Research Article

Pre-experimental Study to Assess the Impact of Awareness Program on Knowledge Regarding Bio-medical Waste Management among Staff Nurses at Selected Hospital of Punjab

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Abstract

Aim: The aim of this study is to provide adequate knowledge and awareness among staff nurses reading bio-medical waste management.

Introduction: Globally current waste and resource management lacks a holistic approach covering the whole chain of product design, raw material extraction, production, consumption, recycling, and waste management. About 85% waste is generated by health-care activities in general from non-hazardous waste and 15% is considered hazardous material that may be infectious, toxic, or radioactive.

Methods: Pre-experimental design and 50 subjects were selected for this study. Structured knowledge questionnaire was used and analyzed by descriptive and inferential statistics using Chi-square and *t*-test.

Results: The findings revealed that in post-test majority of the study subjects 43 (86%) had good knowledge, 7 (14%) had average knowledge and none of them had poor knowledge with post-test mean score (44.04 ± 6.141) is significantly higher than the mean pre-test knowledge scores (24.50 ± 8.428), with a mean difference of (19.540).

Conclusion: Significant association of pre-test knowledge score with professional qualification ($P = 0.000$) while as no association was found between gender and years of experience with their pre-test knowledge scores ($P > 0.05$) at 0.05 level of significance.

Keywords: Assess, awareness program, bio-medical waste, impact, knowledge, staff nurses

Introduction

Biomedical waste (BMW) is any kind of waste either solid or liquid containing harmful materials generated by healthcare facilities, for example, hospitals, practices, and health camps. This waste consists of human tissues, contaminated blood, body fluids, discarded medicines, drugs, contaminated cotton, dressings, and sharps such as needles, glass, blades, scalpels, and lancets. BMW collection and disposal have greatest risk to healthcare, sanitation workers and the general community. The BMW without proper sterilization leads to acquired immune deficiency syndrome, hepatitis B and C, severe acute respiratory syndrome, tetanus, psychosocial trauma, etc. BMW management is important to protect the environment and health of the population.[1,2]

BMW is defined as any waste generated when patient care activities are carried out in a health-care setting, which has the

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potential to cause harm to human beings and environment. It is also known as clinical waste, medical waste and health-care waste. It constitutes about 15–25% of total waste generated in a hospital. To avoid harm to human beings, animals and the environment special precautions and treatment modalities are required for BMW. Most common pathogens found to be transmitted by BMW are human immunodeficiency virus (HIV), hepatitis B virus, and hepatitis C virus. It is, therefore, one of the top priorities for the hospital management and the healthcare professional to implement a proper policy and to ensure that the waste management practices are being followed. Hence, due care is taken while handling and disposing it.[3]

Health-care waste is a unique category of waste by the quality of its composition, source of generation, its hazardous nature and the need for appropriate protection during handling, treatment and disposal. Mismanagement of the waste affects not only the generators, operators but also the common people too.[4]

BMW' means any solid or liquid waste including its container and any intermediate product, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research pertaining thereto or in the production or testing thereof.[5]

"BMW" is any waste, which is generated during diagnosis, treatment, or immunization of human beings. This waste is also generated during research activities or in the production or testing of biological material. The nurses spend maximum time with patients in the ward than any other member of the health team, increases their exposure and risk to the hazards present in hospital environment, mainly BMW. They need to be well equipped with latest information, skills, and practices in managing this waste besides reducing hospital-acquired infections to protect their own health. They are also responsible for preventing risk due to waste to the other members of health team and community at large.[6]

Due to the competition to improve quality and so as to get accreditation from agencies such as ISO, NABH, JCI, and many private organizations have initiated proper BMW disposal but still the gap is huge. Many studies took place in Gujarat, India regarding the knowledge of workers in facilities such as hospitals, nursing homes, or home health. It was found that 26% of doctors and 43% of paramedical staff were unaware of the risks related to BMWs. After extensively looking at the different facilities, many were undeveloped in the area regarding BMW. The rules and regulations in India work with the BMW (management and handling) rules from 1998, yet a large number of health-care facilities were found to be sorting the waste incorrectly.[7]

