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RESEARCH ARTICLE

IMPACT OF TRAINING PROGRAM ON BIOMEDICAL WASTE MANAGEMENT ON THE KNOWLEDGEOF HEALTH-CARE PROFESSIONALS AT A TERTIARY CARE HOSPITAL,HIMACHAL PRADESH

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Abstract

Background: Bio medical waste means any waste, generated during the diagnosis, treatment or immunisation of human beings or animals or in research or in health camps testing. The Ministry of Environment and Forest, Government of India, notified BMW management and handling rules on March 28,1998 under the Environment Protection Act, 1986.Therules were revised and published in 2016 and amendments were added in 2018 and 2019.

Material and Methods: A hospital-based study was conducted to assess the impact of trainings conducted by Department of Microbiology in improving knowledge about BMWM rules at a tertiary care government hospital from August 2022 to September 2023 over a period of one year. For each training, a structured questionnaire comprising of 25 questions was constructed and an individual pre- and post-test questionnaire wasadministered to participants before and after imparting the structured training.

Results:A total of 119 HCWs were imparted training. Out of all participants in the training program,36.9% were staff nurses, 26%were safaikaramchari, 16.8% were doctors, 13.4%were ward attendants, 3.3% were ward sisters and 3.3%were OTAs. The pre-and post-test scores of different groups showed a statistically significant difference in knowledge regarding BMW rules. ($P < 0.05$).

Conclusion: We conclude that the training programs are very effective in enhancing the knowledge of participants regarding rules. So repeated training on BMWM is the only way ahead.

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Introduction:-

"Biomedical waste" means any waste, generated during the diagnosis, treatment and immunization of human beings or animals or research or in health camptesting.[1] Taking cognizanceof the importance of biomedical waste management, the Ministry of Environment and Forest, Government of India, notified BMW management and handling rules on March 28,1998 under the Environment Protection Act1986, and has undergone amendments from time to time.[2]The Bio-medical waste management (BMWM) rules were revised and published in 2016 and amendments were added in 2018 and 2019,which are currently applicable. During COVID-19 in 2020,specific guidelines for management of waste generated during diagnostics and treatment of COVID-19 suspected or confirmed patientswere givenin addition to existing practices under the BMW Management Rules, 2016. These rulesdefine categories of various wastes, their modes ofcollection, storage, transportation, and final treatmentmodalitiesfor all BMWgenerating facilities.[2]

The hospital waste is categorized into hazardous and non-hazardous waste. About 85% of BMW is non-infectious and only 15% is infectious.[3] Under the BMWM rules, occupier is the head of the biomedical wastegenerating facility and is liable to take all necessary steps to ensure that biomedical waste is handled without any adverse effect on human health or to the environment.

According to the 2022 annual report, the Central Pollution Control Board, India, has estimated that 3,93,939 health-care facilities in India have generated approximately 705tons biomedical waste per day. With newer diagnostic and treatment modalities,this volume has shown a rising trend. This enforced developers and regulators to focus on segregation, recycling, and waste minimization of BMW.[1,4]

The BMWM (principle) rules, 2016, and BMWM (amendment) rules, 2018 and 2019includea major penalty to the defaulter. The biomedical waste management rules now follow cradle-to-grave strategy which includes all steps of waste generation, collection, storage, transportation,treatment, and final disposal (incineration, recycling).[5]

The knowledge about the BMW rules among thehospital staff is of paramount importance for the overalleffective functioning and appropriate disposal of waste to avoid any hazardous consequences. Lackof awareness for BMW rules and their updates may make the entireorganization responsible to be blamed for the implicationsof poor BMW handling and disposal. Induction and refresher trainings forawareness among the providers about various provisions ofBMW rules will help in improving the BMWmanagement.

A nationwide survey that was conducted in 25 districts across twenty states by the International Clinical Epidemiology showed that improper pretreatment of BMW at source, improper terminal disposal and a lack of proper dedicated infrastructure are the major challenges in biomedical waste management. Numerous studies on the knowledgeBMWM and handling rules, 1998, exist, but studies on BMWM Rules, 2016, and BMWM (Amendment) Rules, 2018 and 2019, are scarce. Just teaching about the rules without assessing the depth of understanding can lead to a lot of hazards related to biomedical waste management.[1,6,7,8]

With thisbackground, we conducted this operational researchto assess the improvementin knowledgeamong the hospital staff working in this hospital. The present study focused to see the impact of training of HCWs for BMWM in our tertiary care hospital.

Aimsandobjective:-

1.To assess the existing knowledge of BMW management rules among healthcare professionals

2.To evaluate the impact of a training program onBMW management on the knowledge of health-care workers (HCWs).

