

Research Article



Knowledge, Attitude, and Practice of Health Care Workers in Management of Bio-Medical Waste – A Cross-Sectional Study

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ABSTRACT

Background: Management of Bio-Medical Waste involves a great concern. Therefore, awareness of Health-Care Workers (HCWs) becomes very important as improper management leads to injuries and the spread of infection to the staff, patients, and environment. The objective is to assess the Knowledge, Attitude, and Practice (KAP) among Health Care Professionals regarding Bio-Medical Waste Management (BMWM).

Method: This cross-sectional survey was conducted among HCWs at GMC Jammu, India. Study participants were divided into III groups (Group I- 32 Doctors, group II- 48 Paramedical staff including nurses & laboratory technicians, and group III- 20 sanitary workers). Data was collected using a pre-designed questionnaire regarding BMWM and scored as good, average, and poor.

Results: In our study, knowledge regarding symbols of BMWM and awareness regarding categories and segregation of BMW was good in I and II groups but averaged in group III. None in group III has attended CME regarding BMWM in the past. In contrast, this percentage was 61% in group II and 31% in group I. Regarding the capping and destroying of needles, 88% of Paramedics were doing it correctly. None of the class IV employees received the booster dose of HBV vaccination.

Conclusion: Knowledge regarding BMWM was average in Group I and Group II, whereas Group III had the slightest knowledge. Attitude regarding the BMW was good in the case of groups I and II, Whereas Group III scored average. Practices were scored average in Group I, good in Group II, and poor in group III.

Keywords: KAP studies; Bio-Medical Waste; Health Care Professionals

INTRODUCTION

Bio-Medical Waste (BMW) is any waste generated during the diagnosis, treatment, or immunization of human beings or animals, research activities, or in the production or testing of biological or health camps (1). This type of waste which has the potential to harm the environment or fitness of a person, is regarded as infectious, and this waste has to be managed as per BMW Rules, 2016 (2), which was further amended in 2018 (3), 2019 (4). It is estimated that out of the total waste generated in healthcare sectors, 85% is nonhazardous, and 15% is bio-hazardous waste. The hazardous part of the waste poses physical, chemical, and/or microbiological risks to the general population and healthcare workers associated with handling, treating, and disposing of waste (5). The waste generation rate ranges from 0.5 to 2.0 kg/bed/day (6).

Waste includes the materials mixed with the patient's blood, secretions, infected anatomical parts, biological liquids such as chemicals, medical supplies, medicines, lab discharge, sharps, metallic and glassware, plastics, etc. Segregation, collection, in-house transportation, pre-treatment of waste, and storage of waste, before such waste is collected by Common Bio-medical Waste Treatment Facility (CBWTF) Operator becomes very important after waste generation. Therefore, the understanding of waste handling needs to be known, understood, and practiced by each staff category according to the updated guidelines (2)(3)(4).

Due to its potential to spread the infection to patients, attendants, nursing, paramedical staff, and doctors, its effects extend beyond medical establishments' boundaries to the general population and environment (7). And its application became indispensable during the pandemic times like COVID-19, where strict awareness and management of BMW are required to halt the spread of infection to the patients, staff, and environment.

Research on this critical issue has been minimal; therefore, there is an urgent need for planning and policy decisions in the future on this matter (8). With the above objective in mind, this study was performed to assess the Knowledge, Attitude, and Practice (KAP) regarding the BMW among the HCWs working in Government Medical College, Jammu, so that policies can be made in the hospital to curb its lack if it is present in any form.