Hospitals are those institutions which have existed since time immemorial in one form or the other and have become more complex in the present time frequented by people from every walk of life without any distinction between sex, age, caste, and religion. Recently, there is a significant increase in the dental and medical teaching hospitals and correspondingly there has been tremendous increase in the amount of BMW generated by the hospitals. BMW can be defined as "any solid, fluid or liquid waste, including its container and any intermediate product, which is generated during its diagnosis, treatment or immunization of human beings or animals, in research pertaining thereto, or in the, production or testing of biological and the animal wastes from slaughter houses or any other like establishments."[8,9]

Waste generated in a dental teaching hospital is similar to that generated by other hospitals which include a large component of general waste and a smaller proportion of hazardous waste. Dental professionals are at a greater risk for acquiring cross-infection while treating patients. This is evident from the fact that most of the human pathogens have been isolated from oral secretions. Dental hospitals use instruments and materials that are directly exposed to blood and saliva and are therefore potential sources of infection. Many chemicals such as acrylics, impression materials, and mercury used for restorative purposes may have a possible environmental and human health impact if not handled properly.[10-12]

Health-care waste is a heterogeneous mixture, which is very difficult to manage as such. A major issue related to present BMW management is that many hospitals dispose their waste in an improper, haphazard, and indiscriminate manner which contributes to spread of serious diseases such as hepatitis and HIV. BMW management has been brought into focus recently in India, particularly with the notification of BMW rules, 1998 which was brought out by Union Ministry of Environment and Forests under the provision of Environment [protection] act, 1986. These rules apply to all those persons which are connected with generation, collection, receiving, storage, transportation, and handling or BMW in any form.[13,14]

Improper management of waste generated in health-care facilities causes a direct health hazards on the society, the health care workers and on the environment. There is a requirement for the management of BMW to minimize the risk of infection outside the hospital for waste handlers, scavengers and those living in the vicinity of hospitals. Management is also needed due to the risk of air, water, and soil pollution, or due to improper incineration emissions and ash. It plays an important role in disposal of the discarded drugs that can be repacked and sold off.[15]

Keeping in view the above findings and from researchers own clinical experience the researcher realized that, many of staff nurses are not aware regarding the BMW management. Lack of awareness about health hazards related to BMW, inadequate training of proper waste management, absence of waste management and disposal system, insufficient financial and human resources, and low priority given to the topic are most common problems connected with the BMW. Staff nurses play a major role in the whole process. They need to be informed about current amendments in BMW management rules and current technology to deal with BMW. Therefore, sound knowledge and safe practices among them are to be strengthened.

In view of the above studies and magnitude of the problem, the investigator felt the need to assess the level of knowledge of staff nurses and make them aware of the BMW management and so this study was undertaken.

Objectives of study

The objectives are as follows:

1. To asses pre-interventional knowledge scores regarding BMW management among staff nurses.
2. To asses post-interventional knowledge scores regarding BMW management among staff nurses.
3. To compare pre and post interventional knowledge regarding Bio -medical waste management among staff nurses.
4. To determine association of pre-test knowledge with selected demographic variables gender, professional qualification, and years of experience of staff nurses.

Materials and Methods

A pre-experimental one group pre-test posttest research design was conducted to assess the impact of awareness program on knowledge regarding BMW management among staff nurses in selected hospital of Punjab. Fifty subjects were selected by purposive sampling technique. The tool consisted of demographic variables and knowledge questionnaire. Before data collection informed consent was obtained from the participants. The data were collected for analysis using descriptive and inferential statistics.

Results

The data presented in Table 1 show that most of study subjects 45 (90%) were females and 5 (10%) were males.

The data presented in Table 2 show that as per professional qualification of nurses 30% GNM, 24% had post basic BSC nursing degree, and (46%) had BSC nursing degree.

The data presented in Table 3 represent that maximum number of the study subjects 20 (40%) was having experience of >5 years, 18 (36%) having 5–10 years of experience while as 12 (24%) were having <10 years' experience.

The data presented in Table 4 depict that in the pre-test most of the study subjects 26 (52%) had average level of knowledge, 19 (38%) had poor level of knowledge whereas only 5 (10%) had good level of knowledge.

The data present in Table 5 show that the pre-test (mean ± SD) knowledge score of study subjects regarding BMW management was (24.50 ± 8.428), median was 25.5, maximum score was 41, minimum score was 14, range was 27, and mean percentage knowledge score was 45.37.

