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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

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A B S T R A C T

Bio-medical waste management is a matter of great concern. Health-care workers in our country are not fully aware of the various practices of waste management leading to injuries and spread of infection to the patients, staff and environment. This cross sectional study was conducted among HCWs working at GMC, Rajouri, J&K, India. A pre-designed questionnaire was used for data collection regarding BMW management. A total of 90 HCWs participated. 48 (53.33 %) were aware that BMW Rules were first proposed in 1998. 74 (82.22%) opined that infected cotton pads and dressings should be disposed in yellow bags. 20 (22.22%) knew that maximum time limit for storage of BMW was 48 hrs. Nurses had better knowledge as compared to doctors and technicians. Need for regular training programs to improve practices of proper waste disposal in hospital settings.

Introduction

According to Bio- Medical Waste (Management and Handling) Rules, 1998 of India, "Bio-medical waste (BMW) "means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research or in the production or testing of biological products. With the considerable growth of health-care facilities both in government and private sector in our country, the amount of bio-medical waste generated is also increasing.

It is estimated that of the total waste generated in health-care sectors, 85% of waste is non-hazardous and 15% is bio-hazardous waste. On an average about 0.33 million tons of hospital waste is generated in India annually

and the waste generation rate ranges from 0.5 to 2.0 kg/bed/day.[1] Bio-hazardous waste generated in the hospitals include human anatomical waste, dressing material, cotton pads, waste sharps, intravenous sets, catheters, cannula, broken glass, ampoules, vials, drugs, chemicals.[2]

Hospital waste management is a matter of great concern for every hospital. It is due to its potential to spread infection to patients, attendants, nursing, paramedical staff, doctors and extending beyond boundaries of medical establishments to general population and environment.[3]

Many pathogens have been documented to be transmitted during BMW handling and segregation and disposal of which, Human Immunodeficiency Virus (HIV), hepatitis B Virus (HBV), hepatitis C Virus (HCV) are often implicated.[2]

With the implementation of BMW (Management and Handling) rule 1998 every health care provider should have awareness about the proper collection, segregation and disposal of BMW for a safe waste management program. With this objective in mind, the present study was conducted to assess the knowledge, attitude and practice regarding BMW management among the Health Care Professionals working in Govt. Medical College, Rajouri.

Materials and Methods

This was an observational, descriptive, cross-sectional study conducted by the Department of Microbiology, Government Medical College, Rajouri, Jammu and Kashmir.

This institute is a tertiary care centre serving not only Rajouri district but also the other adjoining districts of Poonch and Reasi. The study was conducted in the months of July-August, 2019. The study participants comprised of health care professionals who included doctors, technicians and nurses working in the institute dealing with bio-medical waste.

An informed consent was taken from the participants. For data collection, a pre-designed questionnaire which comprised of 25 questions regarding the awareness and practice of Bio-medical waste was distributed among the health care-professionals from various departments. The questions were grouped into 5 headings: (a) legislature (b) categories and segregation (c) treatment and disposal (d) health-hazards (e) attitude-assessment. The participants were instructed to immediately return the questionnaire after filling.

Confidentiality of the participants was maintained. The data was analyzed using Statistical Package for Social Sciences (SPSS) version 15.0. The percentage of correct and incorrect answers for each question from all the participants was obtained.

Results and Discussion

A total of 90 healthcare professionals (40 doctors, 30 nurses and 20 technicians) took part in the study. Questions regarding the legislature of bio-medical waste showed that 48 (53.33 %) of the responders were aware that Bio-Medical Waste (Management and Handling Rules) were first proposed in 1998 and 26 (28.88 %) knew that latest amendments were made in 2018. 38 (42.22%) of the healthcare professionals were aware that pollution control board regulates biomedical waste management and handling practices, of which 20 (52.63 %) were doctors, 12 (31.5%) were nurses and 6 (15.78%) were technicians. Only 4 (4.44%) were of the opinion that any plastic bag can be used for waste disposal (Table 1).

30 (75%) doctors, 20 (66.6%) nurses, 14 (70%) technicians answered correctly that there were 4 categories of bio-medical waste. Overall amongst the total HCWs 74 (82.22%) opined that infected cotton pads and dressings should be disposed in yellow bags and 65 (72.22%) knew that I/V sets, cannula, Ryle Tubes and urine bags should be disposed in red bags. 60 (66.6%) responded correctly that objects capable of causing puncture and cuts have to be disposed in white bags of which 28 (46.66%) were doctors, 21 (35%) were nurses and 11 (18.33%) were technicians.

