

## Original Research Article

# Assessment of bio medical waste management practices of staff nurses according to newer guidelines in a teaching hospital of rural Vadodara, Gujarat

Bhavesh R. Bariya, Grishma D. Chauhan\*, Aarti Jadeja, Meet Jain

Department of Community Medicine, SBKS MI RC, Sumandeep Vidyapeeth University, Piparia, Vadodara, Gujarat, India

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**\*Correspondence:**

Dr. Grishma D. Chauhan,

E-mail: [drgrishma19@gmail.com](mailto:drgrishma19@gmail.com)

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### ABSTRACT

**Background:** The healthcare services while providing curative, promotive or preventive services inevitably produce waste which may be hazardous to health of patients and hospital staff as well as to the environment. The bio medical waste (management and handling) rules were recently updated by Government of India notification 2016. The present study was carried out to observe and assess the BMW management Practices among staff nurses in a teaching hospital of Vadodara district.

**Methods:** A cross sectional study was carried out to assess BMW management practices in the hospital using BMW Checklist. Observation was the predominant method for data collection.

**Results:** Segregation of BMW at the site of generation was found in 72.73%. Sharp and non-sharp infectious waste was correctly segregated in 72.73% and 100% of areas respectively. Bio medical Waste was found covered in bins, but overfilled in 81.82%. In 6 out of 11, BMW was kept beyond 48 hours. IV set, bottles, syringes, latex gloves, catheters etc. were cut by scissors before disinfection in 45.45%. Staff nurses were using gloves while handling syringe and needles in 10 out of 11 places.

**Conclusions:** Staff nurses were knowledgeable about segregation of BMW, but storage and pretreatment of BMW before its final disposal needs to be improved. An orientation programme about newer guidelines may improve the current practice.

**Keywords:** BMW guidelines 2016, BMW management, Staff nurses

### INTRODUCTION

Dhiraj Hospital is a 1360 bedded teaching hospital of SBKS Medical Institute and Research Centre and a constituent of Sumandeep Vidyapeeth in Vadodara district of Gujarat.

The healthcare services while providing services, curative, promotive or preventive inevitably create waste which may be hazardous to health. "Bio-medical waste" means any waste, which is generated during the

diagnosis, treatment or immunization of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps.<sup>1</sup>

It is estimated that annually about 0.33 million tonnes of hospital waste is generated in India and, the waste generation rate ranges from 0.5 to 2.0 kg per bed per day.<sup>2</sup>

Since majority of the persons receiving treatment in the hospital suffer from infectious diseases, the waste

generated in hospital has potential to transmit infections and other hazards to hospital staff and nearby community, if not managed adequately. Adequate awareness amongst the hospital staff and practices regarding the biomedical waste management is crucial to prevent these hazards.<sup>3</sup> Improper management of waste generated in health care facilities causes a direct health impact on the community, the health care workers and the environment.<sup>4</sup>

Practices or techniques that control or prevent transmission of infection help to protect clients and health care workers from acquiring various diseases. The lack of awareness and technical guidance in the management of the bio medical waste has led to the hospital becoming a hub in spreading diseases rather than working towards eradicating them.<sup>5,6</sup>

The clinical staff in developing countries lacks knowledge about the transmission of hospital acquired infections caused by poor handling of healthcare waste. Poor attitude of staff towards hospital discipline as well as improper training of staff on HCWM (Healthcare waste management) adds further harm to this scenario.<sup>7</sup>

There is a need for improved knowledge for nursing personnel regarding bio medical waste management in hospital in order to safeguard their own health as well as the protection of patients.<sup>6</sup>

The awareness of these laws among the general public as well as the development of policies and enforcement that respect those laws are essential. With this background, the present study has been conducted with the objectives of assessing knowledge and practices of staff nurses regarding BMW management of a teaching institution that may help the respective authorities and society to develop further strategy for improving the situation in future.

### Objectives

- To observe and assess BMW management Practices among staff nurses of Dhiraj Hospital.
- To assess the awareness of BMW management among staff nurses of Dhiraj Hospital according to BMW Management guidelines 2016.

### METHODS

It was a cross sectional study involving the observation of current BMW management practices in the hospital and inquiring the staff nurses about various aspects of BMW management. The study proceeded for 5 months from January 2017 to May 2017.

### Sample size

All nurses working for bio medical waste management in Dhiraj hospital. We visited all the major health care areas

in the hospital. The study included medical, surgical and orthopaedic wards (male and female), obstetrics and gynaecology wards (labour room, postnatal ward), ENT ward and Blood Bank for the assessment.

### Sampling method

Purposive sampling

### Study tool

BMW checklist developed by Government of Gujarat under Quality Improvement Programme was used to collect the data. It included observation for Basic Requirement for BMW, practices of staff nurses for segregation, collection and storage of BMW, use of personal protective means by BMW handlers and assessment of their awareness regarding various aspects of BMW.

### Ethical considerations

Prior approval of Institutional Ethical Committee was taken before proceeding towards data collection. The confidentiality of the records was maintained.

