Research Article

Study to Assess the Knowledge, Attitude and Practices of Biomedical Waste Management among Healthcare Personnel at a Tertiary Care Hospital in Haryana

Nitika Sharma[1], Neelam Kumar[2], JS Malik[3], Srishti Singh[4], Anuj Jangra[5]

Abstract

Background: Biomedical Waste (BMW) collection and proper disposal has become a significant concern for both the medical and general community. It is estimated that 10-25% of healthcare waste is hazardous, with the potential to create a variety of health problems. Handling, segregation, mutilation, disinfection, storage, transportation and final disposal are vital steps for safe and scientific management of biomedical waste in any establishment.

Objectives: To assess the knowledge, attitude and practice among healthcare personnel working in a tertiary care centre.

Methods: A hospital based cross sectional study was conducted in the months of February and March 2015. Study participants included resident doctors, interns, nursing staff, laboratory technicians, ward boys and sweepers working in the institute who deal with biomedical waste and were selected randomly to make the sample size of 200 with equal representation in each category. A pretested semi-structured questionnaire was used.

Results: The study showed gaps in the knowledge of all categories of respondents. The knowledge of the existence of biomedical waste management was better among doctors (96%) as compared to nurses (88%), paramedical staff (70.9%) or the cleaning staff (16.9%). The knowledge of practical aspects of BMW management was better in nurses, paramedical staff and cleaning staff. Conclusion: The present study highlighted the lack of knowledge at every level. Waste management is everybody's concern. The need of a comprehensive training for all the categories of hospital staff is highly recommended.

Keywords: Biomedical waste, Knowledge, Management

[1,4,5]Junior Resident, [2]Professor, [3]Senior Professor, Department of Community Medicine, Pt B.D. Sharma PGIMS, Rohtak.

Correspondence: Dr. Nitika Sharma, Junior Resident, Department of Community Medicine, Pt B.D. Sharma PGIMS, Rohtak.

E-mail Id: 245nitikasharmagmc@gmail.com

Orcid Id: http://orcid.org/0000-0002-7343-3355

Introduction

Generation of biomedical waste is an unavoidable outcome of hospital care and practices.[1]. Rapid mushrooming of hospitals both in the public and private sectors to meet the societal demand has collaterally increased the biomedical waste generation. It is essential to optimally manage the biomedical waste to avoid any public health hazards[1]. Biomedical waste (BMW) has been defined as the "waste generated in the diagnosis, treatment or immunization of human beings or animals, in research or in the production of testing of biological products including all categories of infected and toxic waste that is potential threat to human being and environment".[2] Of the total amount of waste generated by health-care activities, about 85% is general, non-hazardous waste. The remaining 15% is considered hazardous material that may be infectious, toxic or radioactive. Every year an estimated 16 billion injections are administered worldwide, but not all of the needles and syringes are properly disposed of afterwards. Health-care waste contains potentially harmful microorganisms, which can infect hospital patients, health workers and the general public. Health-care waste in some circumstances is incinerated, and dioxins, furans and other toxic air pollutants may be produced as emissions[3]. It is estimated that 0.33 million tonnes of hospital waste is generated in India; rate of generation of which ranges from 0.5 to 2 kg per bed per day[4]. Poor awareness of all categories of health workers and improper management of biomedical waste poses a risk for health and environment.[5] Aim of biomedical waste management is proper segregation, collection, transport, handling and disposal in such a way that it is safe for environment as well as community. There are a number of legislations to enforce proper disposal of BMW in India, for example Biomedical Waste (Management & Handling) Rules 1998, and Solid Waste (Management & Handling) Rules 2000, Hazardous Wastes (Management & Handling) Rules 1989.[2,6,7] These rules are applicable to every hospital and nursing home, veterinary institutions, animal houses or slaughter houses, which generate biomedical waste. With this regard healthcare workers have an important responsibility to properly segregate and train the staff in its disposal. Lack of awareness about the health hazards related to healthcare 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 are the most common problems connected with healthcare waste[3].

Studies carried out in India showed that the awareness and practices on biomedical waste management among health care personnel is far below than the acceptable level.[8-11]

The success of biomedical waste management programme rests on the knowledge and practice of the Health Care Worker (HCW). This paper aims to study the awareness, attitude and practices of health care workers in BMW management in a tertiary care hospital in the district Rohtak of Haryana.