Also 72 (61.1%) of the responders knew that broken glassware, vials, ampoules should be discarded in blue bags (Figure 1).

Knowledge regarding disposal and treatment was poor among the healthcare professionals. Only 20 (22.22%) knew that maximum time limit for storage of BMW was 48 hrs of which 12 (30%) were doctors. 25 (27.77%) answered correctly that glassware should be soaked in 1-2% of sodium hypochlorite solution for disinfection of which 4 (10%) doctors, 18 (60%) nurses and 3 (15%) technicians opined correctly. 50 (55.55%) responders knew that the needles should be destroyed by needle cutter and syringes have to be discarded in white bags of which 30 (60%) were nurses (Table 2).

Majority of the responders had good knowledge about the health-hazards of bio-medical waste. 72 (80%) correctly opined that Hep B, HIV and tuberculosis can be transmitted during collection, segregation, transport and disposal of bio-medical waste. 79 (87.77%) of the healthcare personals had been vaccinated against Hepatitis B of which 38 (48.10%) were doctors, 27 (34.17%) were nurses and 18 (22.78%) were technicians.

Table 3 shows the attitude- assessment of the responders. 4 (4.44%) of the responders believed that BMW management was a financial burden on hospitals. 86 (95.55%) responded that their knowledge about BMW was inadequate of which 38 (44.18%) were doctors, 29 (33.72%) were nurses and 19 (22.09%) were technicians. 90 (100%) responded positively to attend voluntarily program that enhance and upgrade their knowledge about waste management.

Health care sector has a major responsibility towards public and environmental health. The concern regarding the proper bio-medical waste management has greatly increased globally over the past few years and significant efforts have been directed towards safe disposal of hazardous waste in health-care sectors. Health-care workers play a significant role in appropriate collection, segregation and treatment of BMW. With this in mind, the study was conducted to assess the knowledge and practice of health care professionals working in our institution with regard to BMW management.

Analyzing the knowledge regarding the legislature of BMW it was found to be better in doctors as compared to nurses and technicians. 20 (50%) were aware that Bio-Medical Waste (Management and Handling Rules) were 1st proposed in 1998 and 28 (70%) could recognize the universal symbol of bio-hazard. Similar findings were reported in study conducted by Anand P *et al.,*[1] where 85 (70.8%) of the doctors answered correctly.

In our study, awareness regarding categories and segregation was fairly good among the responders. The findings were in contrast to study conducted by Madhukumar *et al.,*[4] where only 3% of the participants knew about categories of BMW. Our study showed poor knowledge of practices regarding disposal and treatment of BMW which is a matter of concern. This was in concordance with study conducted by Pullishery *et al.,*[5].

Table.1 Knowledge of health care personnel regarding legislature of bio-medical waste

	Doctor (N=40)	Nurse (N=30)	Technician (N=20)	Total (N=90)
Aware of BMW generation in our hospital	40 (100%)	30 (100%)	20 (100%)	90 (100%)
1st proposal of BMW management rules-1998	20 (50%)	16 (53.33%)	12 (60%)	48 (53.33%)
Latest amendments of BMW regulations	10 (25%)	10 (33.33%)	6 (30%)	26 (28.88%)
Any plastic bag used for waste disposal	40 (100%)	28 (93.33%)	18 (90%)	86 (95.55%)
Universal Symbol of biohazard	28 (70%)	18 (60%)	12 (60%)	58 (64.44%)
Authority regulating Safe disposal of BMW	20 (50%)	12 (40%)	6 (30%)	38 (42.22%)

