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Original Research Article

A study to assess the knowledge regarding bio-medical waste management among the staff nurses working in selected hospital, Siliguri

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ABSTRACT

Background: Biomedical waste (BMW) management have become a significant concern for health care providers as it carries a higher potential for infection and injury. Inappropriate knowledge of handling of healthcare waste may have serious health consequences. There is an urgent need for raising awareness of BMWM among the hospital staff in all healthcare setups. Effective management of biomedical waste is not only a legal necessity but also a social responsibility. Objective was to assess the knowledge of staff nurses regarding biomedical waste management and to find out the association between the level of knowledge of the staff nurses regarding BMW management with selected demographic variables.
Methods: A descriptive cross-sectional study, was conducted in March 2022. Study participants were the nursing staff, who are dealing with BMW. The data was collected by using a semi-structured questionnaire.
Results: 50% of staff nurses were having a good knowledge, 20% of them had poor knowledge. Significant relationship was found to be exist between knowledge regarding bio-medical waste management with qualification and the duration of their clinical practices ($p<0.05$).
Conclusions: Staff nurses have direct contact with bio-medical waste so they must be made aware of the risk of blood-borne infection and the main emphasis must be given to prevent such infections by using personal protective devices and regular training and supervision is necessary for better healthcare waste management and implementation.

Keywords: Biomedical waste, Hospital, Knowledge, Staff nurses

INTRODUCTION

Biomedical Waste (BMW) management is an issue of major concern for all healthcare providers and healthcare establishments as the waste produced during the course of healthcare activities carries the potential for infection and injury more than any other type of waste.[1] The vital requirement for a healthy life is a safe environment, Health care employees are more likely to contract an infection from their place of work employment, by providing the proper information regarding biomedical waste, this risk can be gradually reduced.[2]

Approximately 10-25 percent of bio-medical waste is hazardous, which could harm people, animals, or even the environment. In India, it is reported about 0.33 million tonnes of medical waste are produced annually.[3]

The average waste generation rate per bed per day is between 0.3 and 8.4 kg. According to data from the

Ministry of the Environment, 651.23 tonnes of BMW were produced daily in the nation in 2020 between May 2020 and March 2022, the daily output of BMW grew by around 962.31 tonnes as a result of the COVID-19 pandemic.[4]

METHODS

A descriptive cross-sectional study, was carried out. The study was conducted in Siliguri District Hospital, Darjeeling. The objectives of this study were to evaluate the level of knowledge regarding BMW management among the staff nurses. The data was collected between 7th March 2022 to 21st March 2022 from the 50 nursing staff of Siliguri District Hospital, North Bengal. The non-probability sampling technique and a semi-structured questionnaire on knowledge regarding Bio-medical waste management was administered to collect the data.

Study was approved by the Institutional Ethics Committee of Anandaloke Institute of Nursing Education, Siliguri. The collected data were subjected to analysis by using descriptive statistics in terms of frequency percentage, and inferential statistics by using the Chi-square test at a 0.05% level of significance, to determine the association between selected demographic variables and research variables.

Inclusion criteria

The staff nurses who completed G.N.M, B.Sc. in nursing, post-basic B.Sc. nursing, M.Sc. in nursing. The staff nurses who were willing to participate. The staff nurses who were available in hospital at the time of data collection.

Exclusion criteria:

Those staff nurses who were not willing to participate. The staff nurses who are not available at the time of data collection in the hospital. The staff nurse who does not fulfil the inclusion criteria of the study

The reliability of the tool

The reliability of the tool II was established using the formula of Cronbach's alpha. The reliability value of the tool was alpha =0.74, So the tool was feasible and reliable.

Data analysis

The collected data were analysed using descriptive statistics like frequency and percentages were calculated and the same are presented graphically. Inferential statistics such as A Chi-square test were performed to find out the association between the different demographic variables related to their knowledge of BMW.

RESULTS

Total of 50 participants were recruited for this study, with a 100% response rate. As shown in Table 1, the result revealed that the maximum 21 (42%) number of participants belonged to the age group of 30-39 years.

Table 1: Distribution table of frequency and percentage of the demographic characteristics n=50.

