



## IMPACT OF ON-SITE TRAINING OF HEALTH CARE WORKERS ON BIOMEDICAL WASTE MANAGEMENT IN A TERTIARY CARE HOSPITAL IN NEW DELHI, INDIA

Priyanka Sharma\*, Manoj Jais., Suraiya K. Ansari., Poonam Gupta., Hemlata Lall.,  
Madhumita Debbarma and Ravinder Kaur

Department of Microbiology, Lady Hardinge Medical College, New Delhi-110001

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### ABSTRACT

**Introduction:** Biomedical waste (BMW) is a major hazard to human health. Improper disposal of BMW can cause sharp injuries in Healthcare workers (HCWs) & Hospital-acquired infections (HAIs) in patients. Hence proper disposal of BMW is an essential aspect of any healthcare establishment. HCWs are directly involved with the patient care, therefore the onus of proper segregation of BMW falls on the HCW. This study was done to find out the segregation practices of BMW among HCWs, the impact of the onsite training program & the problems faced in proper management of BMW. **Methodology:** Various in-patient wards of the hospital were visited for initial period of 3 months and BMW management practices & deficiencies were observed. Onsite training was imparted to the HCWs. These wards were revisited to see the impact of onsite training & HCWs were equivocal about problems faced by them. **Results:** Practices were deficient (65.38%) in Paediatrics wards, followed by OB/GYN (51.92%), Surgery (46.51%) & Medicine (30.7%). Various deficiencies observed were overflowing bags, improper segregation and needle disposals. Post onsite training, deficiencies reduced by 30.76%, 21.15%, 25% and 17.24% in Paediatrics, Obstetrics & Gynaecology, Surgery and Medicine wards respectively ( $P < 0.05$ ). Problems faced by HCWs in proper management of BMW were short supply of basic items, lack of monitoring at night, high workload and lack of awareness. Regular monitoring and onsite training is must for proper segregation of BMW.

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### INTRODUCTION

Biomedical waste (BMW) is a wide terminology used for the waste material produced during the diagnosis, treatment or immunization of human beings and animals, in research or in the production or testing of biological products<sup>1</sup>. Biomedical waste management (BMWM) is a chain of processes from the point of generation of biomedical waste to its final disposal in the correct and proper way, assigned for that particular type of waste. Improper disposal of BMW leads to major hazard to human health and the environment<sup>1</sup>. Improper Disposal of BMW can cause sharp injuries leading to HIV, Hepatitis B virus, Hepatitis C virus infection, Hospital-acquired infections (HAIs) in patients and spread of infection to community as well as increase in antibiotic resistance<sup>1,2</sup>. There is also risk to waste handlers, scavengers and to general public residing in the neighbourhood. Furthermore Gloves, syringes, expired drugs, cotton wool & other medical objects can be repacked and sold by unscrupulous elements<sup>2</sup>. Therefore proper disposal of BMW has become an essential aspect of the current healthcare setup.

The proper management of biomedical waste has become a worldwide humanitarian topic today. Hazards of poor management of biomedical waste have aroused the concern of general public and authorities, especially in the light of its far-reaching effects on human health and the environment<sup>1,2</sup>. As we have already seen with the Hepatitis B outbreak in Gujrat (2009) due to indiscriminate use of infected needles for profiting<sup>3</sup>. Improperly and irresponsibly disposal of human anatomical body parts could also hurt the sentiments of the families and the community<sup>4</sup>.

Health care workers dealing with the patient care are the ones directly dealing with the production and management of the BMW. Segregation forms the backbone of BMWM and "Generator is the Segregator", therefore the onus of proper segregation of BMW falls on the HCW<sup>2</sup>. Hence with this background the present study was done to find out the segregation practices of BMW among HCWs, the impact of the onsite training program on it and to find out the problems faced by HCWs in proper management of BMW.