Material and Methods:-

Ahospital-based study was conducted to assess the impact of trainings conducted by theDepartment of Microbiology in improving knowledgeabout BMWM rules at a tertiary care government hospital from August 2022 to September 2023over a period of one year.The ethical approval was given by the ethical committee vide letter number HFW(H)/SLBSGMC/IEC/2018-145. A total of five trainings were conducted with a batch sizeof twenty-five each.

For each training, a structured questionnaire comprising 25 different questions wasconstructed in the English language. For sanitation workers, a customised questionnaire in Hindi was made. Apre- and post-test questionnaire was administered to each participant before and after imparting the structured training.

Questionnaire validation: A selfadministered, pre-tested, and structured questionnaire with close-ended multiple-choice questions on BMWM was prepared and circulated to the HCWs at the beginning of the training. The questionnaire was designed with novel elements adapted from literature and with assistance from peer experts. It was validated through a pilot study.[9]To ensure better comprehension of the questions, a mock pilot test was conducted with five participants from each group of HCWs. The questions were kept simple, clear, and straightforward, avoiding any leading questions to prevent bias.

The HCWs, including doctors, nursing personnel and sanitation workers,participated in this training program. Audiovisual aids, game cards, question-answer sessions and skill-based learning techniqueswere used to make it more informative. After completion of training, post-test questionnairewas given, and both pre- and post-tests wereanalyzed. A correct response was given a score of one, and each wrong answer was scored as zero.

Statistical-analysis -
Statistical analysis was done by calculating the overall mean score difference of pre- and post-test, and categorywise subgroup analysis was done to see the gain and impact of training.

Results:-

A total of 119 HCWs received training. Out of these participants, 100(84.03%)were females and 19(15.9%)were males.

Table1:- Gender wise distribution of BMW training participants

Gender	Number	Percentage
Male	19	15.97%
Female	100	84.03%
Total	119	100%

Table 2:- Distribution of participants among different HCWs.

Designation	Number	Percentage
Doctors	20	16.8%
Ward sisters	04	3.3%
Staff sisters	44	36.9%
Safai karamchari	31	26%
OTA	04	3.3%
Ward attendants	16	13.4%

Out of all participants in the training program, 44(36.9%)were staff nurses, 31(26%), were safaikaramchari,20(16.8%) were doctors, 16(13.4%) were ward attendants,4(3.3%) were ward sisters and 4(3.3%)were OTAsas depicted in Table-2, Fig-1

Table 3:- Categories wise pre-test and post- test mean score.

Designation	Pre- test average score Maximum score-25	Post -test average score Maximum score- 25	Average Gain
Doctors	16.80	22.70	+ 5.73
Ward sisters	11.5	16.7	+5.08
Staff nurses	13.4	20.2	+6.66
Ward attendants	23.6	24.1	+0.26
OTA	13.5	22.00	+8.36
Safaikaramchari	22.03	23.96	+1.70

Fig 1:- Distribution of participants among different HCWs:

