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KNOWLEDGE, AWARENESS AND PRACTICE OF BIOMEDICAL WASTE MANAGEMENT GUIDELINES 2016 AMONG HEALTHCARE PERSONNEL IN A TERTIARY CARE HOSPITAL, RAJASTHAN, INDIA

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Abstract

Introduction: Bio-medical waste" (BMW)is a term which 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 including the categories mentioned in Schedule I appended to these rules1.BMWM rules were made in 1998, and revised in 2016 which includes 18 rules ,04 schedules and 05 forms, in our hospital, health care personnel too needed to reinforce the revised BMWM 2016 guidelines. Our aim of this study is to determine the existing knowledge, awareness and practice about the BMWM rules 2016 in this tertiary care hospital.

Material and Method: This study was an cross-sectional study conducted with a duration of 3 months from October 2018 to January 2019 in a tertiary care hospital, Rajasthan, India. A total of 150 healthcare personnel which include 75 doctors (36 senior residents and 39 junior residents), 40 nurses and 35 laboratory technicians consented for interview and observations.

Result: We found out that technicians (89.95%) and nurses (88.87%) have more knowledge regarding BMWM then doctors(85.82%). But doctors (82.20%) are more aware for proper management than nurses (73.80%) and technicians (64.0%). Doctors(80.87%) and nurses (82%) are practicing these norms more than technicians(59%).

Conclusion: This study shows that Doctors, nurses and laboratory technicians all had knowledge and awareness regarding revision of biomedical waste management rules in 2016, but laboratory technicians are lagging in practicing them. Strong implementations of rules should be followed in institution and regular training should be held for staff.

Keywords: BMWM (bio medical waste management), knowledge, awareness, practice, healthcare workers.

Introduction

Bio-medical waste" (BMW) is a term which 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 including the categories mentioned in Schedule I appended to these rules[1]. Central population control board, State population control board and Ministry of State(IC) environment, Forest and Climate Change advised to follow and reinforce Bio medical waste management rules because of the menace created by improper disposal of health care waste, emissions of furans, dioxans etc and emergence of multi drug resistant organisms[2]. Inadequate and inappropriate knowledge of handling of healthcare waste may have serious health consequences and a significant impact on the environment as well. Whenever waste generated, a safe and reliable method for handling of biomedical waste is essential. Effective management of biomedical waste is not only a legal necessity but a social responsibility. Taking cognizance of inappropriate BMW management, Ministry of Environment and Forests notified the 'BMW (management and handling) Rules, 1998' in July 1998. BMW Management Rules have thereafter undergone timely revisions to meet the prevailing needs. Till date, four amendments have been made in 2000, 2003 and 2011 with these latest guidelines coming into force from 28th March 2016

BMWM rules were made in 1998, and revised in 2016 which includes 18 rules, 04 schedules and 05 forms, in our hospital, health care personnel too needed to reinforce the revised BMWM 2016 guidelines.

Emphasis of cleanliness and systemic disposal of wastes including hospital waste is aimed by Government of India with a goal to make India "cleaner and greener" and make environment better, this mission is launched as "Swachh Bharat Abhiyan".

This study was conducted in tertiary care hospital with the aim to assess the knowledge, awareness and practice of doctors, nursing staff and technicians regarding BMWM rules of 2016 and its management (segregation, color coding etc.) that may help the authorities of hospital and society to develop strategies for improving situation in future.