The data presented in Table 6 show that in the post-test, maximum number of the study subjects 43 (86%) had good level of knowledge, 7 (14%) had average level of knowledge, and none of the subjects had poor level of knowledge in the post-test.

The data presented in Table 7 show that the post-test (mean ± SD) knowledge score was (44.04 ± 6.141), median score was 46, maximum score was 53, minimum score was 32, range was 21, and mean percentage knowledge was 81.56.

The data presented in Table 8 show that in the pre-test 19 (388%) of subjects had poor level of knowledge while as in the post-test none of the subjects had poor level of knowledge. Consequently, 26 (52%) of subjects in the pre-test had "average level of knowledge" and in the post-test only 7 (14%) of subjects had average level of knowledge. In the pre-test, only 5 (10%) subjects had good knowledge while as most of the subjects, that is, 43 (86%) had good level of knowledge in the post-test.

It is evident from Table 9 that the mean difference between pre-test and post-test knowledge scores was found to be (19.540) at 0.05 level of significance with $P = 0.001$, which is statistically significant. Hence, the null hypothesis stating "there is no significant increase in mean post-test knowledge scores as compared to mean pre-test knowledge

Table 1: Distribution of study subjects according to gender

Gender	Study subjects	
	Frequency	Percentage
Male	45	90
Female	5	10

Table 2: Distribution of study subjects according to professional qualification

Professional qualification	Study subjects	
	Frequency	Percentage
G. N. M	15	30
Post basic nursing	12	24
BSC nursing	23	46

Table 3: Distribution of study subjects according to years of experience (N=50)

Years of experience	Study subjects	
	Frequency	Percentage
>5 years	20	40
5–10 years	18	36
<10	12	24

Table 4: Distribution of study subjects according to pre-test knowledge score regarding bio medical waste management

Pre-test knowledge score	No. of subjects	
	Frequency	Percentage
Poor (0–18)	19	38
Average (19–36)	26	52
Good (37–54)	5	10

Table 5: Pre-test mean knowledge score, standard deviation, median score, maximum score, minimum score, range, mean percentage knowledge of study subjects regarding bio medical waste management waste management

Pre test knowledge score	Mean	Median	SD	Range	Maximum	Minimum	Mean %
Pre test score	24.50	25.5	8.428	27	41	14	45.37

Table 6: Distribution of study subjects according to post-test knowledge scores regarding bio medical waste management

Post-test knowledge level score	No. of subjects	
	Frequency	Percentage
Poor (0–18)	0	0
Average (19–36)	7	14
Good (37–54)	43	86

Table 7: Post-test mean knowledge score, SD, median score, maximum score, minimum score, range and mean percentage knowledge of subjects regarding bio medical waste management

Post knowledge score	Mean	Median	SD	Range	Maximum	Minimum	Mean %
Post score	44.04	46	6.141	21	53	32	81.56

Table 8: Frequency and percentage distribution of study subjects according to pre-test and post-test knowledge score regarding BMW management, (*N*=50)

Pre-test and post-test knowledge score	No. of subjects in pre-test		No. of subjects in post-test	
	Frequency	Percentage	Frequency	Percentage
Poor (0–18)	19	38	0	0
Average (19–36)	26	52	7	14
Good (37–54)	5	10	43	86

Table 9: Mean, standard deviation, paired "*t*" test between pre-test and post-test knowledge scores of study subjects, (*N*=50)

Pre-test and post-test knowledge score	Mean±SD	Mean-difference	*t* value	p value
Pre-test score	24.50±8.428	19.540	29.236	<0.001*
Post-test score	44.04±6.141			

*Significant

score regarding BMW management among staff nurses after administration of awareness program at 0.05 level of significance" was rejected.

Discussion

The major findings of the study and discusses them in relation to similar studies conducted by other researchers. The findings of the study were discussed as per the objectives and hypotheses. The findings of the study showed that majority of study subjects 45 (90%) were females and only 5 (10%) were males. Most 20 (40%) of the sample had experience of <5 years and least percentage 12 (24 %) had experience of more than 10 years and 18 (16.70%) had an experience in between 5–10 years.

