



ISSN: 0975-833X

## RESEARCH ARTICLE

### CHALLENGES OF HOSPITAL SOLID WASTE MANAGEMENT; CASE STUDY IN A TERTIARY CARE HOSPITAL

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#### ARTICLE INFO

##### Article History:

Received 30<sup>th</sup> October, 2014

Received in revised form

03<sup>rd</sup> November, 2014

Accepted 17<sup>th</sup> December, 2014

Published online 31<sup>st</sup> January, 2015

##### Key words:

Infrastructure,  
Management,  
BMW,  
Monitoring,  
Far-reaching,  
Environment.

#### ABSTRACT

Biomedical waste management has recently emerged as an issue of major concern not only to hospitals, nursing home authorities but also to the environment. The Biomedical wastes (BMW) generated from health care units depend upon a number of factors such as waste management methods, type of health care units, occupancy of healthcare units, specialization of healthcare units, ratio of reusable items in use, availability of infrastructure and resources etc. The proper management of biomedical waste has become a worldwide humanitarian topic today. Although hazards of poor management of BMW have aroused the concern world over, especially in the light of its far-reaching effects on human, health and the environment. Now it is a well established fact that there are many adverse and harmful effects to the environment including human beings which are caused by the "Hospital waste" generated during the patient care. Hospital waste is a potential health hazard to the health care workers, public and flora and fauna of the area. The problems of the waste disposal in the hospitals and other health-care institutions have become issues of increasing concern. The main challenges faced in a tertiary care hospitals are lack of manpower, training of staff who are on contract, training of junior doctors, attitude changes and constant monitoring, frequent staff turnover, and shortage of staff and proper funding.

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#### INTRODUCTION

'Bio-medical waste' (BMW) means any waste generated during diagnosis, treatment or immunization of human beings or animals. Management of healthcare waste is an integral part of infection control and hygiene programs in healthcare settings. These settings are a major contributor to community-acquired infection, as they produce large amounts of biomedical waste (Management of Biomedical Waste in India and Other Countries). Biomedical waste can be categorized based on the risk of causing injury and/or infection during handling and disposal. Wastes targeted for precautions during handling and disposal include sharps (needles or scalpel blades), pathological wastes (anatomical body parts, microbiology cultures and blood samples) and infectious wastes (items contaminated with body fluids and discharges such as dressing, catheters and I.V. lines). Other wastes generated in healthcare settings include radioactive wastes, mercury containing instruments and polyvinyl chloride (PVC) plastics. These are among the most environmentally sensitive by-products of healthcare (Askarian *et al.*, 2004) World Health Organisation (WHO) stated that 85% of hospital wastes are

actually non-hazardous, around 10% are infectious and around 5% are non-infectious but hazardous wastes. In the USA, about 15% of hospital waste is regulated as infectious waste. In India this could range from 15% to 35% depending on the total amount of waste generated (Glenn and Garwal, 1999). This exploratory study was attempted to explain the situation and also the challenges faced in healthcare waste management in a public sector tertiary care teaching hospital, with a focus on handling practices, occupational safety and the implementation status of waste management policy together with other pertinent policy issues.

#### MATERIALS AND METHODS

This was a cross-sectional descriptive study designed to explore the perceptions of management regarding health waste management in their hospitals. The techniques used was qualitative, besides observation, in depths interviews were conducted with key personnel in hospitals healthcare waste management. The study was conducted in public sector tertiary care teaching hospital. Interviews were conducted with the directors and relevant key persons in the infection control and waste management in all hospitals. We focussed in the presence of Information Education and Communication (IEC)

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materials such as biohazard marking, safety precautions, national regulations, internal policies and storage places and handling practices related to waste and training of health workers. We also observed the practices in stages of segregation, collection, containment, storage, transport and disposal of medical waste in health care settings.

Data were recorded on a researcher made checklist covering various aspects of BMW management at source of generation of waste. Primarily, 4 broad functions are carried out at source viz.

- i. placement of 4 colour-coded i.e. black, yellow, red and blue waste bins which are lined on inner side by similarly coloured waste bags;
- ii. segregation of waste in such waste bags i.e. general waste like waste paper, wrapper of drugs, cardboard, left-over food etc. is to be put into black; soiled infected waste like dressing material, cotton swabs etc. is to be put into yellow; plastic waste like plastic syringes, dextrose bottles, intravenous sets, Ryle's tubes, urinary catheters etc. is to be put into red
- iii. and sharps like hypodermic needles, surgical blades, glass etc. is to be put into blue bags
- iv. Mutilation of recyclable waste like disposable syringes, plastic dextrose
- v. bottles, plastic tubing's and hypodermic needles and
- vi. disinfection of certain categories of waste notably plastics and sharps (Ramesh Babu ?; Askarian *et al.*, 2004; Rajiv Kumar *et al.*, ?). In the hospital, electrically operated needle cutters were used to mutilate hypodermic needles and nozzle (hub) of disposable syringes and scissors were used to cut the plastic tubing's and 1% bleaching powder was used to disinfect plastics and sharps.