METHOD

This cross-sectional survey was conducted by the Department of Microbiology, Government Medical College, Jammu, Jammu and Kashmir on 100 HCW comprised of 32 Doctors, 48 Paramedical staff (including Technicians and Nurses), 20 Class IV, i.e., Sanitary staff working in the institute dealing with biomedical waste. Health Care Workers (HCWs) willing to participate and relatively free during that session were selected randomly and included in the study. Three determinants, Knowledge, Attitude, and Practices, were assessed using a pre-designed questionnaire containing 18 questions, eight on Knowledge and six on Attitude, and four on practice. Sanitary staff was asked questions in their native language. The participants were told to return the questionnaire after filling it out immediately. Confidentiality of the participants was maintained in every step. The data was compiled on an excel sheet. Each correct response was given one mark. The percentage of the score

was calculated for total correct answers, and then their average rate was categorized as good, average, and poor performance (0-25% poor, 26-75% average, and above 76% as good). The Ethical Committee granted permission, and informed consent was taken from all study participants.

RESULTS

Study participants were divided into III groups (group I–32 Doctors, group II–48 Paramedical staff including nurses and laboratory technicians, and group III–20 sanitary workers) belonging to our Institution. Group I and II were distributed pamphlets, whereas group III was asked questions verbally. Results were compiled in a tabular form on an excel sheet. Knowledge, Attitude and Practice among the groups are presented in Table 1, 2 and 3, respectively.

Table 1. Knowledge of Health Care Professionals of BMWM

| Variable | Group I (n = 32) | Group II (n = 48) | Group III (n = 20) |
|--|---------------------|----------------------|-----------------------|
| Knowledge about Biomedical Waste generation | 8 (25%) | 10 (21%) | 0 |
| Knowledge of bio-medical waste symbols | 26 (82%) | 40 (84%) | 7 (20%) |
| Knowledge of categories of BMW | 27 (85%) | 39 (82%) | 13 (65%) |
| Masks (N95, surgical) disposal | 24 (75%) | 32 (67%) | 10 (50%) |
| Sharp disposal method | 16 (50%) | 40 (84%) | 6 (30%) |
| Time for storing biomedical waste | 8 (25%) | 2 (5%) | 1 (5%) |
| Ideas on cleaning of blood spillage | 10 (32%) | 8 (17%) | 0 |
| Percentage of hypochlorite for disinfection of glassware | 4 (13%) | 1 (3%) | 0 |

Table 2. Attitude of Health Care Professionals of BMWM

| Variable | Group I (n = 32) | Group II (n = 48) | Group III (n = 20) |
|---|---------------------|----------------------|-----------------------|
| BMWM adds to your work burden (yes) | 2 (7%) | 4 (9%) | 5 (25%) |
| BMWM is teamwork (yes) | 32 (100%) | 48 (100%) | 20 (100%) |
| Have you attended any CME regarding BMWM in the past (yes) | 10 (31%) | 29 (61%) | 0 (0%) |
| Is there any need for further training on Biomedical Waste Management (yes) | 32 (100%) | 46 (96%) | 20 (100%) |
| Will you inform to sanitary staff to transport waste once the bag is full (yes) | 24 (75%) | 46 (96%) | 20 (100%) |
| Will you advise your sub-ordinates to adopt color coding for waste disposal (yes) | 32 (100%) | 46 (96%) | 7 (35%) |

Table 3. Practice of Health Care Professionals of BMWM

| Variable | Group I (n=32) | Group II (n=48) | Group III (n=20) |
|--|-------------------|--------------------|---------------------|
| The practice of capping the needles and using a needle destroyer | 2 (7%) | 48 (100%) | 0 |
| Vaccinated against Hepatitis B virus booster dose | 10 (32%) | 24 (50%) | 0 |
| Practicing hand hygiene in between every activity | 32 (100%) | 48 (100%) | 2(10%) |
| Reporting of accidental needle stick injury | 22 (69%) | 46 (96%) | 1(5%) |