Material and Methods

The study was conducted in a reputed tertiary care hospital in Haryana having a bed strength of 1597. The study was conducted in the months of February and March 2015 running over a span of two months. It was a hospital based observational study and cross sectional study design. Study participants included healthcare workers divided into four groups as doctors, nursing staff, paramedical staff, and class IV workers (cleaning staff). The study participants deal with biomedical waste regularly. Purposive sampling technique was used to collect a sample size of 200 with equal representation from each group. Only those healthcare workers were included in the study who had been working in the institution for >6 months. A pretested semi-structured interview schedule was used for recording all the relevant data pertaining to general information of the study participants and knowledge and practices regarding biomedical waste management and data was collected after obtaining a written informed consent.

Questions to assess knowledge were of a multiple choice type where only one response was the correct one. Questions to assess attitude and practice were presented in the positive or negative response format (Yes/No). A score of < 5 was categorized as poor, 5-8 as average and > 8 as good to assess the knowledge regarding BMW management.[12]

The data analysis was done using the statistical software SPSS version 20. Descriptive statistics summarized the results. Statistical significance was analyzed using Chi-square test. The level of significance was set at 5%.

Results

200 study subjects that were grouped into four categories were interviewed for the assessment of knowledge, attitude and practice regarding biomedical waste management.

Majority of the doctors, nursing staff and paramedical staff had good knowledge regarding biomedical waste management expect for the component of storage time (48 hours) for biomedical waste as per BMW handling and management rules. The nursing staff, paramedical staff and class IV staff were not able to identify the bio hazard symbol. Overall, the knowledge regarding BMW management was least among class IV staff (Table 1).

Table 1.Distribution of health care personnel on the basis of knowledge regarding bio-medical waste

S. No	Knowledge regarding biomedical waste management		Doctors	Nursing Staff	Paramedic-al Staff	Class IV Workers
			N=50 (N %)	N=50 (N %)	N=50 (N %)	N=50 (N %)
1.	Knowledge about bio-medical waste generation and legislation		48 (96%)	44 (88%)	36 (72%)	9 (18%)
2	Health care waste is hazardous		50(100%)	47 (94%)	45 (90%)	38 (76%)
3	Biomedical waste is segregated at source		48 (96%)	43 (86%)	40 (80%)	41 (82%)
4	Storage time for BMW as per BMW rules (48 hours)		34 (68%)	26 (52%)	28 (56%)	12 (24%)
5	Awareness of separate colour coding containers		50 (100%)	50 (100%)	50 (100%)	38 (76%)
6	Understanding of colour coding	Yellow Bag	48 (96%)	32 (64%)	34 (68%)	11 (22%)
		Red Bag	47 (94%)	40 (80%)	38 (76%)	14 (28%)
		Black Bag	49 (98%)	36 (72%)	38 (76%)	12 (24%)
		Blue Bag	47 (94%)	30 (60%)	40 (80%)	14 (28%)
7	Awareness about discarding objects causing punctures or cuts		48 (96%)	46 (92%)	38 (76%)	30 (60%)
8	Awareness about discarding of needles		44 (88%)	40 (80%)	36 (72%)	10 (20%)
9	Identification of bio-hazard symbol		48 (96%)	28 (56%)	30 (60%)	8 (16%)
10	Awareness about universal precautions		45 (90%)	43 (86%)	44 (88%)	38 (96%)
11	There is incinerator facility in our hospital		50 (100%)	42 (84%)	40 (80%)	20 (40%)
12	Diseases transmitted through BMW		50 (100%)	46 (92%)	35 (70%)	24 (48%)

When the score regarding knowledge on biomedical waste management was computed and analysed, it was found that the doctors had the highest proportion of good knowledge score as compared to other categories. To find out whether the knowledge level increases as the professional level increases, Spearman's rank correlation coefficient (r_s) was computed. r_s was obtained as 0.171 with a p-value of 0.002 (Table 2).

Table 2.Distribution of level of knowledge according to professional category

Score	Doctors	Nursing Staff	Paramedical Staff	Class IV Staff	Correlation Coefficient (r_s)	p value
	N=50 (N %)	N=50 (N %)	N=50 (N %)	N=50(N %)		
Good (>8)	42 (84%)	38 (76%)	35 (70%)	10 (20%)	0.168	0.003
Average (5-8)	6 (12%)	9 (18%)	11 (22%)	18 (26%)		
Poor (<5)	2 (4%)	3 (6%)	4 (8%)	22 (44%)		

Majority of nursing staff (84%), paramedical staff (88%) and Class IV staff (92%) considered BMW management an additional burden on work. All the healthcare workers were willing to undergo training on BMW management (Table 3).

Table 4 showed that colour coding and segregation was not followed properly. Very few of the Class IV staff have undergone any training regarding BMW management. Many of the healthcare workers were not vaccinated for Hepatitis B.