Variables	Frequency	Percentage
Age (years)		
20-29	14	28
30-39	21	42
40-49	10	20
>50	05	10
Gender		
Female	50	100
Male	00	00
Others	00	00
Preferred language		
English	34	68
Hindi	02	04
Bengali	07	14
Nepali	07	14
Qualification		
General nursing and midwifery	20	40
Bachelor of science in nursing	12	24
Post basic B Sc in nursing	12	24
Master of science in nursing	06	12
Duration of clinical practice (years)		
10	28	56
10-20	18	36
≥10	04	08
Number of trainings attended on infection control		
≤5	37	74
6-10	11	22
≥10	02	04
Experience of working area		
Intensive care unit	07	14
Critical care unit	07	14
High dependency unit	06	12
General ward	30	60
Provided service in		
Government hospital	50	100
Non-government hospital	00	00
Others	00	00

Maximum (68%) participants preferred English for obtaining medical information. Participants with diploma in nursing were more (40%), compared to undergraduate qualification 12 (24%) and postgraduate qualification 06 (12%) respectively. The study showed that 28 (56%) of them had less than 10 years of clinical practice. 74% of

staff nurses received training on infection control less than 5 times. Majority (60%) of them were working in general ward, while 12% of them were found to be working at high dependency unit. All (100%) participants had been the staff of government hospital on permanent basis.

Table 2: Distribution of study participants according to correct response of questionnaires of tool n=50.

Variable	Frequency Correct response	Percent Correct response
Answers regarding knowledge on BMW		
Biomedical waste management	40	80
Element of hazardous waste management is plan solid waste	22	44
Waste handling plan	27	54
The following is not a bio-medical waste	29	58
The lowest chance of producing bio-medical waste	40	80
The primary source of bio-medical waste	42	84
Incineration ash categorized as an incinerator waste	32	64
Answers regarding proper disposal of BMW		
Disposal of general waste	40	80
Disposal of glass items	42	84
Disposal of rubber items	44	88
Disposal of human anatomical waste	45	90
Disposal of expired medicine	30	60
Disposal of plastic syringes	22	44
Disposal of sharp waste	48	96
Incineration is done for sharp instrument	31	62
Disposal mechanism of black colour bio-medical waste bag	22	44
Disposal of infectious non-biodegradable	39	78
Incineration	25	50
Answers regarding storage of BMW		
Storage of Bio-medical waste	42	84
Duration of storage of bio-medical waste in a hospital	27	54
Hazardous waste transportation regulations	25	50
The symbol of bio-medical waste vehicle	40	80

Table 3: Distribution of level of knowledge regarding biomedical waste management among Staff nurses n=50.

Level of knowledge regarding biomedical waste management	Frequency	Percentage	Mean±SD
Excellent	06	12	12.5±8.5
Good	25	50	
Fair	09	18	
Poor	10	20	

Table 2 shows that 80% of participants were aware of the concept of biomedical waste management, 44% were well-versed in waste handling plans, 84% were knowledgeable about the sources of biomedical waste, 80% seem to be informed about the disposal of general waste, 62% of them found to be knowledgeable to function of incineration and only 44% were aware of the mechanism for disposing of bags of biomedical waste that were black in colour, 60% of them gave correct response on disposal of expired medicine. Regarding storage, 84% of participants reported knowing about storage, 50% were familiar with the regulations for transporting hazardous waste, as well as 80% were aware of the bio-medical waste symbol.

The level of knowledge of staff nurse related to biomedical waste management

Study depicted in Table 3, that the majority (50%) of staff nurses were having a good knowledge, 20% of them had poor knowledge, whereas 18% of them had fair knowledge and the remaining 12% of them were reported to have excellent knowledge respectively with the overall mean score of 12.5±8.5.

The association of the knowledge of BMW with certain important demographic characteristics, there was a significant association between knowledge regarding bio-medical waste management and the duration of their

clinical practices and with qualification ($p<0.05$). Therefore, it shows that demographic factors like age, preferred language, number of trainings attained and experience in the working area did not have an impact on knowledge regarding BMW among staff nurses.