DISCUSSION

Using the three determinants, the management of BMW was analyzed. Knowledge regarding the legislature of BMW was found to be poor in all groups, which correlated with the study of Bala *et al.* (9). The knowledge of BMW symbols was found to be good in the case of doctors (82%) and nurses (84%) as compared to sweepers (20%). Similar findings were reported in a study by Sharma K *et al.* (10), where 70% of the doctors answered correctly. In our research, awareness regarding categories and segregation of BMW was pretty good in all groups. 75% of doctors, 67% of paramedics, and 50% of Class IV knew about the disposal of different types of masks in a yellow bag and the knowledge of sharp disposal; 50% of doctors and 84% of paramedics knew that the needles should be destroyed by needle cutter and syringes have to be discarded in white bags, this finding was in correlation with the study of Sharma K *et al.*(10). Majority of our participants didn't have an idea that BMWs should not be stored beyond 48 hours, which was consistent with the findings by Malini *et al.* (11). Also, the knowledge regarding the cleaning of Blood spills by 10% Sodium Hypochlorite and Disinfection of Glasswares was poor in all groups, also observed in the study of Sharma K *et al.* (10). This finding can be attributed to the fewer numbers of departmental lectures or CME on BMWM.

The attitude was very positive in all the groups regarding BMWM. The majority of different categories of HCW feel that BMWM is teamwork. It did not create an extra burden on their work, a similar finding by Malini *et al.* (11). None in group III has attended CME regarding BMWM in the past, whereas this percentage was 61% in group II and 31% in group I. The study conducted by Ananthachari KR *et al.*, Srivastav S, and Dudi M *et al.* (12)(13)(14) have shown that 28%, 30%, and 37% of their participants had attended BMWM training, respectively. Therefore, for this reason, every group favored enhancing their knowledge, and they are ready to give their 100% attendance on BMW trainings in the future. This finding was similar to the studies by Sharma K *et al.* (10) and Sood *et al.*(15), in which they also concluded that health care staff wanted to attend more training programs. They were also very enthusiastic about informing their sanitary inspector once the bag was full. The motivation to teach the junior staff to follow the BMWM rule was higher in group II, followed by group I. Still, group III was slightly hesitant, which can be because they had the slightest knowledge about the gravity of the situation. They were never taught the same. During the pandemic of COVID-19, the commitment to learn more was tested when we conducted

different sessions like CME and seminars on wearing and discarding PPE and maintaining hand hygiene. We recorded 100% attendance in other groups.

BMWM Practices were poor in group IV and average in the case of doctors. Paramedics were following the rules religiously. Regarding the capping and destroying of needles, 88% of Paramedics were doing it correctly. The result can be attributed to the activity being restricted to the nursing staff only. This is similar to the study of Sharma K *et al.* (10), where 80% of paramedics discarded needles by needle cutter. But in a survey by Nirupama N *et al.*(16), 100% of paramedics performed this activity correctly on a routine basis. Only 32% of doctors were vaccinated against Hepatitis B Virus (HBV) booster dose, which is low. This contrasts with Soyam GC *et al.* (17)and Vincent S *et al.*(18), whose percentage was 64.5% and 85.7%, respectively. None of the class IV employees received the booster dose of HBV vaccination. Injury reporting due to needle sticks was high among groups I and II, similar to the Mathur *et al.* (19) study, where approximately 60% of doctors reported injury due to harps. Our study showed good hand hygiene practices in between the activity in groups I and II as compared to group III, which correlated with the study of Sharma K *et al.* (10). Our study showed that sanitary staff had poor KAP values among all groups of health care workers which is similar to the findings of Madhukumar S *et al.* (20).

CONCLUSION

To conclude, it is seen that Knowledge regarding BMWM was found to be average in Group I and Group II, whereas Group III had the slightest knowledge. Attitude regarding the BMW was good in the case of groups I and II, Whereas Group III scored average. Practices were scored average in Group I, good in Group II, and poor in group III, and they are needed to be educated in all spheres of BMWM. It was observed that knowledge regarding Hospital control practices like cleaning blood spillage and glasswares requires the focus for which everyone was in favor of attending the regular trainings. So Continued Medical Education should be held at regular intervals, hands-on training programs should be held to train all the HCWs, and sessions including raising questions and problem solving should be arranged. Further Booster of HBV dose should be given to all concerned HCWs to avoid its risk of exposure.

