only a part of infectious waste was burnt which added obnoxious gases to the environment and further aggravated the

situation. The sharps were left unmelt and were ultimately disposed of to the municipality bins along with ash, increasing the health hazard.

### **Transportation of Waste from Hospital**

The Cantonment Board vehicle was without any cover or protection and sanitary workers loaded the waste manually.

The personnel loading the truck were without sanitary training and were not wearing any special protective equipment.

### **Record Keeping**

There was no record keeping of the waste disposal and collection despite being mentioned in standing operating procedures given by the hospital.

### **Hospital Waste Management Standing Operating Procedures**

There was a committee for hospital waste management but it was not performing its duties according to required standards. There was only partial supervision on how to collect, store and dispose of these hazardous materials. There was no "Responsibility flow chart" with regard to waste disposal.

### **Training**

Training is an important aspect to improve waste management practices in the hospital. The study has revealed that a proportion of the sanitary staff was not given any guidance or training on handling different types of waste materials.

Total numbers of doctors in the hospitals are 106, number of nurses 136, public health specialist 1, sanitary workers 86 and bed capacity of the hospital is 640. As for as daily work load of the hospital is concerned 1589 patients are examined in OPD, 5 - 6 deliveries, 71 daily admissions, 24 major operations, X - Rays 281, Lab investigations 626 and Bed occupancy is 82 %.

## **DISCUSSION**

Various studies have shown that the rate of hospital waste generation in the USA is 5.9 to 10.4 kg/bed/day and the possible reason for such a big amount of health care waste generation is the increasing use of disposable items in the health care facilities [4]. Whereas in the Western Europe it is 3-6 kg/bed/day [5]. The daily production of solid waste in rural hospitals in sub-Saharan Africa ranges between 0.3 to 1.5 kg/bed/day.

In Pakistan various studies have been conducted on the subject of waste generation. A study conducted by Mahmood-ur-Rahman at Rawalpindi General Hospital, a tertiary care hospital, it was shown that average waste generation rate was 1.35 kg/bed/day with maximum waste generation in surgical unit while CCU was the minimum waste generating unit [6]. Another study conducted at District Headquarter Hospital, Kusunur, Pakistan by Khalid revealed that the average waste generation was 2.5 kg/patient/day. Risk waste generation was 0.5 kg/patient/day [7].

Our study also revealed that the present system of hospital waste disposal lacks proper planning and supervision. No scientific methods or treatment facilities like steam sterilization or incineration are applied. There is no coordination between the hospital administration and the cantonment board staff to give a special care while handling the hospital waste.

While comparing the study "Hospital waste management in a tertiary care army hospital", with other studies conducted in various cities of different provinces in Pakistan, the over all situation is not very much different regarding the per bed per day waste generation, prevailing practices of hospital waste disposal, aptitude of sanitary workers using the personal protective devices while handling the hospital waste, and vaccination of sanitary workers against HB as it is mentioned in the study "role of

paramedics staff and sanitary workers in hospital waste management" conducted in CMH Rawalpindi by Nadeem Mahmood 2000-2001 [8], which revealed that sanitary workers are not aware of the infectious and non-infectious waste as 30% consider left over food/vegetable and 18% consider paper as infectious waste. Low literary rate is the main reason for poor perception of sanitary workers towards hazards of hospital waste. 73% are illiterate, 20% have attended the primary school, and the remaining 7% have education up to secondary school level.

It is recommended that all army hospitals should follow the guidelines given by WHO for the disposal of hazardous waste.

## CONCLUSION

Although this tertiary care army hospital is well equipped and provides state of the art health care to the patients, but unfortunately health care waste management practices have not been followed according to the World Health Organization standards. Training of sanitary workers needs improvement. Modern Incinerator should be installed for safe disposal of hazardous hospital waste. Hospital authorities are urged to take necessary steps to improve the knowledge, attitude and practice of health care workers / sanitary workers to comply with the international environmental standards.

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