ORIGINAL ARTICLE

A study of knowledge, attitude and practices regarding biomedical waste management among health care providers in a tertiary care Institute in Punjab

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Abstract

The biomedical waste, if not properly managed, can harm the surrounding environment, cause various infections and injuries to the healthcare workers, patients, their attendants. **Methods:** This cross-sectional study was conducted to assess the knowledge, attitude and practices among different cadres of health care providers in a tertiary care institute. Expecting that 50% of the study population had precise knowledge about the rules and legislation of biomedical waste management, with an allowable error of 10%, at 95% confidence interval, and accounting for the finite population correction for 1700 participants, a minimum sample size of 426 was taken. Data analysis was done by using Microsoft excel and SPSS. **Results:** Out of 426 subjects, 138 (32.4%) were nurses, 35 (8.2%) were lab technicians and 253 (59.4%) were housekeeping staff. Knowledge, attitude and practices regarding biomedical waste management and handling were significantly ($p<0.05$) higher among the nurses as compared to other health care providers. **Conclusions:** Knowledge, attitude and practices regarding the collection, segregation, rules, and disposal of biomedical waste management was more among nursing staff compared to other health care workers. Hence, emphasis on adequate training is required among other health care workers for the safe handling and disposal of biomedical waste management.

Introduction

"Biomedical waste" is defined as "any waste that is generated during diagnosis, treatment or immunization of human beings or animals or in the research activities pertaining to or in the production or testing of biologicals and includes categories mentioned in schedule I of the government of India's biomedical waste Rules 1998"(.1)Hospital waste is very infectious and hazardous and the problem is growing in medical field.(2)There is substantial uncertainty around this estimate and more research and data are needed to obtain a reliable picture of this situation.(3)This biomedical waste comprises of various categories of waste like anatomical waste, cytotoxic wastes, sharps, which when inadequately segregated could cause different kinds of deadly infectious diseases.(4)If not properly managed, this can harm the surrounding environment, cause various infections and injuries to the healthcare workers, patients, their attendants and other hospital visitors. Blood and body fluids present in the bio-medical waste harbour most of the pathogenic bacteria, viruses and parasites.(5,6)Hence to prevent these harms ,the Biomedical Waste Management Rules directed methods for disposal of bio-medical waste. Various studies documented still convey that there are gaps in the

Knowledge, attitude and practices of health care workers in the appropriate handling of bio-medical waste.(7)Therefore the present study was formulated among the health care providers.

Aims & Objectives

1. To assess the knowledge, attitudes and practices among nurses, laboratory technicians, housekeepingstaff in the various departments of hospital.
2. To assess the gaps in knowledge, attitudes and practices among these health care providers.

Material & Methods

Study Design: Cross-sectional study, Sampling method: Stratified sampling method, Eligibility criteria: All consenting individuals amongst the different cadres of staff were included in the study. There were 1700 eligible participants which were taken as the sampling frame. **Sample size:** Expecting that 50% of the study population had precise knowledge (considering the outcome variable) about the rules and legislation of biomedical waste management, with an allowable error of 10%, at 95% confidence interval, and accounting for the finite population correction for 1700 participants (550 staff nurse, 140 lab technicians and 1010 housekeeping staff including sewadar and safai sewadar), a minimum sample size of 426 was included (138 staff nurse, 35 lab technicians and 253 housekeeping staff).

Sampling strategy: The study population was classified according to the different strata based on their designation as staff nurses, laboratory technicians and house-keeping staff. Allocation of the population according to the strata.

Formula:n= $\dfrac{4pq}{l^2}$

l= 10% of p= $\dfrac{10 \times 50}{100}$ = 5

n= $\dfrac{4 \times 50 \times 50}{5^2}$ = 400 (Min)

Data collection Tool:A cross sectional study was conducted at SGRDIMSAR among health care professionals in the various departments of this institution. A pre-tested, semi-structured questionnaire was used to elicit the information like collection, segregation, transportation and disposal of biomedical waste.

