ORIGINAL ARTICLE

AWARENESS AND PRACTICES ABOUT BIO-MEDICAL WASTE AMONG HEALTH CARE WORKERS IN TERTIARY CARE HOSPITAL OF HALDWANI, NAINITAL

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ABSTRACT

Background: The biomedical waste poses significant hazardous risk to the patients, healthcare workers, the community and environments. Thus the knowledge regarding biomedical waste management among health care personnel have greater impact on health and environment. This study aims to assess the awareness and practices regarding biomedical waste management among Health care workers in Tertiary care hospital.

Material methods: A cross sectional study was undertaken from august 2014 to December 2014 among health care workers in tertiary care hospital of Haldwani, Nainital. A pretested, semi structured questionnaire was used for data collection. Results are presented in frequencies, percentages, mean and standard deviations.

Results: Awareness regarding disposal of items in red, yellow and puncture proof containers was 32.7%, 51.8% and 60.9% in health care workers respectively. Only 35.4% of health care workers had undergone training on biomedical waste management and 31% health care workers were found to be unvaccinated against hepatitis B infection.

Conclusion: Periodical sensitization and training program should be conducted for health care providers with focus on vaccination against hepatitis B infection.

Keywords: Bio-medical waste, Health care workers, Tertiary care hospital

INTRODUCTION

Biomedical waste (BMW) is now considered as a great concern due to increased awareness about HIV/AIDS, hepatitis B and hepatitis C and other potential infectious diseases. Healthcare activities like medical treatments, diagnostic tests, immunization, and laboratory examinations restore health and save lives. At the same time health services may generate large quantity of wastes and by-products that need to be handled safely and disposed of properly.[1]

BMW is defined as any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining there to or in the production or testing of biological, and including categories mentioned in Schedule I of BMW Rules of 1998.[2] More than three-fourth of the health care wastes are non-hazardous while the remaining proportion is potentially hazardous.[3] According to WHO 20% of total waste generated by health care activities are hazardous.[4]

The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate knowledge of handling of health care waste may have serious health consequences and a significant impact on the environment as well.[5] The waste management programme in hospitals minimise cross infection, improve the general hygiene in hospitals and minimise environmental pollution through proper treatment and disposal of waste.[6]

The success of biomedical waste management programme depends on the knowledge and practice of the Health Care Worker (HCW).The present study was undertaken with objectives of finding out the level of knowledge of doctors, nurses, technicians

and other sanitary hospital staff about biomedical waste and the practices they are following in a Tertiary care hospital of Haldwani, Nainital for management of the BMW.

MATERIAL AND METHODS

Cross sectional study was conducted from August 2014 to December 2014 among Health care workers in Tertiary care hospital of Haldwani, Nainital. Govt Medical College and Hospital, Haldwani is a tertiary level referral hospital that serves people of Kumaoun region of Uttarakhand. It has more than 500 beds with intensive care unit.

The sample size was calculated by using the formula $(1.96)^2$ pq / d^2 at 95% confidence interval, where p was considered as 50% since there is no similar study in the study area and d = 5% desired level of precision. The sample size came out to be 384. Since the exact number of source population of respondent is less than 10,000, we used correction formula of $n_f = n_i / (1 + n_i/N)$ where n_f = corrected sample size n_i = uncorrected sample size, and N= total number of all the source population.[7] Therefore, (384/ (1 + 384/500 = 218), we obtained sample size of 218. The health care workers included in the study were post graduate resident doctors, interns, nurses, lab technicians, and sanitary staffs involved in handling biomedical waste. Participants were selected using simple random sampling technique.

Data was collected using pre-designed, semi-structured questionnaire from study participants by interviewing them. Informed consent was taken from the health care workers after explaining them the purpose of the study. Information collected through questionnaire included socio demographic characteristics of the respondents, awareness regarding waste management and practices in relation to biomedical waste management. Knowledge of the participants was assessed through nine questions on various aspects of biomedical waste. Knowledge score were calculated by giving 1 for correct response and 0 for incorrect response. Total knowledge scores were computed for each participant

Data was entered in MS excel and analyzed using SPSS v 16. Results are presented in the form of frequencies, percentages, mean and standard deviations. Chi-square test and ANOVA test was used as test of significance in analysis. Ethical approval for the study was taken from the institutional ethical committee.

RESULT

Table 1 describes the socio-demographic characteristics of health care workers. A total of 220 HCW were included with the mean age of participants being 31.15yrs (Standard deviation 6.16) ranging from 19yrs to 49 yrs. Majority of participants were female i.e. 60.5%. Among the health care workers 46.8% were nurses, 23.2% doctors, 19.1% lab technicians and 10.9% sanitary staffs. 59.5% of HCW had work experience above 5 yrs.