Authors' contribution

PS did the research design and manuscript. SP did the data collection. RR and SS did the analysis.

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Conflict of interest

There is no conflict of interest in this research.

REFERENCES

1. National guidelines on hospital waste management based on the bio-medical waste management and handling rules 1998. Bio-Medical Waste (Management and Handling) Rules. In: Government of India, Ministry of Health and Family Welfare. 1998. p. 225–30.
2. Bio Medical Waste Management (Principal) Rules 2016. Government of India Ministry of Environment, Forest and Climate Change, 2016.
3. BMW (Amendment) rules 2018. Government of India Ministry of Environment, Forest and Climate Change. Notif New Delhi, 16th March, 2018.
4. BMW (Amendment) rules 2019. Government of India Ministry of Environment, Forest and Climate Change. Notif New Delhi, Feb, May 2019.
5. Li CS JF. Physical and chemical composition of hospital waste. *Infect Control Hosp Epidemiol*. 1993;14(3):145–50.
6. Anand P, Jain R DA. Knowledge, attitude and practice of biomedical waste management among health care personnel in a teaching institution in Haryana, India. *Int J Res Med Sci*. 2016;4:4246–50.
7. Nosheen Arshad., Nayyar S., Amin F. MK. Pharm. Hospital Waste Disposal. *A Rev Artic Sci Res*. 2011;3(8):1412–9.
8. Vincent S, Pablo B MN. Management of chronic hepatitis B and C in HIV-coinfected patients. *J Antimicrob Chemother*. 2006;57(5):815–5.
9. Bala S NA. Awareness of bio-medical waste management among hospital and dental college and hospital employees. *A Panoramic View. J Oral Heal Comm Dent*. 2013;7:1–7.
10. Sharma K KM and IQ. A Study on the Knowledge, Attitude and Practice of Bio-medical Waste Management among Health Care Professionals from a Rural Medical College in North India. *IntJCurrMicrobiolAppSci*. 2019;8(12):1238–43.
11. Malini A EB. Knowledge, attitude and practice of biomedical waste management among health care personnel in a tertiary care hospital in Puducherry. *Intern J Biomed Res*. 2015;6(3):172–6.
12. Ananthachari KR DC. A study on assessment of knowledge on biomedical waste management among health care workers of tertiary care hospital. *Int J Community Med Public Heal*. 2016;3:2409–13.
13. Srivastav S, Kariwal P, Singh AK SV. Evaluation of biomedical waste management practices in multi-speciality tertiary hospital. *Indian J Community Heal*. 2009;21:46–50.
14. Dudi M, Sharma R, Sharma S JM. Assessment of the knowledge, attitude and practices regarding biomedical waste management amongst paramedical staff in a tertiary level health care facility. *Int J Med Sci Public Heal*. 2016;5:615–9.
15. Sood AG SA. Dental perspective on biomedical waste and mercury management: A knowledge, attitude, and practice survey. *Ind J Dent Res*. 2011;22:371–5.
16. Nirupama N, Shafee M, Jogdand GS RC. Knowledge, Attitude & Practices Regarding Biomedical Waste Management. *IJCM Inst Med Sci Karimnagar, Andhrapradesh*. 2010;35(2):369–70.
17. Soyam GC, Hiwarkar PA, Kawalkar UG, Soyam VC GV. KAP study of bio-medical waste management among health care workers in Delhi. *Int J Community Med Public Heal*. 2017;4:3332–327.
18. Vincent S, Pablo B MN. Management of chronic hepatitis B and C in HIV-coinfected patients. *J Antimicrob Chemother*. 2006;57(5):815–8.
19. Mathur V, Dwivedi S, Hassan MA MR. Knowledge, attitude, and practices about biomedical waste management among healthcare personnel: A cross-sectional study. *Indian J Comm Med*. 2011;36:143.
20. Madhukumar S RG. Study about awareness and practice about health care waste management among hospital staffs in a Medical College Hospital, Bangalore. *Int J Basic Med Sci*. 2012;3:8–9.