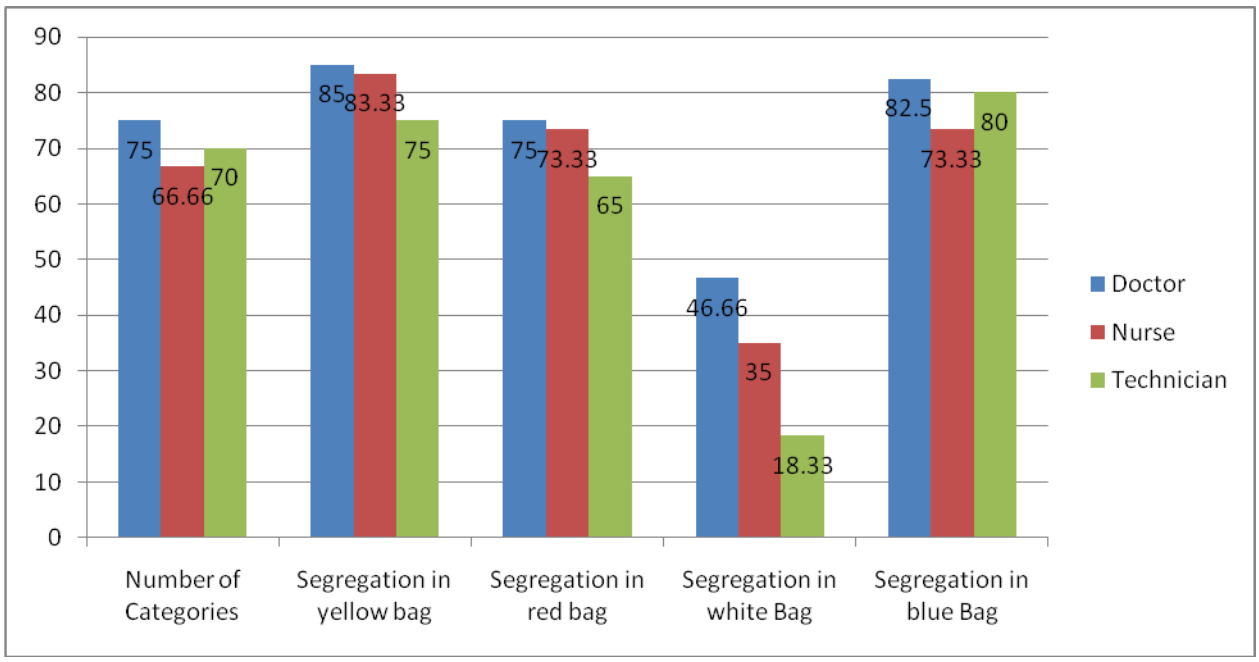
Table.2 Practice regarding disposal and treatment of bio-medical waste

	Doctor (N=40)	Nurse (N=30)	Technician (N=20)	Total (N=90)
Max. BMW storage duration	12 (30%)	6 (20%)	4 (20%)	20(22.22%)
Min. contact time with Sod. hypochlorite soln.	15(37.5%)	12 (40%)	7 (35%)	34(37.77%)
% age of Sod. hypochlorite soln. for disinfection of glassware	4 (10%)	18 (60%)	3 (15%)	25(27.77%)
Cleaning of Blood spillage	8 (20%)	9 (30%)	4 (20%)	21(23.3%)
Discarding of Broken thermometer	10 (25%)	8 (26.66%)	5 (25%)	23(25.5%)
Disposal of syringes with needles	16 (40%)	24(80%)	10 (50%)	50 (55.5%)
Autoclaving of infectious waste before shredding and disposal	28 (70%)	20 (66.66%)	12 (60%)	60(66.6%)

Table.3 Attitude of health care professionals regarding Bio-medical Waste Management

	Doctor (N=40)	Nurse (N=30)	Technician (N=20)	Total (N=90)
BMW management is a team effort	40(100%)	30 (100%)	20 (100%)	90 (100%)
BMW management is a financial burden on hospitals	0 (0%)	2 (6.66%)	2 (10%)	4 (4.44%)
Knowledge about BMW management is inadequate	38 (95%)	29 (96.66%)	19 (95%)	86 (95.5%)
Like to attend voluntarily program and upgrade knowledge	40(100%)	30 (100%)	20 (100%)	90 (100%)

Fig.1 Percentage of awareness regarding categories and segregation of bio-medical waste



Only 8 (20%) doctors, 9 (30%) nurses, 4 (20%) technicians knew that 10% sodium hypochloride should be used for disinfection of blood spillage. Lack of knowledge regarding the waste management practices could be the reason for improper methods and practices by the employee.

79 (87.77%) of the health care staff had been vaccinated against Hep B in our study which was higher than studies conducted by Ananthachari *et al.*,[2] (70.7%) and Kumar *et al.*,[6] (69%). Attitude of health-care staff towards BMW management was found to be positive. It was encouraging to see that HCWs wanted to upgrade their knowledge on BMW management. This was similar to studies conducted by Sood *et al.*,[7] and Sanjeev *et al.*,[8] in which the health care staff wanted to attend training programmes.

It was concluded in the present study that although attitude regarding BMW management was high amongst our health care professionals, knowledge and practice was found to be poor. Overall, the nursing staff had better knowledge regarding categories, segregation and treatment of bio-medical waste as compared to doctors and technicians. It was observed that there was a need of regular training programs of hospital staff in order to improve the practices of proper waste disposal. BMW management rules should be implemented at all levels. BMW segregation posters highlighting the various categories of waste should be put up in all wards and OPDs. Staff should be made aware about the various health-hazards related to BMW. Administration should keep a check on the timely immunization of staff.

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