ORIGINAL RESEARCH

Impact of training on enhancement of knowledge, attitude and practices of bio medical waste management and handling among staff nurses of GGSMCH Faridkot: A before and after comparison study

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ABSTRACT:
Introduction: Hospitals are the centre of cure and also the important centres of infectious waste generation. The lack of awareness and technical guidance in the management of the bio medical waste has led to the hospital becoming a hub in spreading diseases rather than working towards eradicating them. Hence, this study was undertaken to assess the existing knowledge, attitude and practices and to evaluate the impact of a training program on BMW management on the knowledge attitude and practices among the staff nurses.
Methodology: Before and after comparison study was conducted in GGS Medical College and Hospital, Faridkot, Punjab**.** The pre-intervention phase was performed using a sample 91 staff nurses. A predesigned interview questionnaire was used to assess KAP. Next, training was imparted to the study subjects and KAP were re-assessed using the same interview questionnaire. Overall correct answers obtained were categorized into Good (>30correct answers), Fair (20-25correct answers) and Poor (<20 correct answers). The data was compiled in Excel worksheet and percentage was used to interpret the results.
Results: only 3 out of 91 respondents scored good (>30) before the educational programme i.e., training.
Conclusion: It was also observed that there occurred markedly increase in the improvement in Knowledge, Attitude and Practices regarding BMW management rules among nursing staff as there were no respondents who scored fair or poor grade.
Keywords: Bio Medical Waste, Training, Knowledge, Attitude, Practices

Introduction

Medical care plays a vital role in our life, health and well-being. This field has done wonders by creating miracles for saving human life. But on the other side we have in front, the dangerous aspect that is the waste generated from medical activities which is highly contagious (1). Biomedical waste management is an important public health issue. After so many years of formation of Biomedical Waste Management and Handling Rules 1998 indiscriminate disposal of hospital waste is still a major challenge. The common reasons behind are lack of awareness on recommended segregation methods, safe disposal methods and ignorant behavior of hospital authorities. Hospital is an establishment which provides various preventive, diagnostic, curative, rehabilitative and research services (2).

"Bio-medical waste" means any waste, which is generated during 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 of Biomedical waste Management and Handling Rules 1998 (3). Healthcare facilities including laboratories generate a huge amount of non-hazardous and hazardous wastes. Disposables medical devices and items generate biomedical waste beyond one's expectation (4). The hospital waste is

different from the domestic waste. The hospital waste may also be categorized into hazardous and nonhazardous waste, and if this waste is not handled properly, then the patient, staff, and public are at risk of getting infection from Hazardous waste (5).

It is estimated that 80-85 % waste is general or domestic or non-infectious waste, 10% is infectious, they act as a focus of infection, greatly contributing to the rise of nosocomial infections, due to the high concentration of *Shigella* species, *Salmonella typhi*, *Escherichia coli* and hepatitis virus. Handling of infectious waste callously; increases the risk of contamination, especially for the Class IV employees and 5% is other hazardous waste (6)

Material and Methods

The present study "Impact of training on enhancement of Knowledge, Attitude and Practice Of BMW&H among staff Nurses of GGSMCH Faridkot" is a before and after Comparison Study. Study was conducted in GGSMCH Faridkot.

Study setting: The study was conducted in Guru Gobind Singh Medical College & Hospital, Faridkot.

Study period: Data for the study was collected over a period of one year (April 2021-March 2022).

Study design: A before and after comparison study.

Study population: Nursing staff working in GGSMCH.

Inclusion criteria: Nursing staff ready to participate in study was included.

Exclusion criteria: Nursing staff not giving written consent.

Sampling:

Sample size estimation: n= [4PQ/L2]

Where, n= minimum sample size required.

P= The proportion of nursing staff with good practice in Bio Medical Waste Management as 35 % (7), Q=(1-P), Level of confidence =95 %, Marginal error = 10%

Sample size came out to be 91. Therefore, a total of 91 health care workers (satisfying inclusion and exclusion criteria) formulated the sample size.

Sampling frame: GGSMCH Faridkot Nursing Staff list.