### Statistical analysis

Percentage was used to describe the study findings

## RESULTS

We assessed 11 health care points in the hospital where BMW was being generated and managed to assess BMW management practices among staff nurses according to latest guidelines (2016). It was found that forms and formats were available at 10 out of 11 functional points in the hospitals.

**Table 1: Segregation of BMW.**

Segregation of BMW	Frequency	%
<b>At the site of generation</b>	8	72.73
<b>Sharp infectious waste segregated in white/blue puncture proof containers</b>	8	72.73
<b>Non sharp infectious material segregated in red plastic bin/bags</b>	11	100.00

There was a practice of segregation of BMW at the site of BMW generation in 72.73% of visited health care settings; others were doing it after their work is over. Sharp and non-sharp infectious waste segregated in white/blue puncture proof containers and red plastic bin/bags in 72.73% and 100% of areas respectively.

Bio medical waste was found covered in 10 out of 11 locations in the hospital. The bins were filled upto  $\frac{3}{4}$  th

level only at 2 locations, in rest they were overfilled. The Infectious and noninfectious waste were found filled in same bins at 36.36% locations. In 6 out of 11, BMW was kept beyond 48 hours. An 81.82% health premise had at least one person trained and was skilled enough for BMW collection and transportation in this study.

**Table 2: Collection and storage of BMW in bins.**

Collection and storage of BMW	Frequency	%
Waste covered in bins	10	90.91
Bins filled up to 3/4 <sup>th</sup> level	2	18.18
Bins cleaned with soap and disinfectant regularly	9	81.82
Bins overfilled	9	81.82
Infectious and noninfectious waste filled in same bins	4	36.36
BMW storage rooms- lock and key	5	45.45
Stored waste kept beyond 48 hours	6	54.55
Trained and skilled person for BMW collection and transportation	9	81.82

**Table 3: Pre -treatment before final disposal.**

Treatment before final disposal	Frequency	%
Syringes were cut and chemically disinfected	9	81.82
Infected plastics chemically disinfected	8	72.73
General waste chemically disinfected	7	63.64
Sharp waste mixed with the other waste	1	9.09
IV set, bottles, syringes, latex gloves, catheters etc cut by scissors before disinfection	5	45.45

It was found that syringes were cut and chemically disinfected at 9 out of 11 locations in the hospital. Infected plastics was chemically disinfected in 8 locations, where as general waste was also found being chemically disinfected at 7 locations. BMW storage rooms were not under lock and key in more than half of the visited sites (45.45%). At one location sharp waste was found mixed with the other waste. Practice of cutting the IV set, bottles, syringes, latex gloves, catheters etc by scissors before disinfection was noticed only at 5 locations.

We found use of gloves by the staff while handling syringe and needles in 10 out of 11 places in the hospital. It was observed that staff used mask and gloves whenever they handle sputum cups and slides at all places in the hospital. 63.64% of the staff in the study sample had

taken vaccines against Hepatitis B and Tetanus. But Post exposure prophylaxis kit was found in 8 out of 11 visited areas.

**Table 4: Personal protective measures by staff.**

Personal protective measures	Frequency	%
Gloves use while handling syringe and needles	10	90.91
Mask and gloves used while handling sputum cups and slides	11	100.00
Staff immune to hepatitis B and tetanus vaccine	7	63.64
Post exposure prophylaxis kits	8	72.73

**Table 5: Awareness of the staff about BMW management.**

Awareness component	Frequency	%
Improper BMW management affects the population	9	81.82
Hospital financially equipped to maintain BMW management	9	81.82
Environment friendly technology that converts organic waste into commercially useful by – products	9	81.82
The components of fixer solutions used in X-rays are hazardous	9	81.82
Defective incineration emits greenhouse gases	3	27.27
Lead apron and lead collars should be disposed by licensed recyclers	8	72.73
Government legislations related to BMW management in our country	11	100.00

81.82% of the study participants were aware that improper BMW management affects the population, about the existence of environment friendly technology that converts organic waste into commercially useful by – products and knowing that components of fixer solutions used in x-rays are hazardous. Only 3 knew that defective incineration emits greenhouse gases. All were aware about the existence of Government legislations related to BMW management in our country. 81.82% felt that the hospital is financially equipped to maintain biomedical waste management.

## DISCUSSION

After analyzing the study data, the available variables were compared with findings obtained in India and abroad. A cross sectional study, involving 383 healthcare

personnel, by Madukumar found that majority (96.1%) were aware of the colour coding for waste segregation but they did not have any clear idea of what should be disposed in which bin. It also showed that only 88.8% were aware that liquid health care wastes should be treated and disposed properly.<sup>2</sup> The attitude of the study subjects toward separation of infectious and non-infectious waste, proper disposal and implementation of rules was positive. Majority (82%) in that study were agreed for implementation of the rules.<sup>2</sup>

Sharp and non-sharp infectious waste segregated in white/blue puncture proof containers and red plastic bin/bags in 72.73% and 100% of areas respectively in this study. It was contrary to study by Das, Biswas in West Bengal where only 31.3% respondents knew the sharps should be deposited in white-colored Puncture proof (PPR) container followed by 16.7% participants who suggested blue-colored plastic bag for the same purpose.<sup>8</sup> 4.5% of the participants knew about correct bag for disposal of intravenous sets and tubings in that study.<sup>8</sup>