All quantitative variables were estimated using measures of central location (mean, median) and measures of dispersion (standard deviation, standard error and 95% confidence interval).

## RESULTS

The overall mean percentage score for BMW management at source of generation of waste is 85%, at waste segregation is 90%, at mutilation of recyclable waste is 83%, at disinfection of waste is 84%. The department wise scores are , in emergency it is 85%, in central waste collection in wards is 88%, in treatment rooms is 80%, in operation theatres is 89% , in intensive care units is 91%.

The comparison of scores of different areas showed that score related to 'condition of waste receptacles and 'segregation of waste' was not significantly different amongst various areas i.e. Emergency areas, Central Waste Collection Points of Wards, Treatment Room of Wards, OTs and ICUs.

## DISCUSSION

Segregation of waste is the most crucial step for proper management of BMW as waste segregated into various colour-coded containers is finally taken to different sites for disposal. Presence of a wrong kind of waste in a particular container will obviously nullify the efforts of appropriate disposal of waste. This implies that for proper segregation of waste, the waste bins in appropriate number, at appropriate places and with appropriate colour-code are required to be placed at the source of generation of waste and also proper supply of colour coded covers is also essential (Rajiv Kumar *et al.*, ?).

Category of BMW management	emergency	Central waste collection areas in wards	Treatment rooms in wards	Operation theaters	Intensive care units	Overall score of category of BMW management
Condition of waste receptacles	85%	87%	83%	87%	86%	86%
Waste segregation	90%	96%	94%	96%	98%	95%
Mutilation of recyclable waste	83%	88%	80%	90%	92%	87%
Disinfection of waste	84%	82%	61%	83%	88%	80%
Overall score of the area	85%	88%	80%	89%	91%	87%

Parameters related to each of the 4 main categories mentioned above were identified and a checklist was prepared. Each desirable observation was assigned '1' mark and each undesirable observation was assigned '0' mark. There were some parameters, observations regarding which could be in part desirable and in part undesirable in a given area, such observation was assigned '0.5' mark. As an example, if all of the used hypodermic needles in an area were found mutilated (desirable), it was assigned '1' mark; if none of the needles was mutilated (undesirable), it was assigned '0' mark and if some of the needles were mutilated and some not, such observation was assigned '0.5' mark. In the final score-sheet, there were 21 parameters noted.

## DATA ANALYSIS

From the score obtained the mean score and then percentage mean score was calculated.

Inadequate and inefficient segregation and transportation system may cause severe problem to the society hence implementing of protective measures, written policies all of these factors contribute to increased risk of exposure of staff, patients and the community to biomedical hazards (Management of Biomedical Waste in India and Other Countries). The summated score of condition of waste receptacles in all the patient care areas was more than 80%. Various studies have found poor condition of waste receptacles for waste disposal. In a 600-bedded super specialty corporate hospital of a South Indian city, there were only white receptacles for all types of BMW for aesthetic reasons and since the colour of all receptacles or bins was same, following the segregation practices was difficult<sup>5</sup>. In studies in Irbid city of Jordan (Bdour, 2007) and UK (Blenkharn, 2007), waste bins or receptacles were found to be in poor shape. In studies conducted in Egypt (Talaat *et al.*, 2003), England and Ethiopia

(Debere *et al.*, 2011) also, the waste segregation practices were found to be poor. In a study in a 350-bedded polyclinic at Lucknow, India (Gupta *et al.*, 2009) and 574-bedded tertiary care Medical Institute located at Belgaum, Karnataka, India (Patil and Pokhrel, 2005), the waste segregation practices were found to be good.

### Conclusion

The present study was done to evaluate the practices of biomedical waste management amongst different patient care areas and the challenges faced in a public sector tertiary care medical hospital using a checklist. It was found that though a well functioning system is in place more emphasis needs to be laid for training of waste handlers and motivation to bring attitudinal change especially in wards' and in emergency ward. Hospital administrators may need to formulate and implement a plan for providing appropriate training to HCWs so as to address the deficiencies observed in the study.

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