Sampling unit: The study was conducted among nursing staff.

Sampling technique: The selection of the subjects was done by systematic random sampling. A list of nursing Staff was procured. There were total of 218 nurses. First subject was selected randomly by currency note method considering the last digit of the currency note. Subsequent subjects were selected as per sampling interval. list

Data collection tools:

The questionnaire consisted of three sections on the basis of knowledge, Attitude and Practices. These questions were for assessing the knowledge attitude and practices regarding BMW (M and H) rules. It was translated to vernacular language i.e., Punjabi.

Methodology

After line listing and selection of subjects. All the nursing staff were included in the study using simple random sampling technique. The consent form from each participant was obtained individually for filling the pre-test questionnaire before imparting a training program. Pre-test questionnaires were distributed among the participants to assess the knowledge, attitude and practice regarding BMW(M&H) rules. The filled questionnaire was collected. Thereafter, the training program was held BMW (M and H) rules 2016 with the help of audio-visual learning techniques. The participants were then given the post-test questionnaires after the training session, and the filled questionnaires were collected before the closing of training program. The questions evaluated the basic knowledge, attitude and practice towards the biomedical waste disposal of the participants. Overall correct answers obtained were categorized into Good (>30correct answers), Fair (20-25correct answers) and Poor (<20 correct answers). The data was compiled in Excel worksheet. Chi-square test and percentages were used to interpret the results.

Results

Table 1: Impact of **Educational program** on **Knowledge** of Nursing Staff (n=91) with regard to BMW management

Knowledge regarding BMW management	Pre intervention		Post intervention		Chi square value	p value
	N	%	N	%		
Do you know about BM waste generation and legislation?						
Yes	89	97.8	90	98.9	0.34	0.56
No	2	2.2	1	1.1		
Have you attended any prior training of BMW Management?						
Yes	80	87.9	91	100	74.19	<0.05
No	11	12.1	0	0.0		
If yes, how many times?						
1	27	29.7	0	0.0	54.71	<0.05
2	17	18.7	1	1.1		
≥3	47	51.6	90	98.9		
How should BMW be disposed off?						
Dump directly into garbage bins	9	9.9	1	1.1	80.98	0.91
Handling it over to pre-medical waste agency	80	87.9	90	98.9		
Don't know	2	2.2	0	0.0		
Do you think it is important to know about BM waste generation, hazards and legislation?						
Yes	89	97.8	90	98.9	0.34	0.56
No	2	2.2	1	1.1		
Biomedical Waste (Management & Handling) Rules were first proposed in:						
1997	11	12.1	0	0.0	21.21	<0.05
1998	72	79.1	91	100		
1999	6	6.6	0	0.0		
2000	2	2.2	0	0.0		
Correct Sequence of Bio-Medical Waste						
Segregation → Collection & storage → Transportation → Treatment & Disposal	83	91.2	91	100	8.36	0.15
Collection → Transportation → Disposal	6	6.6	0	0.0		
Don't know	2	2.2	0	0.0		
Which statement describes one type of BM waste:						
Materials that may be poisonous, toxic, or flammable and do not pose disease-related risk.	12	13.2	0	0.0	18.75	<0.05
Waste that is saturated to the point of dripping with blood or body fluids contaminated with blood.	74	81.3	91	100		
Waste that does not pose a disease-related risk.	5	5.5	0	0.0		
According to the Biomedical Waste (Management & Handling) Rules, waste should not be stored beyond:						
12Hrs	27	29.7	0	0.0	37.36	<0.05
48 Hrs	60	65.9	91	100		
72 Hrs	3	3.3	0	0.0		
96 Hrs	1	1.1	0	0.0		
Which of the following is the universally accepted symbol for bio hazard						

	5	5.5	0	0.0		
	76	83.6	91	100	16.34	<0.05
	10	11.0	0	0.0		
Who regulates the safe transport of medical waste?						
Pollution Control Board of India.	35	38.5	91	100		
Transport Corporation of India.	47	51.6	0	0.0	80.88	<0.05
College Administration.	9	9.9	0	0.0		
Do you need a separate permit to transport biomedical waste?						
Yes	38	41.8	0	0.0		
No	47	51.6	91	100	58.02	<0.05
Can't say	6	6.6	0	0.0		