A questionnaire was translated into local language (Punjabi) and was administered to all HCPs of hospital. Questionnaire was distributed in closed envelope with request letter to participate in the study and give genuine and serious response. Collected data compiled and enter into excel sheet. Coding of data was done. Then data was analyzed with the help of SPSS-25.

Results

The study was conducted regarding knowledge, attitude and practices of health care professionals in tertiary care institution.A sample size of 426 subjects were taken amongst 3 main groups i.e. nurses, lab technician and housekeeping staff. Majority of respondents 253 (59.4%) were from housekeeping staff followed by nurses 138 (32.4%) and lab technicians 35 (8.2%).

Table 1 shows that out of 426 respondents primarily housekeeping staff were younger than 30 years while nursing staff were comparatively of elder age group (58.6%). Females were predominately among the nursing staff (93.5%) while lab technicians had more respondents who were graduate and above (77%). While all of the housekeeping staff was belowgraduate. Based upon experience in years, majority of housekeeping staff (70.8%) had job experience of more than 5 years while majority of nursing staff (65.9%) had job experience of less than 5 years. Majority of HCP underwent training UNIDO project training in past one year.

Table 2 shows that the HCP were asked knowledge-based questions and results were combined for nursing staff and lab technicians to that of housekeeping staff and it shows that nursing staff and lab technicians had significantly more knowledge than housekeeping staff regarding bio-medical waste rules. (p<0.05) Overall awareness of bio medical waste rules correctly describing colour coding, acknowledging NSI as concern and awareness about its consequences and also explaining the steps of spill management were found to be statistically significant. (p<0.05) While correct response for storage of waste beyond 48 hours and necessity of bio hazard symbol were found to be insignificant.

Table 3 shows the perception of following colour coding correctly, accepting that colour coding helps in prevention of spread of infections while perceiving colour coding as easy method to follow and realising importance of wearing ppe were found to be significant (p<0.05)as nursing staff and lab technicians accepted above parameters in comparison to that of housekeeping staff.

Table 4 shows that practices which are being followed by nursing staff and lab technicians vary considerably when compared to housekeeping staff. The parameters of practice like wearing gloves while handling waste, point source segregation, proper labelling of colour coded bins, ensuring proper closure while handling bio medical waste and proper steps of needle stick injury and spill management were practiced more thoroughly by nursing staff and lab technicians as compared to housekeeping staff and difference was found to be highly significant. (p<0.05)

Discussion

In our study, majority of respondents 253 (59.4%) were from housekeeping staff followed by nurses 138 (32.4%) and lab technicians 35 (8.2%). Similar results were found

in a study conducted in Delhi by Gajanan C. Soyam. (8)In our study, out of 426 respondents primarily housekeeping staff were younger than 30 years while nursing staff were comparatively of elder age group (58.6%). Females were predominately among the nursing staff (93.5%) while lab technicians had more respondents who were graduate and above (77%). While all of the housekeeping staff was below graduate level. Based upon experience in years, most of housekeeping staff (70.8%) had job experience of more than 5 years while majority of nursing staff (65.9%) had job experience of less than 5 years. Majority of HCP underwent training in past one year. Similar results were observed in a study conducted in Jaipur by Alok Sharma.(9)

Regarding Knowledge it was observed that Health Care Providers were asked questions and results were combined for nursing staff and lab technicians to that of housekeeping staff and it shows that nursing staff and lab technicians had significantly more knowledge than housekeeping staff regarding bio-medical waste rules. (p<0.05) Overall awareness of bio medical waste rules correctly describing colour coding, acknowledging needle stick injury as concern and aware about its consequences and also explaining the steps of spill management were found to be statistically significant. (p<0.05) While correct response for storage of waste beyond 48 hours and necessity of bio hazard symbol were found to be insignificant. Another study conducted by S.Saini shows similar findings.(10)Also studies conducted in Delhi, Jaipur, Chandigarh and Amritsar reported similar findings.(8,9,11,12)Many studies stated that importance of practical training and adequate theoretical knowledge is required among both medical and paramedical health care workers for overall improvement of biomedical waste management and handling practices.(13,14)

Overall knowledge of HCWs was high but nursing staff was excellent.

