

## Awareness about Biomedical Waste Management among Hospital Staff in a Tertiary Care Hospital in Tumkur

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#### Abstract

*Context:* The biomedical waste (BMW) poses significant hazardous risk to the patients, healthcare workers, the community and environments. Healthcare professionals are at potential risk for hazards due to biomedical waste. Thus the knowledge regarding biomedical waste management among health care personnel has greater impact on health and environment. *Aims:* 1. To assess the knowledge regarding biomedical waste management. 2. To assess the attitude regarding biomedical waste management. *Settings and Design:* Hospital-based Descriptive study. *Methods and Material:* A questionnaire containing questions based on knowledge and attitude regarding BMW management was administered to the study participants (25 each of Professors, Associate Professors, Assistant Professors, Postgraduates, interns, senior & junior nurses, technicians, and class IV employees). Statistical analysis used: *Descriptive statistics Results:* The awareness about BMW management was poor among study subjects. Majority of them did not undergo regular training. Class IV staff were found to be unvaccinated against hepatitis B infection. BMW management attitude was found to be unsatisfactory. *Conclusion:* The study concluded that regular training and supervision is necessary for better healthcare waste management and implementation.

**Keywords:** Biomedical Waste; Awareness; Medical; Nursing.

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#### Introduction

The term Biomedical waste includes all the waste generated within health-care facilities, research centres and laboratories related to medical procedures [1]. Biomedical waste is defined as any waste, which is generated during the diagnosis, treatment or immunization of human beings/ animals or in research activities pertaining thereto in the production or testing of biological,

and including categories mentioned in Schedule I of BMW Rules of 1998 [2]. The biomedical waste (BMW) poses significant hazardous risk to the patients, healthcare workers (HCW), the community and environments. Waste generated by health care activities includes a broad range of materials, from used needles and syringes to soiled dressings, body parts, diagnostic samples, blood, chemicals, pharmaceuticals, medical devices and radioactive materials. Between 75% and 90% of the waste produced by health-care providers is comparable to domestic waste and usually called "non-hazardous" or "general health-care waste". It comes mostly from the administrative, kitchen and housekeeping functions at health-care facilities and may also include packaging waste and waste generated during maintenance of health-care buildings. The remaining 10–25% of health-care

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waste is regarded as “hazardous” and may pose a variety of environmental and health risks [1]. Poor management of biomedical waste potentially exposes health care workers, waste handlers, patients and the community at large to infection, toxic effects and injuries, and risks polluting the environment. It is essential that all medical waste materials are segregated at the point of generation, appropriately treated and disposed of safely.

Biomedical waste contains potentially harmful microorganisms which can infect hospital patients, health workers and the general public. Other potential infectious risks may include the spread of drug-resistant microorganisms from health facilities into the environment.

The major reasons for failure of waste management are: lack of awareness about the health hazards related to biomedical waste, inadequate training in proper waste management, absence of waste management and disposal systems, insufficient financial and human resources and the low priority given to the topic. Many countries either do not have appropriate regulations, or do not enforce them.

Key elements in improving health-care waste management are: building a comprehensive system, addressing responsibilities, resource allocation, handling and disposal; raising awareness of the risks related to health-care waste, and of safe practices; and selecting safe and environmentally-friendly management options, to protect people from hazards when collecting, handling, storing, transporting, treating or disposing of waste.

With this background, the present study was taken up to assess the knowledge and attitude regarding biomedical waste management among

the healthcare staff of Sri Siddhartha Medical College Hospital.

#### Objectives

1. To assess the knowledge regarding biomedical waste management.
2. To assess the attitude regarding biomedical waste management.

#### Materials and methods

A cross sectional study was done between December 2017 to June 2018 among the healthcare staff working at Sri Siddhartha Medical College for a period of six months. Two hundred and eighteen healthcare staff which included (25 each of Professors, Associate Professors, Assistant Professors, Postgraduates, interns, senior & junior nurses, class IV employees and 18 technicians). Data were collected using a pretested, structured, self-administered questionnaire. The proforma was administered by the investigator for group-D workers. The data collected was analysed using SPSS version 16.0. Descriptive statistics was applied. Spearman’s rank correlation was computed to measure the relationship between knowledge and attitude.