Table 1: Socio-demographic characteristics of study participants

Characteristics	No (%)
Gender	
Male	87 (39.5)
Female	133 (60.5)
Religion	
Hindu	159 (72.3)
Muslim	8 (3.6)
Christian	53 (24.1)
Profession	
Doctor	51 (23.2)
Nurse	103 (46.8)
Lab technician	42 (19.1)
Sanitary staff	24 (10.9)
Marital status	
Unmarried	84 (38.2)
Married	135 (61.4)
Divorced	1 (0.5)
Work experience	
Less than 5 years	89 (40.5)
More than 5 years	131 (59.5)

As shown in table 2, 87.3%, 86.4%, 85.5% and 80% of HCWs were aware about transmission of HIV, Hepatitis B, Hepatitis C and risk to environment through BMW respectively. Awareness regarding transmission of diseases was higher in doctors in comparison to other paramedical staffs.

Out of the total HCW 32.7 % (72) had correct knowledge regarding disposal of plastic items like catheters, IV sets in the red color bag. Among the HCW awareness regarding disposal of items in red bag was found to be maximum in nurses (47%) followed by doctors, lab technicians and sanitary staffs which was 25.5%, 21.4% and 8.3% respectively. This difference among HCW was found to be statistically significant. Maximum nurses (70.9%) and sanitary staff (45.8%) while only 33.3% lab technicians and 31.4 % doctors had correct knowledge about disposal of soiled dressings ,plaster casts, cotton etc in the yellow colored bag. This difference was statistically significant.

Table 2: Awareness regarding various aspects of bio-medical waste management

Variables		Doctors	Nurses	Lab technicians	Sanitary staff	P Value
		No (%)	No (%)	No (%)	No (%)	
Risk of transmission of HIV through BMW	Correct response	47(92.2)	85(82.5)	36(85.7)	20(83.0)	0.74
	Incorrect response	4(7.8)	18(17.5)	6(14.3)	4(17.0)	
Risk of transmission of HBV through BMW	Correct response	48(94.1)	84(81.6)	34(81.0)	19(79.1)	0.16
	Incorrect response	3(5.9)	19(18.4)	8(19.0)	5(20.9)	
Risk of transmission of HCV through BMW	Correct response	44(86.3)	84(81.6)	36(85.7)	19(79.1)	0.45
	Incorrect response	7(13.7)	19(18.4)	5(11.9)	5(20.9)	
Hazardous effect of BMW on environment	Correct response	47(92.2)	68(66.0)	38(90.5)	18(75.0)	0.00
	Incorrect response	4(7.8)	35(34.0)	4(9.5)	6(25.0)	
Disposal of plastic items (catheters, IV sets)	Correct response	13(25.5)	48(46.6)	9(21.4)	2(8.3)	0.00
	Incorrect response	38(74.5)	55(53.4)	33(78.6)	22(91.7)	
Disposal of soiled dressings, plaster casts, cotton	Correct response	16(31.4)	73(70.9)	14(33.3)	11(45.8)	0.00
	Incorrect response	35(68.6)	30(29.1)	28(66.7)	13(54.2)	
Disposal of sharps and needles	Correct response	41(80.4)	67(65)	12(28.6)	14(58.3)	0.00
	Incorrect response	10(19.6)	36(35)	30(71.4)	10(41.7)	
Symbol of biohazard	Correct response	47(92.2)	92(89.3)	32(76.2)	17(70.8)	0.018
	Incorrect response	4(7.8)	11(10.7)	10(23.8)	7(29.2)	
Knowledge score	Mean (SD)	6.92(1.16)	6.82(1.92)	5.98(1.67)	5.96(2.13)	0.010*

*P value calculated using ANOVA test.

Table 3: Practices of study participants in relation to bio-medical waste management

Variables		**Doctors**	**Nurses**	**Lab tech**	**Sanitary staff**	**P**
		No (%)	No (%)	No (%)	No (%)	**Value**
Training	Yes	11(21.6)	63(61.2)	4(9.5)	0(0)	0.00
	No	40(78.4)	40(38.8)	38(90.5)	24(100)	
Hepatitis B Vaccination	Yes	37(72.5)	91(88.3)	18(42.9)	6(25.0)	0.00
	No	14(27.5)	12(11.7)	24(57.1)	18(75)	
Use of personal protective equipments	Yes	48(94.1)	101(98.1)	38(90.5)	22(91.7)	0.21
	No	3(5.9)	2(1.9)	4(9.5)	2(8.3)	
Practicing segregation of waste at place of generation	Yes	28(54.9)	77(74.8)	22(52.4)	17(70.8)	0.019
	No	23(45.1)	26(25.2)	20(47.6)	7(29.2)	