Table 1 shows comparison of distribution of responses of study subjects to questions related to knowledge regarding bio medical waste before and after intervention. Statistically significant difference was observed for responses to question regarding any prior training attended for BMW Management and how many times it was attended, waste not to be stored beyond how many hours, universally accepted symbol for bio hazard (p<0.05). The difference in responses regarding the knowledge of safe transport and its permit was found to be statistically significant (p<0.05).

Table 2: Impact of **Educational program** on **Attitude** of Nursing Staff (n=91) with regard to BMW management

	Pre intervention		Post intervention		Chi square value	p value
	Frequency	**Percent**	**Frequency**	**Percent**		
Safe management of health care waste is not an issue at all.						
Agree	11	12.1	91	100.0		
Disagree	77	84.6	0	0.0	142.74	<0.05
Can't comment	3	3.3	0	0.0		
Waste management is team work/no single class of people is responsible for safe management.						
Agree	35	38.5	91	100.0		
Disagree	53	58.2	0	0.0	80.88	<0.05
Can't comment	3	3.3	0	0.0		
Safe management efforts by the hospital increase the financial burden on management.						
Agree	9	9.9	0	0.0	25.02	<0.05
Disagree	69	75.8	91	100.0		

Can't comment	13	14.3	0	0.0		
Safe management of health care waste is an extra burden on work.						
Agree	7	7.7	0	0.0	11.7	<0.05
Disagree	80	87.9	91	100.0		
Can't comment	4	4.4	0	0.0		
Do you wear gloves while handling bio-medical waste?						
Yes	41	45.1	91	100.0	68.93	<0.05
No	47	51.6	0	0.0		
Can't comment	3	3.3	0	0.0		
Will you like to attend voluntarily programmes that enhance and upgrade your knowledge about waste						
Yes	41	45.1	91	100.0	68.93	<0.05
No	49	53.8	0	0.0		
Can't comment	1	1.1	0	0.0		
Do you think that infectious waste should be sterilised from infections by autoclaving before shredding						
Yes	74	81.3	91	100.0	18.75	<0.05
No	13	14.3	0	0.0		
Can't comment	4	4.4	0	0.0		
Do you think that an effluent treatment plant for disinfection of infected water should be set up in dental colleges?						
Yes	44	48.4	91	100.0	63.36	<0.05
No	47	51.6	0	0.0		
Do you think it is important to report to the Pollution Control Board of India about a particular institution if it is not complying with the guidelines for biomedical waste management?						
Yes	88	96.7	91	100.0	3.05	0.08
No	3	3.3	0	0.0		
Do you think that labelling the container before filling it with waste is of any clinical significance?						
Yes	46	50.5	89	97.8	53.03	<0.05
No	45	49.5	2	2.2		

Table 2 shows comparison of distribution of responses of study subjects to questions related to attitudes regarding bio medical waste before and after intervention. Statistically significant difference was observed in the responses to the questions related to attitude/behaviour of subjects towards BMW management. Marked changes were reported for weather Waste management is team work or safe management of health care waste is an extra burden on work or reporting to the Pollution Control Board of India about a particular institution if it is not complying with the guidelines for biomedical waste management or labelling the container before filling it with waste is of any clinical significance (p<0.05).

Overall, it was observed that there was marked improvement in the distribution of correct responses in all three dimensions i.e., knowledge, attitude and practices regarding BM waste management among subjects.