#### Results

Socio-demographic profile: The median age of study subjects was 34.36 years (IQR: 24.0-41.0). Duration of service of study subjects was 7 years (IQR: 2.0-16.0). Majority of study subjects were females i.e., 126 (57.80%) followed by males i.e., 92 (42.20%) (Table 1).

**Table 1:** Socio-Demographic Characteristics of study subjects

Socio-Demographic Characteristics		N= 218
Age of study subjects		34.36 years (IQR: 24.0-41.0)
Duration of service		7 years (IQR: 2.0-16.0)
Sex	Male	92 (42.20%)
	Female	126 (57.80%)
Designation	Professor	25 (11.47%)
	Associate Professor	25 (11.47%)
	Assistant Professor	25 (11.47%)
	Postgraduate	25 (11.47%)
	Intern	25 (11.47%)
	Lab technician	18 (8.24%)
	Staff nurse	25 (11.47%)
	Junior nurse	25 (11.47%)
	Group D	25 (11.47%)

IQR: Interquartile range

**Table 2:** Knowledge regarding biomedical waste management among study subjects

Sl. No	Knowledge	Number (Percentage)
1.	Awareness about biomedical waste legislation	156 (71.56%)
2.	Hazards of poor BMW management	192 (88.07%)
3.	People at risk to BMW hazards	178 (81.65%)
4.	Training on biomedical waste management	57 (26.15%)
5.	Awareness about steps of BMW management	137 (62.84%)
6.	Awareness about colour coding of the bins	78 (35.78%)
7.	Management of needle prick injury	89 (40.83%)
8.	Management of mercury spillage	104 (47.71%)
9.	Maximum hours for storing waste before disposal	25 (11.47%)
10.	Storage of discarded food with BMW	49 (22.79%)
11.	Awareness about BMW transportation	108 (49.54%)

**Table 3:** Attitude regarding biomedical waste management among study subjects

Sl. No	Attitude	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	Safe management of HCW is not an issue	2 (0.92%)	20 (9.17%)	18 (8.26%)	71 (32.57%)	107 (49.08%)
2.	Training of all health care staff on BMWM	124 (56.88%)	80 (36.70%)	5 (2.29%)	7 (3.21%)	2 (0.92%)
3.	Vaccination of all health care staff against Hep B	168 (77.06%)	47 (21.56%)	3 (1.38%)	-	-
4.	Upgrade existing knowledge on BMWM through CME	101 (46.33%)	79 (36.24%)	28 (12.84%)	9 (4.13%)	1 (0.46%)
5.	Sterilizing infectious waste before disposal	64 (29.49%)	59 (27.19%)	47 (21.66%)	39 (17.97%)	8 (3.69%)
6.	Setting up treatment plant for infectious liquid waste	72 (33.03%)	89 (40.83%)	43 (19.72%)	13 (5.96%)	1 (0.46%)
7.	Labelling the containers is of clinical significance	1 (0.46%)	108 (49.54%)	16 (7.34%)	16 (7.34%)	6 (2.75%)

Hepatitis-B vaccination: Among the study subjects, 156 (73.58%) were vaccinated against hepatitis B.