### METHODOLOGY

This study was done in 6 months from September 2015 to February 2016, conducted in LHMC & associated hospitals which is a 1247 bedded, tertiary care hospital. As per the

\*Corresponding author: Priyanka Sharma

Department of Microbiology, Lady Hardinge Medical College, Connaught Place, New Delhi, India-110001

BMWM rules 1998 (India) segregation of infectious waste, plastic waste, sharps & general waste are to be disposed in yellow, blue, puncture proof container and black bag respectively. In the first 3 months of our study, biweekly rounds were conducted to observe segregation practices of BMW at various generation sites of major wards such as Medicine, Surgery, Obstetrics & Gynaecology and Paediatrics. During inspection deficiencies in segregation were monitored and recorded. Onsite training was imparted to the HCWs and they were taught both verbally and through posters about various aspects of BMW such as hazards associated with poor BMWM, segregation of waste according to BMWM rules and transportation from generation point to common collection site.

The impact of training program on segregation of BMW was assessed by number of deficiencies reported before and after the onsite training. Also HCWs were interviewed about the problems faced during management of BMW and their suggestions were also taken.

Data was collected in a set proforma and then compiled in Excel sheet. Data was analysed using SPSS version 16 software and P value <0.05 was considered significant. A total of 160 HCWs gave their inputs regarding the reasons behind improper BMWM, or the problems faced by them during BMWM. A total of 160 HCWs responded, out of which 52 (32.5%) stated irregular /short supply of basic items such as colour coded waste bags, sharps container, scissors etc., as the major reason for improper BMWM. HCWs also suggested lack of monitoring during evening & night duties (21.3%), heavy workload & shortage of staff especially multi-task workers (MTWs) who are responsible for removing and transporting BMW to the common collection site (41.2%). Lack of monitoring during evening & night time (21.3%) & lack of awareness were other reasons given by the HCWS for improper BMWM. (Table 3)

## RESULTS AND DISCUSSION

BMW management is an important aspect of infection control policy of any hospital. As the HCWs are the generator of BMW, its segregation is also the responsibility of HCWs. As per WHO, the total amount of hazardous waste generated in hospital is 15-20%, whereas 80-85% waste is nonhazardous<sup>1,2</sup>. If segregation of hazardous waste is not done properly, the percentage of hazardous waste increases tremendously this would pose high risk to human health and environment. Hence there is a need to train HCWs in BMW management.

In our study it was found that before providing onsite training, Paediatrics, Obstetrics & Gynaecology, Surgery and Medicine wards were the most deficient in their BMWM practices (65.38%), (51.92%), (46.15%) and (30.7%) respectively.

After providing the on-site training and regular monitoring, deficiency in the practices significantly improved by 30.76%, 21.15 %, 25 % & 17.24 % in the wards of Paediatrics, Obstetrics & Gynaecology, Surgery & Medicine respectively. This shows that onsite training helps in improving the segregation in day to day BMWM practices. Ndaiye M *et al* (Dakar 2012) also recommended for on-the job training for health care workers for improvement of BMWM<sup>5</sup>. Lakbala P *et al* also recommended the same<sup>6</sup>.

Although it is mandatory in our institute to attend BMW management training program at the time of the recruitment

and they are being conducted on a regular basis, the impact of the onsite training program was found to be more effective. It was also realized that knowledge of HCWs needs to be updated from time to time and hence our institute has started refresher training program for all categories of HCWs.

### Various Deficient Practices

Since overflowing bags/ containers of BMW was the most common deficient practice it improved upon regularizing supply of bags and container and monitoring removal of BMW from the wards and its transfer to the common collection site (CCS). Improper segregation and improper gloves disposal was improved by repeated on site teaching and putting up posters describing the correct segregation practices. Improper needle & syringe disposal was checked through monitoring and training about the correct method of sharp disposal and teaching about the risks of sharps injuries. Hence, it was observed that regular monitoring & onsite training improved the deficient practices.