There was a practice of Segregation of BMW at the site of BMW generation in 72.73% of visited health care settings in our study in contrary to study by Das, Biswas in West Bengal where segregation of BMW at the site of generation was found nil among study population.<sup>8</sup> In other study by Chudasama et al figured out that the correct response for the same was as high as 86.9%.<sup>9</sup>

In study by Shrestha et al reviewing compliance to biomedical waste management rules in a tertiary care hospital in Maharashtra found that compliance with respect to use of PPE's such as gloves, masks and aprons was only 93%, 24% and 6% of the total sites respectively.<sup>4</sup> Gloves and masks were the PPM used by all subjects; however, in addition, apron was used in case of maternity (gynecology and obstetrics) wards in study by Das and Biswas.<sup>8</sup> Chudasama et al in his Rajkot study found 84.8% used PPM while handling BMW.<sup>9</sup> We found use of gloves by the staff while handling syringe and needles in 10 out of 11 places in the hospital. It was observed that staff used mask and gloves whenever they handle sputum cups and slides at all places in the hospital; but Post exposure prophylaxis kit was found in 8 out of 11 visited areas in our study

In all the wards (Das and Biswas), no bin was covered with lid; rather, all of them were kept open. All kinds of waste were collected in the bins.<sup>8</sup> It was observed that BMW was covered in bins at 10 out of 11 locations in the hospital in present study. The bins were filled upto ¾th level only at 2 locations, in rest they were overfilled. The Infectious and noninfectious waste were found filled in same bins at 36.36% locations in present study. In study by Shrestha et al plastic bins containing sharps were not being sent for disposal when ¾th full with syringes.<sup>4</sup>

It was found that syringes were cut and chemically disinfected at 9 out of 11 locations and infected plastics

were chemically disinfected in 8 locations in present study. It was in contrary to study by Shrestha et al where hypodermic needles were not being mutilated by needle cutter or burner prior to disposal in the bins. They also found that saline bottles and nozzle of syringes were not being destroyed prior to their disposal, and needles and the sharps were often not completely immersed in hypochlorite solution present in the plastic bins. Weighing machine for monitoring weight of the waste collected in the BMW bags was absent at all sites in that study.<sup>4</sup> Practice of cutting the IV set, bottles, syringes, latex gloves, catheters etc. by scissors before disinfection was noticed only at 5 locations in our study.

In present study, BMW storage rooms were under lock and key in 45.45%. Shrestha et al came across that there was no separate storage room for collected BMW bags before transport to the common BMW room. BMW bags were kept in the toilets or patient waiting areas attached to these sites of waste generation, which had free access to patients and their relatives.<sup>4</sup>

In study by Shrestha et al, 42.18% wards disinfected the biomedical waste bins daily. Mixing of contents in the red bag, yellow bag and black bag was found to be 20.31%, 12.5% and 10.93% respectively.<sup>4</sup> We found that Infectious and noninfectious waste filled in same bins at 36.36% locations. There is no over-lapping or confusion with regard to color coding bags and segregation of waste which existed in previous rules.<sup>10</sup> Still there was mixing of different kinds of waste into the same BMW container, this warrants urgent reorientation of BMW handler towards the newer guidelines.

In study by Chawla et al the segregation of BMW was inadequate in 20 (40.8%) government centers and 59 (96.7%) private centers. Hub-cutter/ needle destroyer was available at 31 (63.3%) of government health centers while in private health centers it was only 12 (19.7%). Disinfection was adequate in 3 (6.1%) government centers and 1 (1.6%) private center.<sup>11</sup>

All participants in present study were aware about the existence of Government legislations related to BMW management in our country. It was contrary to study by Das and Biswas where all participants had heard about BMW and its management, but only 1.5% of the subjects had formal training, and only 30.8% of them knew about BMW rules.<sup>8</sup>

A study in Bangladesh found from self-opinions of staff nurses, 88.8% said there was no good infrastructure for waste management; 95.2% said there is no logistic supply, and 92% respondents said there is no sufficient manpower for waste management.<sup>12</sup> 81.82% of study participants in our sample felt that the hospital is financially equipped to maintain biomedical waste management.

KAP study conducted in northern India by Mathur et al in 2011 showed the importance of training associated with biomedical waste management and lack of proper and complete knowledge about biomedical waste management practices. The study also recommended compulsory continuous training for the healthcare personals in accredited training centers.<sup>13</sup>

## CONCLUSION

Staff nurses were knowledgeable about segregation of BMW, but storage and pretreatment of BMW before its final disposal needs to be improved. Majority was using PPEs while handling infectious BMW material, but 36% of them were lacking immunization against Hepatitis B and Tetanus. Majority of them were about hazardous nature of BMW and Government legislations related to BMW management in our country.

## Recommendations

- Strict implementation of BMW management rules 2016 and its continuous monitoring by designated officials to ensure compliance towards the rules.
- Healthcare facilities must get their healthcare personnel trained from accredited training centers and these training should be a continuous process.

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