Table 3.Attitude towards biomedical waste management

S. No.	Attitude towards BMW management	Doctors	Nursing Staff	Paramedical Staff	Class IV Staff
		N=50 (N %)	N=50 (N %)	N=50 (N %)	N=50 (N %)
1	Bio medical waste management is an important issue	50 (100%)	46 (92%)	47 (94%)	39 (78%)
2	Waste management is a responsibility	50 (100%)	46 (92%)	38 (76%)	25 (50%)
3	Financial burden increases because of BMW management	45 (90%)	26 (52%)	40 (80%)	12 (24%)
4	BMW management increases burden of work	11 (22%)	42 (84%)	44 (88%)	46 (92%)
5	Willing to attend training on BMW management to enhance knowledge	48 (96%)	50 (100%)	50 (100%)	23 (46%)
6	Reporting to concern authorities if centre is not complying with the guidelines of bio-medical waste management	40 (80%)	30 (60%)	18 (36%)	14 (28%)

Table 4.Practice on bio-medical waste management

S. No.	Biomedical waste management practice	Doctor	Nursing Staff	Paramedical Staff	Class IV Staff
		N=50 (N %)	N=50 (N %)	N=50 (N %)	N=50 (N %)
1	Disposal of sharps in puncture proof container	43 (86%)	40 (80%)	42 (84%)	39 (78%)
2	Disposal of expired drug in black colour bag	41 (81%)	38 (76%)	26 (52%)	14 (28%)
3	Disposal of used gauze piece in yellow colour bag	48 (96%)	46 (92%)	38 (76%)	31(62%)
4	Not recapping the used needle	50 (100%)	46 (92%)	33 (66%)	12 (24%)
5	Discarding of used needles by hub cutter	40 (80%)	42 (84%)	30 (60%)	8 (16%)
6	Vaccinated for Hepatitis-B	43 (86%)	40 (80%)	27 (54%)	5 (10%)
7	Ever undergone training for bio-medical waste management	21 (42%)	16 (32%)	14 (28%)	5 (10%)

All the categories of health care workers have good knowledge about infectious diseases transmitted due to improper management of waste and the responses received were, HIV, HBV, HCV, air borne infections, TB, water borne infections (Figure 1).

Discussion

The study was carried out in a tertiary care hospital in Rohtak, Haryana to study about the knowledge, attitude and practices regarding BMW management. The BMW is generated by various sources. The major sources are govt. hospitals and private hospitals, primary health centres, medical colleges and veterinary colleges and animal research centres.[13] Inadequate biomedical waste management not only poses significant risk of infection due to pathogens like HIV, Hepatitis B & C virus but also carries the risk of water, air & soil pollution thereby adversely affecting the environment and community at large[14]. Therefore, the Ministry of Environment and Forests has promulgated the Bio-Medical Waste

(Management and Handling) Rules, 1998 for proper management of biomedical waste.[2]

The study concluded that the knowledge regarding biomedical waste management waste was higher among doctors, nursing staff and paramedical staff as compared to the cleaning staff. 96% doctors were aware about BMW Handling and Management rules. All the doctors, nursing staff and paramedical staff were aware of separate colour coding containers. However, the knowledge regarding the type of BMW waste and the colour coding of bag was not upto the mark among the nursing staff, paramedical staff and the class IV staff. These findings were consistent with the findings in the study conducted by Malini et al[15] which showed the knowledge among doctors to be >95% regarding biomedical waste management and segregation and lesser knowledge among nursing staff (50%) and paramedical staff (80%). Similar findings were reported in the study done by Mathur et al in Lucknow as knowledge of BMW management at 91%, 92%, 85%,