These findings are compared conducted by Patidar *et al.*, (2014)[16] where majority of the sample (78.3%) were females and only 21.7 % of sample were males, and also showed, majority of the sample (60%) were having clinical experience of <5 years and only (3.3%) of sample were having experience in between 10–15 years.

In pre-test score study most of the subjects 26 (52%) had average level of knowledge, 19 (38%) had poor level of knowledge, and only 5 (10%) had good level of knowledge regarding BMW management.

These findings are supported with a study conducted by Elnour *et al.*, (2015).[17] The result (pretest) showed that (58%) of subjects had fair level of knowledge, (25 %) had poor level of knowledge, and only (17%) had good level of knowledge and these findings are supported with the study conducted by Nagraju *et al.* (2013)[18] where it was found that 24%were having good level of knowledge, 65% having adequate knowledge, and 10% were having poor level of knowledge. In post-test score most of the study subjects among the total sample (N = 50) none of study subjects, 0 (0%) had poor level of knowledge, 7 (14%) had average level of knowledge, and majority of study subjects 43 (86%) had good level of knowledge regarding BMW management. The findings are supported with the study conducted by Elnour *et al.*, (2015) [17] where it revealed that majority of study subjects (56%) had good level of knowledge, 34% had fair level of knowledge, and only 10% had poor level of knowledge. In this study, the

difference between the pre-test knowledge score and the post-test knowledge of staff nurses on knowledge regarding BMW was done, the mean post-test knowledge scores (44.04 ± 6.141) of staff nurses regarding BMW management is significantly higher than that of the mean pre-test knowledge scores (24.50 ± 8.428), with a mean difference of (19.540). These findings are supported with the study conducted by Jadhav *et al.* (2015)[19] on knowledge regarding BMW management where the pre-test knowledge score was (17.0 ± 2.25) and post-test knowledge was (21.94 ±1.20) with a mean difference of (4.94). The present study results revealed that there was a significant association of pre-test knowledge score with professional qualification ($P = 0.000$) while as no association was found between pre-test knowledge with other demographic variable gender and years of experience ($P = 0.393$) and ($P = 0.112$), respectively, the findings of study are also supported with study conducted by Patidar *et al.*, (2014)[16] where the mean pre-test score was (14.28 ± 4.322) and mean post-test score was (22.43 ± 2.825) with a mean difference of (8.15). These findings are also supported with another study conducted by Barthma *et al.*, (2015)[20] where the result revealed that there was significant increase in post-test knowledge as compared to pre-test knowledge and was statistically significant ($P < 0.001$). The pre-test mean score was (3.93 ± 1.388) and post-test mean score was (7.27 ± 1.311) with a mean difference of 3.34. The present study results revealed that there was a significant association of pretest knowledge score with professional qualification ($P = 0.000$) while as no association was found between pre-test knowledge with other demographic variable gender and years of experience ($P = 0.393$) and ($P = 0.112$), respectively. These findings are supported with a study conducted by Patidar *et al.*, (2014)[16] who conducted a study to assess the effectiveness of structured teaching program on BMW management where the study revealed that there was no significant association of knowledge with gender and years of experience as variable ($P = 0.600$) and ($P = 0.265$) respectively, but there was significant association of knowledge with educational qualification as variable ($P = 7.846$).[16-20]

Conclusion

This study was conducted with the objective "to assess the effect of awareness program on knowledge regarding BMW management among staff nurses at selected hospital Punjab. Majority of study subjects were not having good level of knowledge but were having good level of practice regarding BMW management. The mean post-test knowledge scores of staff nurses regarding BMW management were significantly higher than that of the mean pre-test knowledge scores. The mean pretest knowledge score was (24.50), which increased to (44.04) showing an average increase of (19.54), while as mean pre-test practice score was (13.96) and post-test practice score was (15.80) which increased to (1.979) regarding BMW management indicating that awareness program was effective in improving knowledge and practice of staff nurses regarding BMW management.

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Conflict of Interest and Funding

As such there was a bit conflict and compromise between the staff nurses and investigator because the stuff nurses were not so much interested in gaining the knowledge regarding BMW. The fact was that they are professional nurses with their busy schedule and are having good piece of knowledge regarding BMW and its management. The investigator also has done ethically this work without getting any fund or any support from any organization.

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