### Reasons of Improper BMWM

Various reasons told by HCWs, regarding improper management of BMW are heavy workload/shortage of staff (41.2%), short supply of the basic items such as colour coded waste bags, scissors, and sharp disposal container (32.5%), lack of monitoring during evening & night time (21.3%) and lack of awareness (5%).

It is suggested that the administration should take action so as to maintain and store the basic items for a minimum period of 3 months, so that regular supply of these items is maintained. BMWM is basically a team work which involves different sections of the hospital<sup>7</sup>, it depends on the store, which should supply basic items (colour coded waste bags, sharp disposal container, needle destroyer, Hypochlorite, PPE etc.) on a regular basis. Secondly, administration should provide for adequate staff to manage the workload.

Another reason reported by the HCWs was lack of inspection/ rounds conducted during the night. Usually poor segregation occurred during the night time hours as no inspection is done at that time regarding BMWM. So it is suggested that night time inspection rounds should also be conducted from time to time.

It is also suggested that from every department nodal officer should be appointed with Sister in-charge. These nodal officers should monitor their respective department with a checklist and sister in-charge should maintain a proper stock of basic items in their departments. Weekly feedback should be given to the secretary BMWM. If any deficiency found, a corrective and a preventive action should be taken which should be documented.

**Table 1** Deficiencies in segregation reported before & after onsite training

Department	Before Training		After Training		P value
	No. of Rounds conducted	No. of times Deficiency Observed	No. of Rounds conducted	No. of times Deficiency observed	
Paediatrics	52	34(65.38%)	52	18(34.62%)	<0.002*
OBS/GYN	52	27(51.92%)	52	16(30.77%)	<0.002*
Surgery	52	20(46.15%)	52	11(21.15%)	<0.007*
Medicine	52	16(30.7%)	52	7(13.46%)	<0.036*

\*significant P<0.05

**Table 2** Deficient Practices Observed

Deficient Practice	No. of times observed
Needles lying on the floor, bed stand, bed etc.	16
Needles used as pins on display board	2
Syringes discarded in Black bags	43
Gloves discarded in Black bags	29
Intact glass and broken ampoules together	34
Plastic packaging/ paper in yellow bag	7
Overfilled bags/ container	52

**Table 3** Reasons for Improper BMWM as given by HCWs

Reasons for Improper BMWM	%
Shortage of staff/High workload	66 (41.2%)
Short supply of basic items of BMWM	52 (32.5%)
Lack of monitoring during evening & night	34 (21.3%)
Lack of awareness	8 (5%)

A constant liaison is required between Nodal officers and Secretary BMWM. Regular refresher training programs must be conducted to update with any changes or newer methods.

As BMW poses various hazards to human health as well as the environment, its proper management is essential part of any Health care establishment. Segregation is the backbone of BMWM and generator is the segregator, therefore all HCWs should be well aware of the various categories of BMW and how to properly segregate and dispose them. Training of HCW helps in their better understanding of various categories of BMW and its management thereby improving the segregation practices and minimization of health hazards associated with it.

Onsite training is more helpful in understanding and resolving the problems faced during BMWM. Therefore training should not be stand alone in the form of lecture done in a closed lecture theatre, but also accompanied with on-site practical training.

**Observation**

It was observed that practices were deficient (65.38%) in the Paediatric ward, followed by Obstetrics & Gynaecology (OB/GYN), Surgery and Medicine wards with (51.92%), (46.51%) and (30.7%) respectively.

After observing BMW management practices in the major BMW generation sites of the Hospital, onsite training was provided to the HCWs. After onsite training was imparted it was observed that deficiencies in the segregation practices reduced to (34.62%) in Paediatric ward, followed by OBS/GYNAE (30.77%), Surgery (21.15%) and Medicine wards (13.46%) respectively (Table 1)

The various deficiencies in BMWM observed during the study are shown in Table 2.

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