1998	2016
Occupiers with more than 1000 beds required to obtain authorisation	It is now mandatory for all the healthcare facilities generating BMW including health camp or AYUSH to obtain authorisation
Operator duties are not listed	Duties of the operator have been listed
BMW was divided into ten categories (reduced to eight categories in 2011 guidelines)	BMW is divided into four categories
No format for annual report (format for annual report included in 2011 guidelines)	A format for annual report has been appended with the rules
Schedule present were I, II, III, IV, V, VI	Change of Schedule to I, II, III, IV [Table 2]
Forms I, II, III, IV, V (VI form was included in 2011 guidelines)	Forms I, II, III, IV, V [Table 3]
Chemical pre-treatment was with 1% sodium hypochlorite	Chemical pre-treatment with 10% sodium hypochlorite
The minimum limit for the release of carcinogenic dioxins and furans have not been specified	The minimum limit of carcinogenic dioxins and furans released from incinerator has been clearly specified
Outsourcing of BMW was not mandatory	Outsourcing is strongly recommended (if treatment facility is located within 75 km of radius from hospital)
The methods of disposal are incineration/autoclaving/microwaving/ mutilation/shredding	The newer methods introduced apart from those of 1998 are plasma pyrolysis/hydrolysis/encapsulation/inertisation
Cytotoxic drugs to be discarded in black colour bag	Cytotoxic drugs to be discarded in yellow bag
Chemical solid waste to be discarded in black bag	Chemical solid waste to be discarded in yellow bag
Waste sharp/metal sharp are to be discarded in blue/white bag	Waste sharp/metal sharp are to be discarded in transparent puncture proof box
Metallic body implants are to be discarded in blue/white bag	Metallic body implants are to be discarded in transparent puncture proof box
Majority of the BMW rules were for discarding the waste	Majority of the waste disposal rules are directed for recycling the waste

BMW: Biomedical waste

Material and method

This study was a cross-sectional study conducted with a duration of 3 months from October 2018 to January 2019 in a tertiary care hospital, Rajasthan, India. Study participants were working in different departments of hospital and were at different level of healthcare providers such as doctors, nursing staff and laboratory technicians. A total of 150 healthcare personnel which include 75 doctors (36 senior residents and 39 junior residents), 40 nurses and 35 laboratory technicians consented for interview and observations. These interviews and observations were conducted on a predesigned questionnaire containing a set of questions pertaining to biomedical waste management rules 2016 knowledge, awareness and practice was used. All Doctors, nurses and laboratory technicians who consented for the study were included in this study. Housekeeping staff and sanitary staff were excluded because of there reluctance to participate in the study.

Data was collected and entered into Microsoft excel sheets, and double checked for any manual typing error and percentage was used to analyze the result.

Result

Knowledge

Analysis of data revealed that Doctors, nurses and laboratory technicians have adequate knowledge regarding biomedical waste management, but nurses and laboratory technicians have better knowledge regarding color coding and waste segregation to doctors (Table 1).

All participants were aware about the fact that infectious diseases can spread through BMWs. All of them heard about BMWM but only 72% had formal training in it and 58% of them knew about change in rules of BMW 2016.

All of the participants knew about use of personal protective measures while handling BMW. 82.4% of the participants knew about use of gloves and mask together but only 72.4% of them knew of use of gloves, mask and cap simultaneously.

Table 1: knowledge regarding biomedical waste management among healthcare participants (n=150)

Knowledge	Doctors (n=75)	Nurses (n=40)	Laboratory technicians (n=35)
Biomedical waste management rules	72 (96%)	35 (83%)	31 (88.5%)
Color coding for waste containers	66 (88%)	39 (97.5%)	33(94.2%)
Segregation of waste at source	50(66%)	38(95%)	32(91.4%)
Disinfection of hospital waste before disposal	70(93.3%)	32(80%)	30(85.7%)

Awareness

Among all 62% were aware about modifications done in BMWM guidelines in 2016. Biohazard and cytotoxic symbols were identified by 83% and 76% respectively. Approx 71% and 45% had clarity of sharp waste disposal and changed specification of BMW bags respectively. 15.1% of them preferred black and blue containers for disposal of sharps. (table 2)

Table 2: awareness regarding biomedical waste management among healthcare participants (n=150)

Awareness	Doctors (n=75)	Nurses (n=40)	Laboratory technicians (n=35)
Modification in waste category	66 (88%)	16 (40%)	20 (57%)
Identifying biohazard symbol	54 (72%)	37 (92%)	30 (85%)
Identifying cytotoxic symbols	57 (76%)	33 (83%)	25 (70%)
Specification and definition of sharps	69 (92%)	33 (82%)	16 (40%)
Specification of biomedical waste bags	62 (83%)	29 (72%)	24 (68%)

Practice

Posters of segregation of BMW according to color codes were provided by the authority.

[Table 3] Practice about BMW among Health care personnel (n=150)

We found out that technicians (89.95%) and nurses (88.87%) have more knowledge regarding BMWM then doctors (85.82%). But doctors (82.20%) are more aware for proper management than nurses (73.80%) and technicians (64.0%). Doctors (80.87%) and nurses (82%) are practicing these norms more than technicians (59%). (Figure 1 and 2).

