Research Article

Assessment of the knowledge, attitude and practices regarding Biomedical Waste Management amongst Paramedical Staff in a Tertiary Level Health Care Facility

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Abstract

Background: Biomedical waste is any waste that is generated in the diagnosis, treatment, or immunization of human beings or animals, which carries a higher potential for infection and injury. Inadequate and inappropriate handling of health-care wastes has serious public health concerns and significant impact on the environment.

Objective: To assess the knowledge and awareness about various aspects of biomedical waste management among paramedical personnel.

Materials and Methods: A hospital-based cross-sectional study was carried out on paramedical personnel working at MB General Hospital, RNT Medical College Udaipur, Rajasthan, India, from June 2014 to November 2014. Using multistage random sampling, 147 nurses working in various departments in the hospital and 34 lab technicians (LTs) working in central lab, blood bank, pathology, and microbiology departments were selected for this study.

Result: Only 79 (44.88%) knew of biomedical waste legislation and only 57 (32.38%) had correct knowledge of percentage of hazardous waste. Only one-third (54, 30.68%) knew of the categories of biomedical waste and only about half of the respondents (103, 58.52%) knew about disinfection of sharps before disposal. Seventy (39.77%) respondents were in favor of discarding used needles immediately. The practice score of LTs was significantly less than the nurses.

Conclusion: Knowledge regarding color coding and risks of handling biomedical waste was not adequate among the participants. Compulsory continuous intensive training programs should be conducted at regular time interval for all the paramedical personnel with special importance to the new comers.

KEY WORDS: Biomedical waste, knowledge, paramedical, nurses, lab technicians.

Introduction

Biomedical waste is any waste (solid or liquid) that is generated in the diagnosis, treatment, or immunization of human beings or animals, which carries a higher potential for infection and injury than any other type of infection. The important waste-generating sources are government and private hospitals, clinics, nursing homes, blood bank, laboratories and research organizations, etc.[1]

Inadequate and inappropriate handling of health-care wastes have serious public health issues and significant influence on the environment.[2] Approximately 75–90% of biomedical waste is nonhazardous, the remaining 10–25% is hazardous and can be injurious to human, animals, and harmful to environment. If both these types are mixed together, the whole waste is going to become dangerous. It is estimated that annually about 0.33 million tons of hospital waste is

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produced in India and waste generation rate ranges from 0.5 to 2.0 kg/bed/day.[3]

Although there is an increased global awareness among health professionals about the waste hazards and also proper management techniques but the level of awareness in India is still found to be unsatisfactory. Adequate knowledge about the health hazards of hospital and laboratory waste, proper techniques and methods of handling the waste, and practice of safety measures is needed.[4]

The quantity of waste generated varies depending on the hospital policies and practices and the type of care being provided. The quantity of waste generated in developed countries range from 1 to 5 kg/pt./day and in developing countries it ranges from 1–2 kg/pt./day. According to World Health Organization report, about 85% of the waste is domestic waste and nonhazardous, 10% is infectious and remaining 5% is noninfectious but hazardous.[5]

Every year total 1200 million infections (i.e. 8–10 million hepatitis B, 2.3 to 4–7 million hepatitis C and 80.000 to 1,60,000 HIV infections) are estimated globally, which occur from reuse of syringe needles without sterilization.[6]

With this view of context, this study was carried out to assess the knowledge and awareness about various aspects of biomedical waste management among paramedical personnel at this college and hospital so that their status of knowledge and practice can help the authority to develop the strategy for improving the situation in future.

Materials and Methods

A hospital-based cross-sectional study was carried out on paramedical personnel working at MB General Hospital, RNT Medical College Udaipur, Rajasthan, India, from June 2014 to November 2014. 'Paramedical Personnel' is defined as health-care workers who provide clinical services to patients under the supervision of a physician. The term generally encompasses nurses, therapists, technicians.[7] Using multistage random sampling, 147 nurses working in various departments in the hospital and 34 lab technicians (LTs) working in central lab, blood bank, pathology, and microbiology departments were selected for this study. Purpose of the study was fully explained to all study participants and informed consent was taken. Approval for the study was taken from the Institutional Ethical Committee. Predesigned, pretested semi-structured questionnaire and a checklist were used. The questionnaire was divided in six sections.

1. Demographic characteristics of the respondents
2. Knowledge of respondents on various aspects of biomedical waste management
3. Attitude or behavior toward biomedical waste management
4. Biomedical waste management practices
5. Needle stick injury: Knowledge, attitude and practices and incidents in last 1 year among the respondents
6. Respondents' suggestions.