This could be explained by the fact that most of study subject not only received superior trainings frequently on BMWM but also nearly half of the HCWs have been received training within one year.

The perception of following colour coding correctly, accepting that colour coding helps in prevention of spread of infections while perceiving colour coding as easy method to follow and realising importance of wearing personal protective equipment were found to be significant (p<0.05) as nursing staff and lab technicians accepted above parameters in comparison to that of housekeeping staff. Deo D et al in their study opined nurses and lab technicians had better knowledge (90%) than others and study done by Saini S also opines nursing staff had fair knowledge and positive attitude regarding health care waste segregation.(10,15)

Practices which are being followed by nursing staff and lab technicians vary considerably when compared to housekeeping staff. The parameters of practice like wearing gloves while handling waste, point source segregation, proper labelling of colour coded bins, ensuring proper closure while handling bio medical waste and proper steps of needle stick injury and spill management were practiced more thoroughly by nursing staff and lab technicians as compared to housekeeping staff and difference was found to be highly significant. (p<0.05)

Conclusion

Knowledge attitude and practices regarding the collection, segregation, rules, and disposal of biomedical waste management is more among nursing staff compared to other health care workers. Hence, emphasis on adequate training is required among health care workers for the safe handling and disposal of biomedical waste management. Knowledge attitude and practices were found to be extensively followed by nursing staff and lab technicians than housekeeping staff inspite of having less job experience.

Recommendation

More hands on training sessions among health care providers should be planned to avoid the pilferage and hazardous effects of bio-medical waste.

Limitation of the study

Small sample size and exclusion of other categories of health care providers for eg. Junior residents, post graduates and senior residents are the limitations of the present study.

Relevance of the study

Awareness about the biomedical waste management and handling is the need of an hour which is often not considered necessary specially by the paramedical personnels who are handling the waste.

Authors Contribution

HS & MN contributed in the literature search, data collection and management. PB, HS & AG were involved in data compilation and analysis.

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Tables

TABLE 1: SOCIO DEMOGRAPHIC CHARACTERISTICS OF HEALTH CARE PROVIDERS

Characteristics		Health Care Providers			
		Nursing Staff N=138 (%age)	Lab Technician N=35 (%age)	House-keeping staff N=253 (%age)	Total (426)
Age	< 30 years	81 (58.6)	14 (40.0)	85 (33.6)	180
	≥ 30 years	57 (41.4)	21 (60.0)	168 (66.4)	246
Sex	Males	9 (6.5)	25 (71.4)	105 (41.5)	139
	Females	129 (93.5)	10 (28.6)	148 (58.5)	287
Education	Undergraduate	56 (40.5)	08 (22.8)	253 (100)	317
	Graduate & Above	82 (59.5)	27 (77.2)	00 (00)	109
Experience in years	< 5	91 (65.9)	16 (45.7)	74 (29.2)	181
	≥ 5	47 (34.1)	19 (54.3)	179 (70.8)	245
Underwent training in last 1 year	Yes	109 (78.9)	29 (82.8)	186 (73.5)	324
	No	29 (21.1)	06 (17.2)	67 (26.5)	102
HBV taken	Yes	115 (83.3)	20 (57.1)	118 (46.7)	253
	No	23 (16.7)	15 (42.9)	135 (53.3)	173