#### Knowledge

We observed that 57 (26.15%) were trained in BMW management and knowledge of BMW management was low, especially regarding colour coding of the bins (35.78%), management of needle prick injury (40.83%), storage of waste before disposal (11.47%), and transport of waste (49.54%). There was relatively good knowledge concerning the biomedical waste legislation (71.56%), steps of BMW management (62.84%). (Table 2)

Knowledge Score = 10.5 (IQR: 8.0-13.0) Out of 18

#### Attitude

The present study showed that, the attitude (applying their knowledge to clinical practice) of healthcare staff was less appropriate regarding labelling of waste storage containers (50%) and

sterilizing infectious waste before disposal (56.7%). The attitude of the respondents towards the safe management of healthcare waste, upgrading knowledge through Continuing of Medical Education (CME) and setting up treatment plant for infectious liquid waste was 81.7%, 82.6% and 73.86%. However, the percentage of attitude score towards training of healthcare staff on BMW management (93.6%) and vaccination against hepatitis B (98.6%) was quite high. (Table 3)

Attitude Score = 7.16±1.90 Out of 11

The Spearman rank correlation between knowledge and attitude was computed. There was amoderate positive linear relationship between knowledge and attitude ( $r = 0.586, p < 0.001$ ).

#### Discussion

The age of study subjects in the present study was 34.36 years (IQR: 24.0-41.0) which was similar to the study conducted by Lakshmi kantha, et al. where the age was 36.46±8.104 years [3]. In the present

study, 126 (57.80%) were females and 92 (42.20%) were males while in other studies, 176 (52.2%) were males and 161 (47.8%) were females [3], 63% were males and 37% were females [4]; 52% were males and 48% were females [5]. The duration of service of study subjects was 7 years (IQR: 2.0-16.0) whereas the study by Lakshmi kantha et al., showed that 135 (40.1%) had their period of practice for 4-8 years; 102 (30.3%) for <3 years; 56 (16.6%) for more than 15 years and above and 44 (13.1%) for 9-15 years [3].

156 (71.56%) knew about BM waste generation and legislation whereas in a study by Lakshmi kanth et al, 91 (88.4%) knew about BM waste generation and legislation [3]. 192 (88.07%) & 178 (81.65%) were aware of hazards of poor BMW management and people who are at risk of these hazards. This was similar to study by Mukesh Kumar et al., in which 87.3%, 86.4%, 85.5% and 80% of HCWs were aware about transmission of HIV, Hepatitis B, Hepatitis C and risk to environment through BMW respectively [6].

Another study by Shafee et al., showed 479 (95.8%) had knowledge about various health problems caused by BMW [7]. 137 (62.84%) were aware of the steps of BMW management and 78 (35.78%) were aware of colour coding of the bins whereas study for Shafee et al., showed that 70.6% study subjects were having idea about segregation of BMW and 297 (59.4%) subjects were aware of colour coding [7]. Only 25 (11.47%) were aware of maximum duration of storage of waste whereas 130 (38.6) were aware according to study by Lakshmikantha et al. Another study by Ukey et al. showed that 61 (53.98% of 113) knew that the correct maximum storage time of biomedical waste is <48 hours [8]. Compared to other studies, present study showed a poor awareness regarding storage of biomedical waste.

The present study showed that 156 (73.58%) were vaccinated against hepatitis B which was similar to other studies by 69.1% [6].

The present study showed that 178 (81.65%) agreed that, safe management of HCW is an important issue whereas another study showed that 276 (81.9) Safe management of health care waste is an issue [3]. The present study showed that 123 (56.68%) agreed on sterilizing infectious waste before disposal which was similar to study which showed that 199 (59.1%) agreed on sterilizing infectious waste before disposal [3]. In the present study, 161 (73.86%) agreed on setting up treatment plant for infectious liquid waste. It was similar to findings in the study by Lakshmikanth et al, which

showed that, 281 (83.4%) who agreed on setting up of effluent plant [3].

Majority, 204 (93.58%) felt that training of all health care staff on BMWM is needed and 180 (82.57%) agreed that the importance of CME for upgrading the existing knowledge on BMWM whereas another study by Md. Asadullah et al. showed that 142 (85.5%) of nursing staff were felt that they need fresh training on BMW [9] & study by Lakshmikanth et al. showed that 304 (90.2%) agreed on the importance of CME [3].

## Conclusion

Knowledge & Attitude regarding Bio-Medical waste management among the health care staff was inadequate. Regular training and supervision is necessary for better healthcare waste management and implementation.

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