The checklist was used for qualitative assessment by observation, for this, a total of seven wards (general surgery, general medicine, postnatal, gynecology, pediatrics, labor room, and casualty), injection and dressing rooms in outpatient departments, immunization clinic and antirabies clinic, and four laboratories (central lab, blood bank, microbiology, and pathology) were purposively chosen. The paramedical personnel from these observation points were not the respondents in our study. Health-care waste segregation practices were observed for at least 2 h between 10 am and 2 pm, at each station and findings were recorded. Total questions asked were 21, 12, and 11 for knowledge, attitude, and practice, respectively. The responses on KAP were classified as:

Knowledge: Low, medium, and high (score <50%, 50–75%, >75%, respectively).[8]
Attitude: Unfavorable: <6 answers showing positive attitude
Favorable: >6 answers showing positive attitude
Practice: Poor: <6 practices according to guidelines
Moderate: 6–8 practices according to guidelines
Good: >8 practices according to guidelines

Those who had good practices were assumed to be managing the waste in the proper manner and were able to protect themselves and environment from the negative impact of waste. After completion of data collection, data were coded and analyzed using Microsoft Excel and Epi Info 7 software. χ^2 statistics were used to assess association between categorical variables. Statistical significance was set at $p \leq 0.05$.

Result

Most of the participants were nurses 142 (80%) and 34 (20%) were LTs. Seventy-one (40.34%) participants were in the age group of 20–30 years of age. Majority of them were females (104, 59.09%), 67 (38.07%) participants were recruited within last 3 years and 113 (64.21%) participants were doing nonsurgical work. Only 37 (21.02%) participants were affirmative on receiving training on biomedical waste. Of these, 29 (78.4%) had received training more than 5 years back; none of the respondents had received training recently (within last 3 years), that is, since the latest amendment of Bio Medical Waste (Management and Handling) Rules, 2011. Only 79 (44.88%) knew of biomedical waste legislation and only 57 (32.38%) had correct knowledge of percentage of hazardous waste. Only one-third (54, 30.68%) knew of the categories of biomedical waste and only about half of the respondents (103, 58.52%) knew about disinfection of sharps before disposal [Table 1]. Only 27.84% participants scored high for knowledge. The paramedical personnel in both groups were aware of only four infections spread by improper handling of biomedical waste. The awareness was mostly focused around HIV (91.47%) and Hep-B (92.61%). One-fourth participants (26.14%) showed unfavorable attitude toward biomedical waste, more than 10% scored poor for practices. There was highly significant inverse association of knowledge with length

Table 1: Knowledge of the respondents on some aspects of handling of biomedical waste

S.NO.	General information	Nurse (%) (*n* = 142)	LT (%) (*n* = 34)	Total (%) (*n* = 176)	*P*-value
1.	Categories of biomedical waste (8)	42 (29.57)	12 (35.29)	54 (30.68)	0.51
2.	Maximum storage time for hospital waste (according to biomedical waste rule, 2011)	124 (87.32)	27 (79.41)	151 (85.79)	0.23
3.	Used needle should be put in which bag	136 (95.77)	31 (91.17)	167 (94.88)	0.27
4.	In which bag Human anatomical waste is disposed	122 (85.91)	28 (82.35)	150 (85.22)	0.59
5.	How sharps are treated before disposal	84 (59.15)	19 (55.88)	103 (58.52)	0.72
6.	Who collects the waste bags from the hospital	118 (83.09)	17 (50)	135 (76.70)	< 0.001
7.	Frequency of waste collection from the wards/labs	137 (96.46)	24 (70.58)	161 (91.47)	< 0.001

Table 2: Attitude* of respondents towards proper handling of biomedical waste

S.NO.	Attitude of respondents	Nurse (%) (*n* = 142)	LT (%) (*n* = 34)	Total (%) (*n* = 176)	*P*-value
1.	It is an important issue and a matter for concern	135 (95.07)	24 (70.58)	159 (90.34)	<0.001
2.	It is a team work/no single class of people is responsible for it	132 (92.97)	28 (82.35)	160 (90.90)	0.05
3.	Proper handling of BMW is a part of our duty	140 (98.59)	33 (97.05)	173 (98.29)	0.53
4.	It increases financial burden on hospital management	50 (35.21)	14 (41.17)	64 (36.36)	0.51
5.	It is an extra burden on work	56 (39.43)	13 (38.23)	69 (39.20)	0.89

*Number of respondents that agreed with the statement in the questionnaire.

Table 3: Biomedical waste handling practices* of the respondents (response of the participants on the questionnaire)

S.NO.	Practice	Nurse (%) (*n* = 142)	LT (%) (*n* = 34)	Total (%) (*n* = 176)	*p*-value
1.	Disposal of waste in specified color coded containers	134 (94.34)	17 (50)	151 (85.79)	<0.001
2.	Disposal of sharps in puncture proof bags and containers	139 (97.88)	31 (91.17)	170 (96.59)	0.05
3.	Use of personal protective barriers	124 (87.32)	32 (94.11)	156 (88.63)	0.26
4.	Reporting of injuries due to sharp wastes	14 (9.85)	3 (8.82)	17 (9.65)	0.85
5.	Wash hands before and after handling biomedical waste	137 (96.47)	32 (94.11)	169 (96.02)	0.52
6.	Maintaining of log book for waste disposal	133 (93.66)	31 (91.17)	164 (93.18)	0.60
7.	Recapping of used needles	44 (30.98)	8 (23.52)	52 (29.54)	0.50

*Number of respondents that agreed with the statement in the questionnaire.