Table 3: Impact of **Educational program** on **Practice** of Nursing Staff (n=91) with regard to BMW management

Practice regarding BMW management	Pre intervention		Post intervention		Chi square value	p value
	N	%	N	%		
Do you know about colour-coding segregation of BM waste?						
Yes	88	96.7	91	100.0	3.05	0.21
No	2	2.2	0	0.0		
Not sure	1	1.1	0	0.0		
Do you follow colour-coding for BM waste?						
Yes	86	94.5	91	100.0	5.14	0.07
No	4	4.4	0	0.0		
Sometimes	1	1.1	0	0.0		
Is the waste disposal practice correct in your hospital?						
1	27	29.7	91	100.0	98.7	<0.05
2	4	4.4	0	0.0		
3	60	65.9	0	0.0		
Objects that may be capable of causing punctures or cuts, that may have been exposed to blood or body fluids including scalpels, needles, glass ampoules, test tubes and slides, are considered biomedical waste. **How should these objects be disposed off?**						
Black bags	2	2.2	0	0.0	43.33	<0.05*
Yellow bags	11	12.1	0	0.0		
Clear bags	22	24.2	0	0.0		
Sharp container	56	61.5	91	100.0		
Documents with confidential patient information are to be disposed off into the paper recycling bins.						
True	10	11.0	3	3.3	16.81	<0.05
False	70	76.9	88	96.7		
Don't Know	11	12.1	0	0.0		
The colour code for the BM waste to be autoclaved, disinfected is:						
Red	12	13.2	88	96.7	128.25	<0.05
Black	8	8.8	0	0.0		
Yellow	19	20.9	1	1.1		
Blue/White	52	57.1	2	2.2		
The approximate proportion of infectious waste among total waste generated from a health care facility is:						
10-20%	17	18.7	91	100.0	124.7	<0.05
30-40%	58	63.7	0	0.0		
50-60%	10	11.0	0	0.0		
80-90%	6	6.6	0	0.0		
The colour code for disposal of normal waste from the college is:						
Red	4	4.4	0	0.0	41.81	<0.05
Black	57	62.6	91	100.0		
Yellow	9	9.9	0	0.0		
Blue/White	21	23.1	0	0.0		
All the following steps should be followed after an exposure with infected blood/body fluid and contaminated sharps EXCEPT:						
Exposed parts to be washed with soap and water.	18	19.8	0	0.0	124.7	<0.05
Pricked finger should be kept in antiseptic	54	59.3	0	0.0		

lotion.						
Splashes to eyes should be irrigated with sterile irritants.	17	18.7	91	100.0		
Splashes to skin to be flushed with water.	2	2.2	0	0.0		
All of the following statements about hazardous waste containers are true, except for:						
Containers must be closed except when removing or adding waste.	10	11.0	0	0.0		
Containers must be clean on the outside.	4	4.4	0	0.0	96.35	<0.05
Contents must be compatible with the type of waste containers.	49	53.8	0	0.0		
Any type of container, including food containers, can be used to contain hazardous waste.	28	30.8	91	100.0		

Table 3 shows comparison of distribution of responses of study subjects to questions related to practices regarding bio medical waste before and after intervention. The difference in responses to the question that weather waste disposal practice is correct in their hospital or not was found to be statistically significant ($p<0.05$). Other responses that were found to be statistically significant includes – disposing off the objects that may be capable of causing punctures, documents with confidential patient information are to be disposed off into the paper cycling bins, the colour code for BMW to be autoclave and disposal of normal waste colour code, step not to follow after exposure with infected blood or body fluid and the wrong statement regarding hazardous waste containers ($p<0.05$).

Table 4: Grading of Respondents after conducting educational programme

Grading	Frequency (n)	Percentage (%)
Good (>30)	91	100%
Fair (20-25)	0	0
Poor (<20)	0	0
Total	91	100%

Table 4 shows the grading of the respondents after conducting the educational programme. It was observed that the majority of the study participants had scored good (>30).

Table 5 : Grading of Respondents before and after educational programme

Grading	Before	After
Good (>30)	3	91
Fair (20-25)	75	0
Poor (<20)	13	0
Total	91	91

Table 5 shows that only 3 out of 91 respondents scored good (>30) before the educational programme i.e., training. It was also observed that there occurred markedly increase in the improvement in Knowledge, Attitude and Practices regarding BMW management rules among nursing staff as there were no respondents who scored fair or poor grade.