Table 3: Practice about BMW among Health care personnel (n=150)

Practice	Doctors (n=75)	Nurses (n=40)	Laboratory technicians (n=35)
Safe injection practice	60 (80%)	25 (62%)	15 (44%)
Discarding sharps/vials/ampoules	71 (95%)	37 (92%)	31 (88%)
Discarding gloves	73 (97%)	39 (98%)	12 (34%)
Discarding solid linen	54 (72%)	33 (82%)	22 (62%)
Discarding Foley's catheter with urobag	66 (88%)	36 (90%)	25 (72%)
Onsite disinfection of waste	50 (66%)	28(71%)	18 (51%)
Emptying bag/container	59 (78%)	32 (79%)	23 (66%)
Reporting of injuries due to sharps	53 (71%)	33 (82%)	19 (55%)

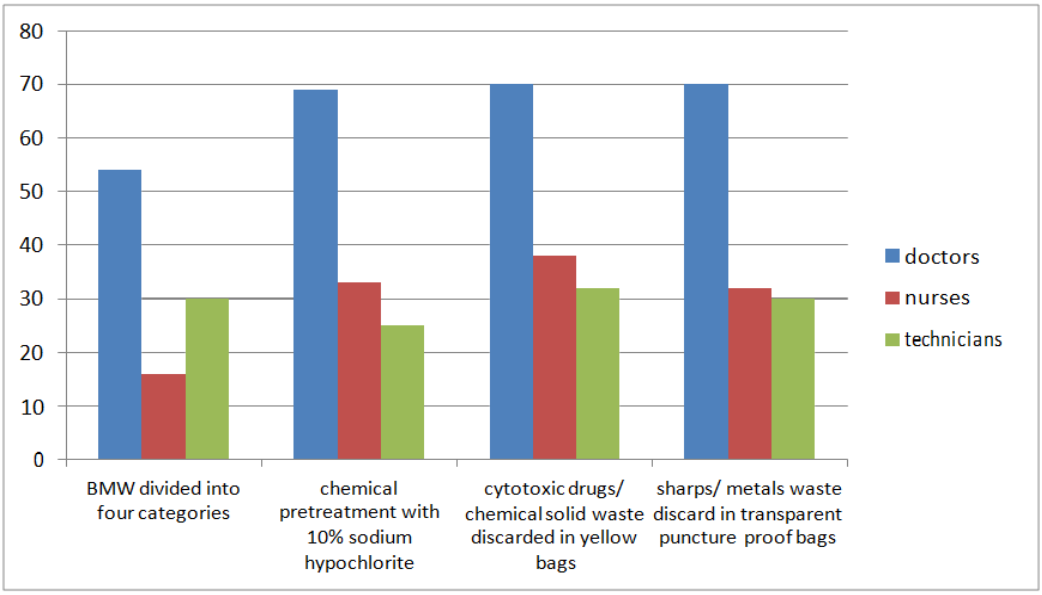

Figure 1: knowledge, awareness and practice of new rules of BMW according to 2016