Table 4: KAP score of the respondents

	Category	Nurse (%) (*n* =142)	LT (%) (*n* = 34)	Total (%) (*n* = 176)	*P*-value
Knowledge	High	39 (27.64)	10 (29.41)	49 (27.84)	0.57
	Medium	90 (63.38)	19 (55.88)	109 (61.93)	
	Low	13 (9.15)	5 (14.71)	18 (10.23)	
Attitude	Favorable	103 (72.54)	27 (79.41)	130 (73.86)	0.41
	Unfavorable	39 (27.64)	7 (20.59)	46 (26.14)	
Practice	Good	58 (40.85)	9 (26.47)	67 (38.07)	0.01
	Moderate	73 (51.41)	16 (47.06)	89 (50.57)	
	Poor	11 (7.75)	9 (26.47)	20 (11.36)	

of service ($p < 0.05$). Most of the participants (159, 90.34%) felt that proper handling of biomedical waste is an important issue and a matter for concern and it is a part of their duty but 69 (39.20%) felt that it was an extra burden on work [Table 2]. Seventy (39.77%) respondents were in favor of discarding used needles immediately but 26 (76.47%) of the LTs and 98 (69.01%) of the nurses felt that used needles can be recapped and discarded later. Only half of the LTs (17, 50%) disposing waste in color-coded containers as compared to nurses (134. 94.93%); the difference in both groups for this practice was highly significant ($p < 0.001$). Recapping of used needles, a wrong practice was accepted by one-third respondents, 44 (30.98%) nurses, and 8 (23.52%) LTs, respectively. Only a few, 14 (9.85%) nurses and 3 (8.82%) LTs said that they had reported injuries due to sharp waste [Table 3]. Among total 176 respondents, only one-third (27.84%) scored high for knowledge, about one-tenth scored low (18, 10.23%), more were LTs, 5 (14.71%) scored low as compared to nurses 13 (9.15%). One-fourth respondents displayed unfavorable attitude and more than 10 present scored poor for practice. The practice score of LTs was significantly less than the nurses ($p < 0.01$) [Table 4].

Discussion

Majority of the respondents in this study had knowledge of most of the aspects of management of biomedical waste included in the study. The knowledge of segregation at source, that is, color coding, was less among LTs (15, 44.12%) than the nurses (105, 73.94%). The respondents could name only four infections spread by improper handling of biomedical waste and their knowledge was focused mostly around HIV and Hepatitis B. Ismail et al.[9] also found that most of the nurses (70%) in their study were aware that segregation of biomedical waste has to be done at the point of generation. But contrary to our findings, correct knowledge regarding the risk of diseases transmission through biomedical waste was adequate in all the groups. Most of the participants agreed that proper segregation of biomedical waste was important and it was a part of their duty. Our observations are in accordance with the attitude observed by Ismail et al. Most of the respondents in both groups were in favor of discarding of used needles but three-fourth (26, 76.47%) of the LTs and one-third (98, 69.01%) of the nurses felt that used needles can be recapped and discarded later. Shafee et al.[10] concluded through a KAP study on paramedical workers that the nurses had a better attitude toward separation of wastes (99.5%), proper disposal (98.7%), implementation of rules (98.3%), and cooperation in programs (62.8%) than the technical staff. Segregation and disposal of waste in color-coded bins is the most important pivotal point for further management of biomedical waste, it emerged that only half of the LTs (17, 50%) disposed waste in color-coded bin whereas most of the nurses (134, 94.34%) were following this practice. Ismail et al. too concluded through their study that only 43% nurses and 30% LTs were discarding the biomedical waste according to color code. The overall KAP scoring showed that although one-third of respondents scored high for knowledge but 46 (26.14%) respondents displayed unfavorable attitude and more than 10% scored poor for practice. The practice score of LTs was significantly less than the nurses ($p < 0.01$). Our findings are in theme with those of Saini et al.[11] Their KAP study revealed that nursing professionals had on edge in the attitude and understanding in the subject and it is found that they are practicing the guidelines in more responsible manner may be due to their accountability and commitment in the patient welfare. Laboratory staffs have relatively less understanding on the subject, but have high attitude and more practical habits that may be because of strict instructions by authorities and fear for punitive action. Our findings are in contrast with Sachan et al.[12] who observed that 20% nurses had more than 70% knowledge, 60% had positive attitude, and 65% were following more than 70% correct practices.

Conclusion

There was a felt need for training and reorientation training workshops on biomedical waste. Only one-third participants had high level knowledge, one-fourth displayed unfavorable attitude, and more than 10% scored poor for practice. Knowledge regarding color coding and risks of handling biomedical waste was not adequate among the participants. Nursing protocol should be made for handling infectious and noninfectious waste should by displayed at all nursing stations. Compulsory continuous intensive training programs should be conducted at regular time interval for all the paramedical personnel with special importance to the new comers.

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