27% for doctors, nurses, lab-technicians and sanitary staff respectively.[8] Similar findings were also described in studies by Bansal et al[9], Pandit et al[10] and Sharma et al[16]. However, our findings did not corroborate with the finding of the study done by Imaad et al[17] which showed that knowledge regarding bio-medical waste management was inadequate across all the groups and 90% of the doctors were unaware of the bio-medical waste management rules.
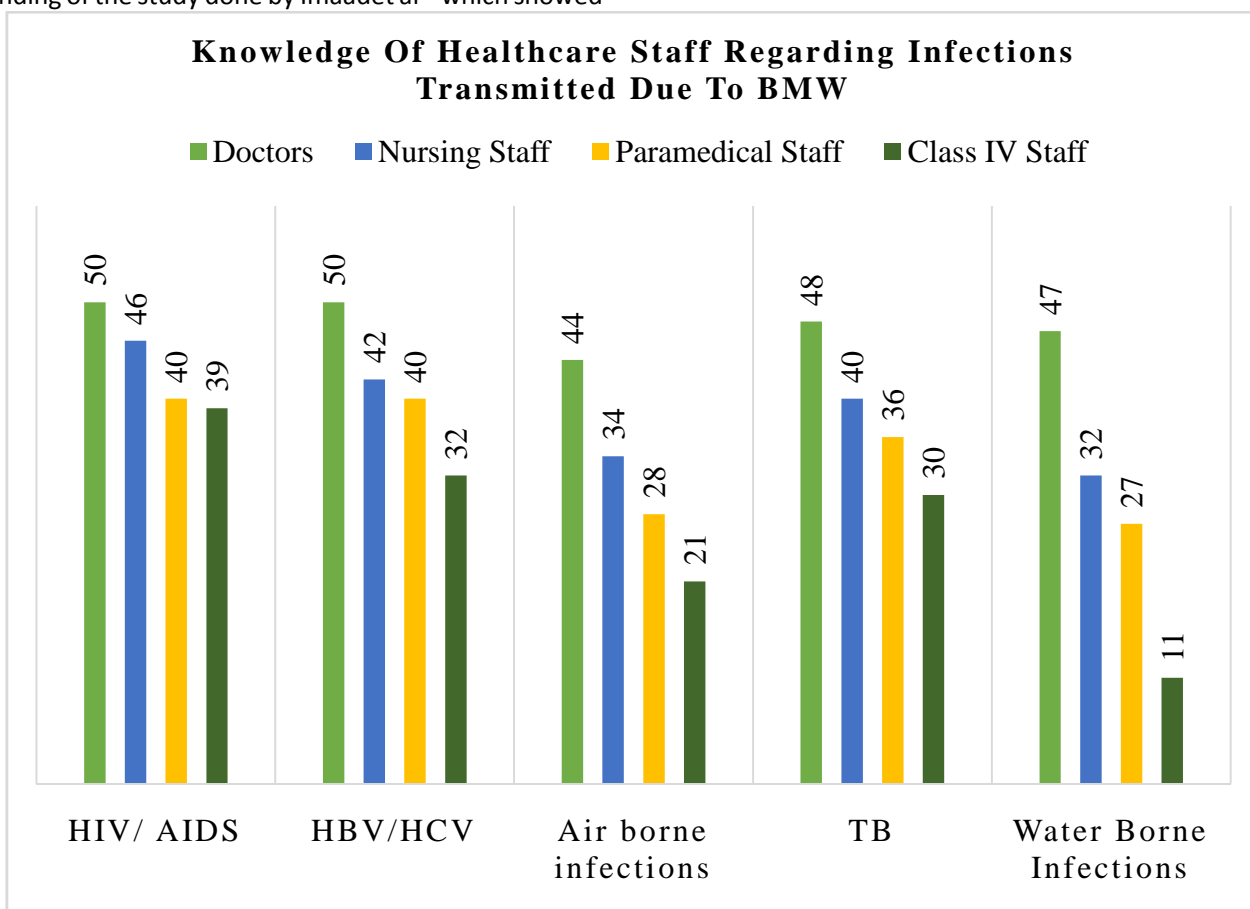

Knowledge Of Healthcare Staff Regarding Infections Transmitted Due To BMW

Figure 1.*Multiple responses) (In numbers)

As far as the understanding of the type of waste and the colour coded bag for its segregation is concerned, it was found that doctors had an edge over nursing staff and paramedical staff with respect to this and overall class IV staff had the least awareness. Our observations were in solace with those in the studies done by Gupta et al[18], Malini et al[15] and Mathur et al.[8]

Majority of the health care personnel considered it their responsibility to manage biomedical waste. However, the nursing staff (84%), paramedical staff (88%) and the class IV staff (92%) deemed biomedical waste management as an additional burden on their work unlike the doctors. These findings abided with the findings of the studies by Malini et al[15] and Gupta et al[18].

It was quite satisfactory to discern that majority of healthcare personnel in all groups disposed sharp waste in puncture proof containers. However, many among the paramedical staff (66%, 60%) and class IV staff (24%, 16%) recapped the used needle and did not use hub cutter for discarding the used needles respectively. Malini et al[15] and Gupta et al[18] also made similar observations in their studies.

86% doctors and 80% nursing staff were found to be vaccinated for Hepatitis B. In comparison, only 54% paramedical staff and 10% class IV staff were found vaccinated against Hepatitis B. Similar findings were quoted in the studies done by Ismail et al[17], Malini et al[15] and Gupta et al[18].