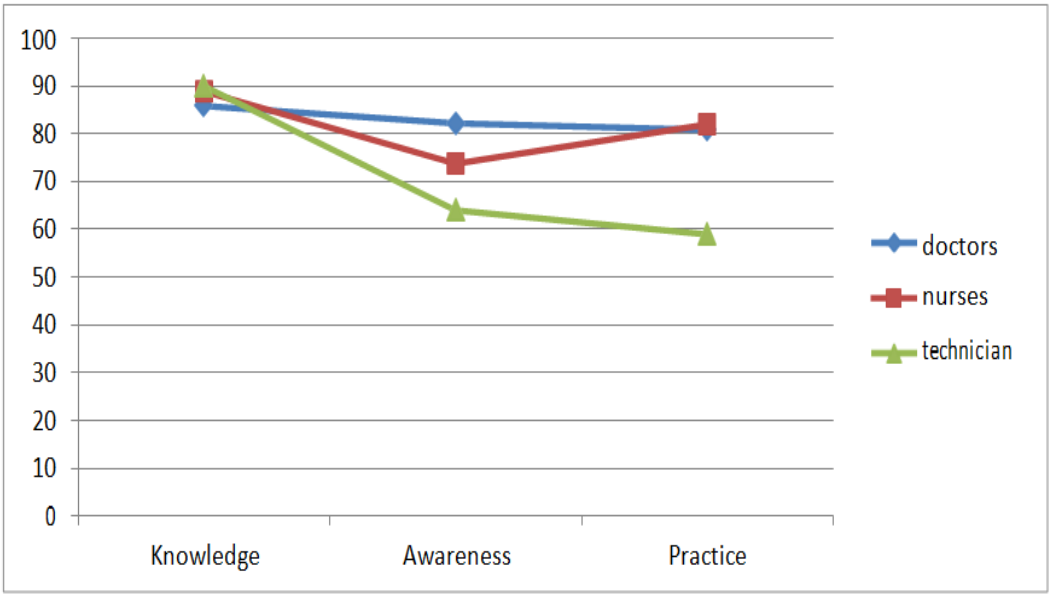

Figure 2: Comparison between doctors, nurses and technician for BMWM (in %)

Discussion

The present study revealed that health care workers including doctors, nurses and technicians had sufficient knowledge, awareness and practices of biomedical waste management which is same as of Sehgal et al[3] in Delhi which also said that awareness of biomedical waste is satisfactory in doctors and nurses. Awareness of categories of biomedical waste as per changed guidelines of 2016 was found in doctors 82.2% followed by nurses73.8% and technicians 64.4%. This is similar to Bhagwati et al[4] study which stated awareness among doctors 50% is highest and very poor in nurses and technicians. Mathew et al[5] also stated awareness of 65% and 100% among technician and paramedical staff respectively. Madhukumar et al[6] reported that 62.5 % technicians were aware about biomedical waste management.

Awareness regarding health hazards due to improper BMWM was found to be 80%. In our study 88% doctors were aware of the same which is contrast to study done by Narang et al[10] where 100% were aware. All participants heard about BMW management which is similar to Chudasama et al[7], Madhuri et al[8] who also found 95.4% and 94.8% of the population knew about Management respectively.

About 44% of them knew about bleaching solution use for disinfection whereas 58.2.5 knew that 1% hypochlorite solution use for disinfection. 75.44% knew about presence of poster in wards, laboratories etc. which is similar to study of Chudasama et al which showed 81.2% of study population knew about posters.

Only 10.5% participants knew about the time limit of 48hrs set by national authorities for infectious BMWs to be kept in hospital premises. Posters of segregation of BMW according to color codes were provided by the authority.

All bins were found to be covered with lids and none were left open in wards. In all the wards proper sharps disposal and disinfection with 1% hypo chloride or bleaching powder was done. Safe PPM practice was conducted by all the participants.

Biohazard and cytotoxic symbols were identified by 83% and 76% respectively in our study which is higher than studies conducted by Sanjeev et al[9] and Madhuri et al who showed 64% and 65.2% respectively. Approximately 71% and 45% had clarity of sharps waste disposal and changed specification of BMW bags respectively. 15.1% of them preferred black and blue containers for disposal of sharps.

In our study doctors had very casual approach towards segregation of waste (66%) which is in contrast to study of Selvarej et al[12](98%). It may be due to overloading of emergency and OPD overloading with patients which gives doctors no choice but to give priority to patients first than waste segregation.

Conclusion

This study shows that Doctors, nurses and laboratory technicians all had knowledge and awareness regarding revision of biomedical waste management rules in 2016, but laboratory technicians are lagging in practicing them. Importance of training cannot be overemphasized so, there should be strict implementation of rules by

healthcare facilities and continuous training of healthcare personnel should be done. Injuries to staff due to sharps should be reported to in-charge of BMWM and they report it to pollution control board. Most medical waste is being incinerated this practice is short lived because of environmental considerations. The burning of solid and regulated medical waste generated by healthcare system creates many problems such as emitting toxic air pollutants and toxic ash residues, which are the major source of dioxins in the environment. Public concerns about incinerator emissions and its toxic emissions, as well as the creation of strict regulations for medical waste incinerators, are causing many healthcare facilities to reconsider their choices in medical waste treatment. The newer non- incineration treatment technologies can be adapted to create toxin-free environment.[11]adequate equipments and supplies should be provided to all departments for proper care of wastes. Public and private sectors should be incorporated into this matter for better management of waste.

Acknowledgements

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