TABLE 2 KNOWLEDGE REGARDING BMW AMONG HEALTH CARE PROVIDERS

Knowledge		Health Care Providers				X^2	Df	P Value
		Nursing Staff N=138 (%age)	Lab Technician N=35 (%age)	House-keeping staff N=253 (%age)	Total n=426			
Aware of BMW rules	Yes	126 (91.3)	31 (88.5)	201 (79.4)	358	9.7	1	<0.001 (s)
	No	12 (8.7)	4 (11.5)	52 (20.6)	68			
Know colour coding Correctly	Yes	113 (81.9)	26 (74.3)	161 (63.6)	300	13.7	1	<0.001 (s)
	No	25 (18.1)	09 (25.7)	92 (36.4)	126			
Waste should not stored beyond	Correct response (<48 Hours)	112 (81.1)	24 (68.6)	173 (68.4)	309	5.4	1	0.02
	Incorrect response (>48 Hours)	26 (18.9)	11 (31.4)	80 (31.6)	117			
Is Biohazard symbol necessary	Yes	118 (85.5)	27 (77.1)	196 (77.4)	341	25	1	0.10
	No	20 (14.5)	8 (22.9)	57 (22.6)	85			
Think NSI is concern	Yes	126 (91.3)	28 (80)	192 (75.9)	346	9.8	1	<0.001 (s)
	No	12 (8.7)	7 (20)	61 (24.1)	80			
Aware of consequences of NSI	Yes	124 (89.8)	28 (80)	148 (58.5)	300	42.5	1	<0.001 (s)
	No	14 (10.2)	7 (20)	105 (41.5)	126			
Steps of Spill management	Yes	109 (78.9)	25 (71.4)	145 (57.3)	279	18.4	1	<0.001 (s)
	No	29 (21.1)	10 (28.6)	108 (42.7)	147			

TABLE 3: DISTRIBUTION OF HEALTH CARE PROVIDERS REGARDING THEIR ATTITUDE TOWARDS BIO MEDICAL WASTE MANAGEMENT

Attitude		Health Care Providers				X²	Df	P Value
		Nursing Staff N=138 %age	Lab Technician N=35 %age	Housekeeping staff N=253 %age	Total (n=426)			
Colour coding (CC) should be followed strictly	Yes	124 (89.8)	28 (80)	179 (70.7)	331	17.3	1	**<0.001 (s)**
	No	14 (10.2)	7 (20)	74 (29.3)	95			
CC prevents spread of infections	Yes	123 (89.1)	26 (74.3)	166 (65.6)	315	22.4	1	**<0.001 (s)**
	No	15 (10.9)	9 (25.7)	87 (34.4)	111			
CC easy method for follow	Yes	124 (89.8)	25 (71.4)	163 (64.4)	312	24.6	1	**<0.001 (s)**
	No	14 (10.2)	10 (28.6)	90 (35.6)	114			
Importance of wearing personal protective equipment	Yes	124 (89.8)	25 (71.4)	177 (69.9)	326	14.9	1	**<0.001 (s)**
	No	14 (10.2)	10 (28.6)	76 (30.1)	100			

TABLE 4: DISTRIBUTION OF HEALTH CARE PROVIDERS REGARDING PRACTICES TOWARDS BIO MEDICAL WASTE MANAGEMENT

Practices		Health Care Providers				X²	Df	P Value
		Nursing Staff N=138 %age	Lab Technician N=35 %age	House-keeping staff N=253 %age	Total			
Do you wear gloves while handling waste	Yes	125 (90.6)	28 (80)	182 (71.9)	335	16.6	1	<0.001 (s)
	No	13 (9.4)	7 (20)	71 (28.1)	91			
Segregation at source practised	Yes	122 (88.4)	27 (77.1)	179 (70.8)	328	13.7	1	<0.001 (s)
	No	16 (11.6)	8 (22.9)	74 (29.2)	98			
Labelling of CC Bags done	Yes	125 (90.6)	23 (65.7)	186 (73.5)	334	8.7	1	< 0.001 (s)
	No	13 (9.4)	12 (34.3)	67 (26.5)	92			
Proper closure of bins while handling BMW	Yes	125 (90.6)	27 (77.1)	183 (72.3)	335	14.7	1	<0.001 (s)
	No	13 (9.4)	8 (22.9)	70 (27.7)	91			
Protocol for NSI followed	Yes	121 (87.7)	30 (85.7)	176 (69.5)	327	18.1	1	<0.001 (s)
	No	17 (12.3)	5 (14.3)	77 (30.5)	99			
Proper steps for spill management are followed	Yes	121 (87.7)	22 (62.8)	145 (57.3)	288	30.1	1	<0.001 (s)
	No	17 (12.3)	13 (37.2)	108 (42.7)	138			