Discussion

Nurses are an essential part of the medical staff who provide care in the correct disposal of hospital waste. They enter the hospital waste management process at a very early stage. The increase in the usage of disposable medical equipment and the expansion of the medical industry globally over the past ten years have both contributed to the massive volume of medical waste produced. In developing nations with limited prior experience implementing official and informal community environmental education awareness programmes, the challenge of waste management has just surfaced (8).

The planning, implementation and monitoring of actions aiming to avoid contact, guarantee the care of clients and professionals involved, avoid the occurrence of ecological influences, and decrease waste production comprise the management of health-care waste (HCW) (9).

KNOWLEDGE

In our study it was observed that 97.8% of the respondents were aware of Biomedical waste management rules. Similar finding was observed by the study conducted by Mathur et al in 2011 in Allahabad city where 91.7% nurses were aware of Biomedical waste management rules. 85% were aware of segregation of waste at source, this is in consistence with our study that showed 87.9% of the nurses knew about proper segregation of the biomedical waste being generated (10).

In another study conducted by Vishal et al in 2012, only 54.5% nurses were aware of existence of BMW management & handling rules while 72.7% knew that BMW should not be stored beyond 48 hrs and 77.3% nurses were aware of the correct method of treatment and disposal. Similar findings were observed in present study where 65.9% and 91.2% nurses were aware of this, respectively (10). Bariya RB et al in 2017 assessed BMWM practices of staff nurses in Vadodara Hospital, which reported that 100% respondents knew about Government legislations related to BMW management in our country (11).

In our study 87.9 % of the respondents were aware of correct disposal of BMW. Our results were quite similar to the study conducted by Narang et al (9). wherein 88% of the study participants were aware of the disposal of waste into different color-coding bags.

PRACTICES

The disposal of erroneous waste in wrong colour coded container definitively abolishes the efforts of appropriate disposal of waste. The current study revealed that 94.5% of the staff nurses followed the colour coding for BMW disposal. However, when compared with the study conducted by Mathur V et al in Allahabad city, 73.3% of the nurses practiced proper disposal of BMW in specific colour coded containers (10).

ATTITUDE

According to Pinto NV et al, 60.5% of the study participants thinks that safe management efforts by the hospital increases the financial burden on the management. While 43.6% believed this according to Anand P et al (12). If we compare this to our study, only 9.9% agreed, which is quite less.

As observed from the analyzed data of this present study, only 45.1% of the staff nurses wore gloves while handling the bio-medical waste. However, the results of the study conducted by Chudasama R in 2014 showed that 97.8% used gloves (13). Another study done by Haider S et al in Ranchi showed 73.33 of the participants used personal protective measures while handling BMW (14).

IMPACT OF EDUCATIONAL PROGRAMME

After the training procedure, a vast difference was noted among the staff nurses who lacked knowledge, attitude and practices towards BMW, confirming that training methodology helped the study participants.

In the current study, 7.7% of the study participants believed that safe management of health care waste is an extra burden on work. However, after conducting the educational programme regarding the management of BMW, 100% of the staff nurses disagreed to this statement. Similar study was done by Pinto et al in 2014 where it was revealed that during pre-intervention 10% of respondents thought that BMWM was extra burden on work. While post-intervention, only 5% thought so (15).

In the present study, before the educational programme was conducted, majority of the staff nurses (75%) fell in fair category (20-25) and 14.3% of them fell in poor category (<20). These findings are in contrast with the study done by Chaudhary A in Shimla, Himachal Pradesh where (2016) during pre-intervention, the scores of the majority (86.2%) of the participants fell in poor category, 13.3% in fair, only 0.5% in good while none in the excellent category. The study found out that there was a highly unsatisfactory level of knowledge with nearly 86.2% of participants falling in poor category score regarding recent amendments in BMW management (16).

Conclusion

Concluding from the results, the importance of training regarding biomedical waste management cannot be overemphasized; lack of proper and complete knowledge about biomedical waste management impacts practices of appropriate waste disposal. Regular training programs of health care workers on bio medical waste are very important and this should be done at regular interval. The structured training program was very effective in increasing the knowledge of participants regarding BMW (M and H) rules.

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