RESEARCH PAPER:

Biomedical waste management in a large teaching hospital

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SUMMARY

The methodical "Hospital waste Management" is of critical significance as its inappropriate management poses risks to health care workers, waste handlers, patients, community in common and mainly the environment. Keeping this in view, bio-medical waste management was studied at "J.A. Group of Hospitals, Gwalior" for a period of three months. Quantity of solid waste generated per bed per day was found to be 2.02 Kg. Inpatient area generated maximum solid waste (69.09 %) followed by supportive services (14.70%). Other areas like operation theatre, Emergency and OPD together produced lesser amounts (16.09 %). In the waste management processes, segregation and storage were not properly followed in J.A. Group of Hospitals, Gwalior. However, collection and transportation activities to final disposal are being practiced. The policy of quality control system in waste management needs to be improvised.

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The biomedical waste management and handling rules of 1998 of Govt. of India requires every occupier of an establishment generating bio-medical waste, which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank by whatever name called to take all steps to make sure that such waste is handled without any adverse effect to human health and environment.

The biomedical waste by its definition includes solids or fluids, their containers and any intermediate product generated during diagnosis, treatment or immunization, in research pertaining there to or in the production of of testing of biological and animal waste. Hospital waste generated from different units of hospitals can cause serious health hazards like spread of HIV infection, Hepatitis B and C etc. According to WHO, around 85 % of the hospital waste is non-hazardous, 10 % infective and remaining 5 % non-infective but hazardous.

Management of hospital waste is a main challenge to the hospitals. This waste has become a risk factor to the health of the patients, hospital staff extending beyond the restrictions of the medical establishments to the general population and to the environment, hence the management of hospital waste at this tertiary care hospital was studied.

A study has been conducted at about 1200 bedded teaching hospital (J.A. Group of hospitals) including J.A. Hospital and Kamla Raja Hospital to find out the quantity of waste generated and the methods of disposal.

MATERIALS AND METHODS

Bio-medical waste management was studied at J.A. Group of hospitals and the average bio medical waste was calculated by recording bio medical waste accumulation fortnightly from each study site randomly from September 2008 to November 2008. A study of the various hospital areas was done to study the process of collection, segregation, storage, transportation, treatment and disposal of hospital waste. Through personal obsevations, the area-wise generation of waste fom inpatients, accident and emergency, operation theatre, OPD, laboratories, kitchen, CSSD and pharmacy was recorded. The actual type and amount of waste was physically inspected to record different types of waste and their collection in different containers. These wastes were subjected to weighing by a balance and the weight was recorded. The emphasis was laid on separate collection of bio-medical waste. Separate containers were used for collection of such waste. Most of the officials

and staff were reluctant to provide any information on the present position of waste management. The data were used to calculate amount of waste generated in kg/bed/day by the following formulae:

$$\text{Mean waste generated per day} = \frac{\text{Total waste produced during period of study}}{\text{No. of days of study}}$$

$$\text{Waste generated per bed per day} = \frac{\text{Mean waste generated per day}}{\text{No. of beds}}$$

RESULTS AND DISCUSSION

The different types of wastes generated at J.A Group of hospitals included paper, soiled dressings, body tissue, waste ampoules, disposable masks, sharps, disposable syringes, drapes, catheters, drainage sets, colostomy bags, surgical gloves and sweepings from hospital, contaminated glassware, plastics, specimen container, specimen slides and organs, cartons, crates, packing material, metal containers, food container, solution bottles, pharmaceutical bottles, waste from public and patient's rooms, waste food material, waste from x-ray department. In J.A Group of hospitals these wastes were not segregated in different types.

Collection of waste was done in polythene bags and PVC containers by skilled sanitary workers. The collected waste from wards was transported through chute to the propositioned tuggers lying under the chute. Tuggers were also placed at some points in the hospital premises by sanitation department for collection of waste. The waste from emergency, OPD, theatres and other service areas of the hospital was collected in PVC containers, and then carried to tuggers, which are being emptied at incineration plant where it is incinerated.

Biomedical waste collected separately was found to be 28.44 % of total waste generated. Amount of waste generated was 2.0 kg per bed per day. 18031.10 kg (69.09%) of the total quantum generated from inpatient area, 704.46 kg (2.7 %) from OPD, 652.45 kg (2.5%) from operation theatre, 1591.98 kg (6.1%) from emergency, 730.75 kg (2.8%) from laboratories, 626.35 kg (2.4%) from pharmacy, 104.39 kg (0.4%) from CSSD. Total waste from supportive services was found to be 3836.40 kg (14.70%).

Managing waste has two vital parts: firstly management of hazardous waste of different types generated from different sources, which involve careful segregation, collection, transportation and final disposal and secondly effective training and supervision of various categories of personnel involved in whole waste management system Acharya and Singh (1992) and Sharma (1999).

For streamlining the process wastes have been classified and are to be stored in different colour coded containers or bags so that staff is able to distinguish 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 unique interest to the reasonably small quantities of infectious and hazardous waste, only domestic waste is being collected to separate containers, which also gets mixed with bio-medical waste. No segregation is practised. Different colour coded bags are not used for different types of wastes. No labeling or marking, *viz.,* hazardous/infectious waste is being practised. The general waste is collected in common container in the wards which also contains part of bio-medical waste. 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 be disposed off by land-fill need incineration also thus reducing risks and costs of waste management.

In developed countries due to the increased use of disposals the waste produced has been up to 5.24 kgs, in hospitals of UK, France, Norway, Spain, Netherlands, USA and Latin America, waste produce 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 (W.H.O. 1995). Most hospitals in india generate 1-2 kgs per bed per day, except the tertiary care hospital like AIIMS which produce waste on higher side. Waste 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. Increasing use of disposables in tertiary care hospitals may be the reason of higher quantum of wastes generated.

Studies conducted at AIIMS revealed that the quantum of waste generated was 2.2 kgs per bed per day, Mumbai Tata Memorial hospital produces 1.13 kgs per bed per day. In Amritsar large tertiary hospital produces 1.05-1.3 kg per bed per day. Packing materials 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:

J.A. Group of hospitals generate 2.02 kgs per bed per day. Though waste management practice in this hospital is healthier than other hospitals in the state, yet, all the waste management activties 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 should be done. Since this is the first study of its kind in Gwalior city, more research will be desirable to work out the improvised policy of waste managent practices and its quality controll system in hospitals of the state.

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