DISCUSSION

Globally, 18 to 64 percent of healthcare institutions are reported to have unsatisfactory bio-medical waste management (BMWM) facilities; due to lack of awareness, insufficient resources and poor disposal mechanisms.[5,6] As per the biomedical waste (management and handling) rules 1998 any violation of the rules is punishable under the Environment Protection Act 1986.[7,8]

BMW management is an important issue for not only medical colleges, hospitals, clinics, and nursing homes but also for environment and law forcing agencies, media, and the public.[9] Awareness regarding effective BMW management is poor among various classes of health care workers.[10]

Knowledge concerning BMW handling and waste segregation is probably the most important crucial point and key for further waste management.[11,12]

Many studies have mentioned that health care workers have good BMW management knowledge, which was consistent with the current findings.

In current study, it was observed that majority 80% had knowledge regarding the concept of bio-medical waste, 54% were well-versed in waste handling plans,

Another study conducted in Bhopal reported that only 54.5% of nurses were aware of the existence of BMW management and handling rules 1998.[13]

Study conducted by Chudasama et al revealed that only 51% of participants have heard about BMW Rule/Act, 1998.[14]

In our study 60% of the participants gave correct answer regarding the proper disposal of discarded or expired medicine which is similar to the study done in a tertiary hospital Lucknow, where 62% of participants are found to be given correct response.[15]

In another study conducted in Uttarakhand, showed that 63% of the participants give correct answer regarding proper disposal of discarded expired medicine.[16]

The finding showed that among 50 staff nurses, the majority (50%) of staff nurses were having good knowledge (20%) of them had poor knowledge, whereas (18%) of them had a fair knowledge and the remaining (6%) of them were reported to have poor knowledge respectively

Study conducted in Sekhukhune District, Limpopo Province revealed that 77.4% of the respondents had excellent knowledge, 21.1% had good knowledge and 1.5% had poor knowledge of medical waste segregation.[17]

Study conducted in Bangladesh 2022, It was observed that 44.9% had excellent knowledge, 35.3% had good knowledge and 19.8% had poor knowledge.[18]

Similarly, the study conducted in Government Medical College Srinagar also revealed that only 11% respondents have attended in-service programme on BMW and majority of the respondents i.e. 89% have not attended any in-Service programme on BMW. Most of the respondents (87%) have average knowledge while as 8% have good knowledge and 5% have poor level of knowledge.[19]

In our present study, there was a significant ($p<0.05$) relationship between knowledge level and different demographic factors such as, academic background (qualification), and work experience.

Study conducted in tertiary level hospital in Cumilla, Bangladesh there was a significant ($p<0.05$), relationship between knowledge level and different demographic factors such as gender, academic background, and work experience.[18]

Similarly, another study conducted in Cumilla, Bangladesh 2022, showed that there was statistically significant ($p<0.05$) relationship was discovered between knowledge level and educational qualification) ($\chi^2=19.120$) and work experience ($\chi^2=13.146$).[18]

Another study conducted in Pakistan in 2013 also demonstrated that, level of knowledge was statistically significant ($p<0.05$) in term of socio-demographic information such as level of education, and working experience.[20]

Ethical considerations

Study was approved by the Institutional Ethics Committee of Anandaloke Institute of Nursing Education, Siliguri. Participation of the subjects in the study was voluntary and informed consents were obtained from all participants. Confidentiality and anonymity of information were maintained.

The current study had only a small number of staff nurses who willingly agreed to participate. A larger study sample including all healthcare workers employed in private hospitals and multispecialty clinics would have been taken as participants in order to compare trends in employee behaviour regarding the handling of biomedical waste, safety precautions, and the prompt reporting of any health issues which may arise as mismanagement of biomedical waste. This study could not be generalized at

the national level because it was conducted in a limited geographical area. This study could have been replicated as an interventional study using larger samples of all types of health care personnels from a larger geographic area.

CONCLUSION

Staff nurses have direct contact with bio-medical waste so they must be made aware of the risk of infection main emphasis must be given to teaching to prevent such infections by using personal protective devices. The study concluded that regular training and supervision is necessary for better healthcare waste management and implementation and immunization. Safe and effective management of biomedical waste is not only a legal necessity but also a social responsibility. Regular training sessions regarding separation, storage, transportation, and disposal of BMW should be conducted by the administration.

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