60.9% HCW responded correctly about collection of sharps and needles in blue / white puncture proof container. Majority of doctors (80.4%), nurses (65%) and sanitary staff (58.3%) had responded correctly about disposal of BMW in blue / white puncture proof container and this knowledge was found to be lowest (28.6%) among lab technicians which was statistically significant. Majority of HCW 85.5% were able to identify the symbol of biohazards. 92.2% of doctors followed by 89.3% nurses, 76.2 % lab technicians and 70.8% sanitary staff were able to identify the symbol and this was statistically significant.

The doctors had good knowledge of BMW followed by nurses, lab technicians and sanitary staffs. The practices of HCW regarding BMW management and preventive measures are shown in Table 3. Out of 220 participants, 69.1% were immunized for hepatitis B. Three-fourth of the sanitary staff and more than half of lab technicians (57.1%) had reported about no vaccination against Hepatitis B whereas 27.5% doctors and 11.7% nurses had not taken Hepatitis B vaccine, which was statistically significant.

95% of HCW had reported about using PPE while handling and disposal of BMW. About two-third(65.5%) of the HCW had reported practice of the segregation of waste at site of generation and this practice was maximum by nurses (74.8%)and sanitary staff (78.8%)and lowest by doctors(54.9%) and lab technicians (52.4%) and it was statistically significant ($p < .05$). Majority of nurses (61.2%) had received training regarding BMW while only 21.6% doctors and 9.5% lab technicians had received this training. None of the sanitary staff had reported about any training in relation to BMW.

DISCUSSION

Health care workers are the key workers in the management of biomedical waste generated in the hospitals. So the inadequate knowledge and practices of BMW is dangerous for their own health and those in the society and environment.[8] Biomedical waste management and handling rules 1998 apply to all those who generate, collect, receive, store, transport, treat, dispose or handle biomedical waste.[9] This study was done to assess the awareness and practices of doctors, nurses, lab technicians and sanitary staff regarding biomedical waste management.

Knowledge regarding transmission of HIV, Hepatitis B and Hepatitis C through BMW was maximum in doctors which ranged from 86% to 94% in comparison to paramedical staffs this is similar to findings of Mathur et al.[5] where 93% doctors had knowledge regarding transmission of diseases and it was also higher in comparison to other paramedical staffs.

67.3% of HCW were not aware of items to be disposed in red bag which was maximum in sanitary staff (91.7%). 48.2% of HCW were not aware of items to be disposed in yellow bag which was maximum in lab technicians 66.7%. Awareness regarding disposal of items in red and yellow bag was found to be maximum in nurses which was 46.6% and 70.9% respectively. 60.9% of HCWs were aware of disposal of items in blue/white puncture proof container was maximum in doctors (80.4%). In study by Hakim S A etal.[10] knowledge regarding disposal of items in red and sharps box was maximum in doctors i.e. 60.9% and 51.8% respectively in comparison to other HCW. 92.2% doctors were aware of symbol of biohazards which was higher than other HCW. Overall 85.5% HCW aware of symbol of biohazard which was similar to the finding of Chudasama et al. (87.6%).[11]

In our study 69.1% HCW had reported vaccination against hepatitis B which is less in comparison to study by sarika et al.[8]Among HCWs vaccination against hepatitis B was maximum in nurses (88.3%) which is similar to study by Asadullah et al. which was 92%.[12] Our study showed that 95% of HCWs practiced using PPE while handling and disposing biomedical waste. The study by Chudasama et al.[11] reported use of PPE by 85% of HCW which was lower than our study. In the present study 75% of nurses were practicing segregation of waste at place of generation which was higher than other categories of HCW. Vishal B et al.[13] also had similar observations where 70.5 % nurses practiced segregation of BMW which was highest among different categories of HCW. According to Chudasama et al[11] 86.9% of HCW practicing segregation of waste which is higher in comparison to our study where 65.5% were practicing segregation.

In our study we had also noted that only 35%of HCW have received training on BMW which is low in comparision to study conducted by Chudasama et al[11] where 44% HCW received training. Training of both the technical staff and the non-technical staff is critical for the proper and appropriate management of biomedical waste.[14, 15]

CONCLUSION

The awareness and practices of the BMW management varied among different categories of HCW and were not found to be satisfactory. For effective implementation of biomedical waste management practices in the hospitals periodical sensitization and continuous training program is mandatory to improve the biomedical waste knowledge and practices among health care workers especially focusing at the paramedical staffs.

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