Conclusion and Recommendations

Concluding from the results, the importance of training regarding biomedical waste management cannot be overemphasized; lack of proper and complete knowledge about biomedical waste management impacts practices of appropriate waste disposal.

Following recommendations are proposed: (i) strict implementation of biomedical waste management rules, (ii**)** compulsory training of healthcare personnel from accredited training centres on a continuous basis (iii) training of sanitary staff, and (iv) it should be ensured that the injuries happening to the healthcare personnel are reported to the person in-charge of biomedical waste management or to the biomedical waste management committee, and they report it in the prescribed format to the pollution control board.

Conflict of Interest: Nil

References

1. Neupane S. Legal service network and law resources portal, biomedical waste management in hospitals. Legal India [Internet]. [Cited 2016 September 2] Available From: http://www.legalindia.in/bio-medical-waste-management-in hospitals.

2. Biomedical Waste (Management & Handling) Rules, 1998, Extraordinary, Part II, Section 3, Subsection (ii), The Gazette of India, No. 460, 27 July 1998 [Internet]. [Cited 2016 September 3] Available from: http://envfor.nic.in/legis/hsm/so593e.pdf.

3. Waste from healthcare activities, Fact Sheet. [Internet]. November 2011. [Cited 2016 September 2] Available from: http://www.who.int/mediacentre/factsheets/ fs253/en/.

4. Patil AD, Shekdar AV. Healthcare waste management in India. J Environ Manage. 2001; 63: 211-20.

5. Kishore J, Ingle GK. Biomedical Waste Management in India. New Delhi: Century Publications; 2004.

6. Hazardous Wastes (Management and Handling) Rules. Ministry of Environment & Forests, Govt. of India, New Delhi. [Internet] 1989 [cited 2016 September 5]. Available from: http://envfor.nic.in/legis/hsm/hsm1.html.

7. Municipal Solid Wastes (Management and Handling) Rules. Ministry of Environment and Forests, Govt. of India, New Delhi. [Internet] 2000 [cited 2016 September 5]. Available from: http://www.moef.nic.in/legis/hsm/mswmhr.html.

8. Mathur V, Dwivedi S, Hassan MA, Mishra RP. Knowledge, attitude and practice about biomedical waste management among healthcare personnel: A cross-sectional study. Indian J Community Med 2011; 36:143-5.

9. Bansal M, Mishra A, Gautam P, Changulani R, Srivastava D, Gour NS. Biomedical waste management, awareness and practices in a district of Madhya Pradesh. Natl J Community Med 2011; 2(3):452-7.

10. Pandit NB, Mehta HK, Kartha GP, Choudhary SK. Management of bio-medical waste: Awareness and practices in a district of Gujarat. Indian J Public Health 2005; 4:245-7.

11. Saini S, Nagarajan SS, Sarma RK. Knowledge, attitude and practices of bio-medical waste management amongst staff of a tertiary level hospital in India. Journal of the Academy of Hospital Administration 2012; 17(2):1-12.

12. Rawar R, Kumar S, Leela M. Knowledge, attitude and practice regarding biomedical waste management amongst health care personnel in a medical college hospital in Trivandrum. Natl J Community Med 2016; 7(6):457-460.

13. Mathur P, Patan S, Shobhawat AS. Need of biomedical waste management system in hospitals - An emerging issue - A review. Curr. World Environ 2012; 7(1): 117-24.

14. Central Pollution Control Board. Environmental standard and guidelines for management of hospital waste. CPCB, Ministry of Environment and Forest, New Delhi. 1996 [Internet]. [Cited 2016 September 6] Available from: http://www.cpcb.nic.in/NewItem_19_PollutionControlLaw.pdf.

15. Mailini A, Eshwar B. Knowledge, attitude and practice of biomedical waste management among health care personnel in a tertiary care hospital in Puducherry. Int J Biomed Res 2015; 6(03): 172-176.

16. Sharma A, Sharma V, Sharma S, Singh P. Awareness of biomedical waste management among health care personnel in Jaipur, India. Oral Health and Dental Management. 2013; 12(1):32-40.

17. Ismail IM, Kulkarni AG, Kamble SV, Borker SA, Rekha R, Amruth M. Knowledge, attitude and practice about bio-medical waste management among personnel of a tertiary health care institute in Dakshina Kannada, Karnataka. Al Ameen J Med Sci 2013; 6 (4): 376-380.

18. Gupta NK, Shukla M, Tyagi S. Knowledge, attitude and practices of biomedical waste management among health care personnel in selected primary health care centres in Lucknow. Int J Community Med Public Health. 2016 Jan; 3(1):309-313.