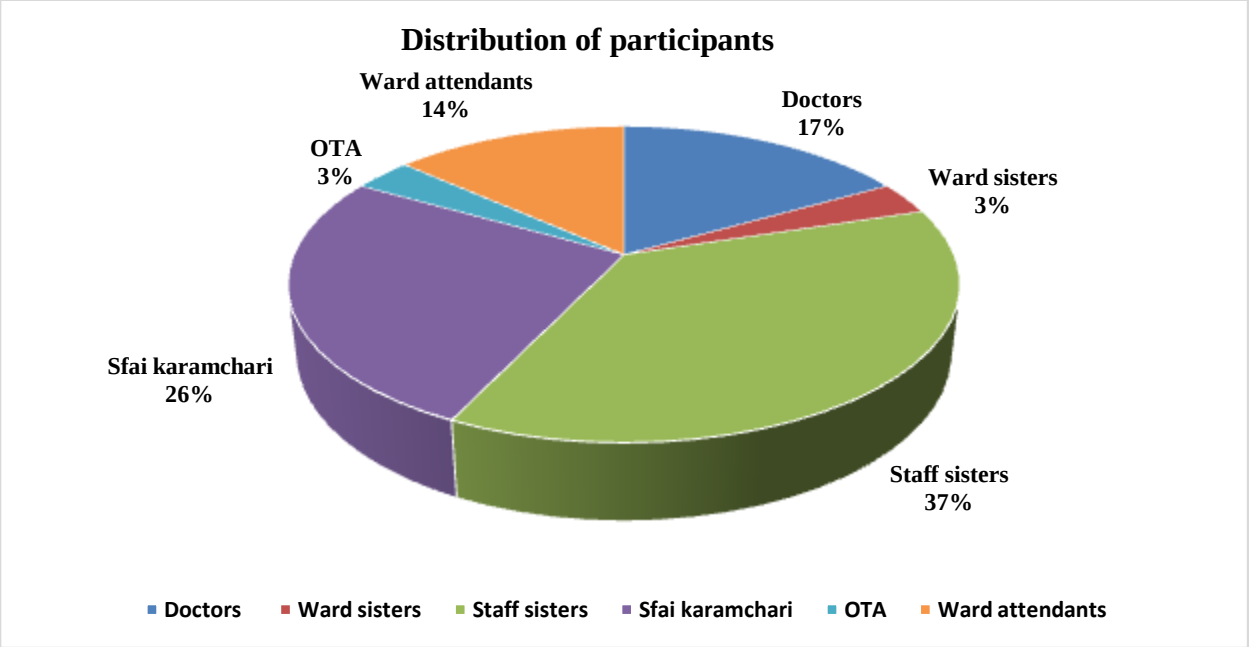
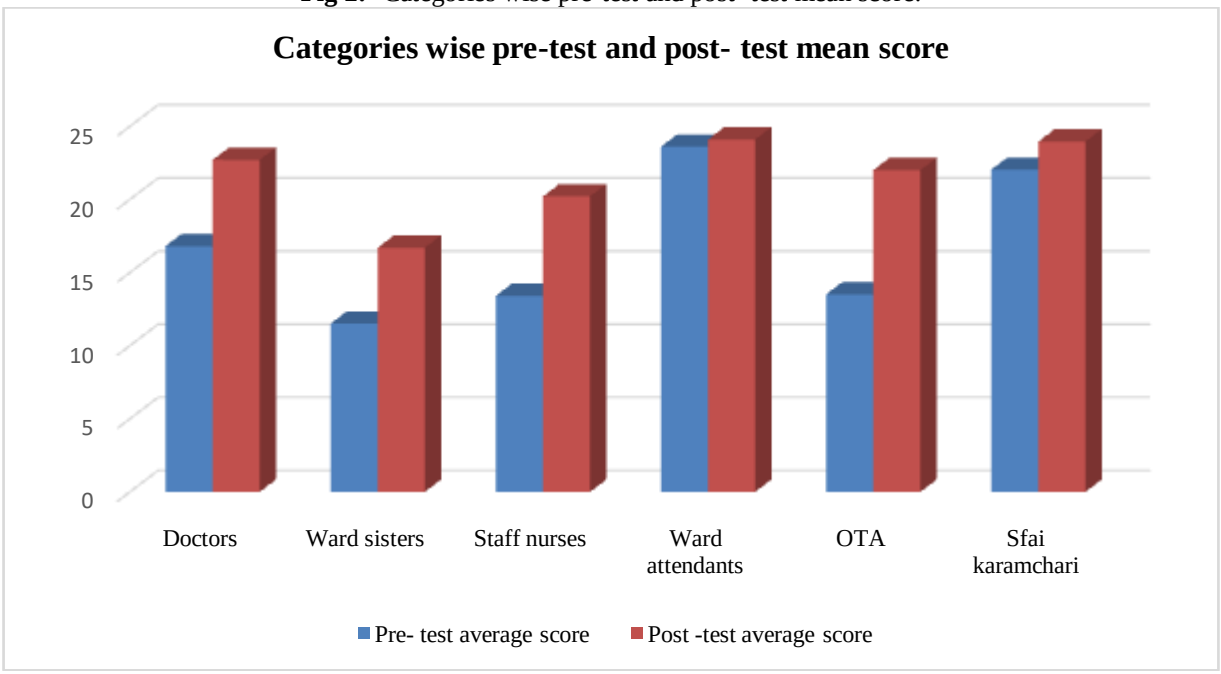


Fig 2:- Categories wise pre-test and post- test mean score.



The comparison between the pre-and post-test mean scores shows that there is an average gain score of +5.73, +5.08, +6.66, 0.26, +8.36 and +1.70 among doctors, ward sisters, staff nurses, ward attendants, OTAs andsfaikaramchari, respectively.

It is shown in Table-3, Fig-2

Table 4:- Comparison of knowledge among pre – test and post-test groups.

Groups	P value
Doctors, n=20	<0.0001**
Ward sisters, n=4	0.0837
Staff nurses, n=44	<0.0001**
OTA,n=4	0.0130*
Ward attendants, n=16	0.2031
Sfaikaramchari, n=31	0.0003**

Table 4: The paired t-test is applied to the pre- and post-test scores of different groups and the difference in knowledge regarding BMW rules among pre and post-test groups is found to be statistically significant($P < 0.05$). On designation wise analysis, it is found that the doctors, staff nurses, safaikaramchari and OTAs have significant P value.

Discussion:-

All the healthcare professionals must understand the BMW rules, 2016 and the amendments made by the government from time to time. In our study, the difference in mean knowledge score regarding BMW rules between pre- and post-test was found to be statistically significant ($P < 0.05$) on the paired t-test analysis. The substantial improvement in the score can be attributed to the training program administered to the participants and is evident between pre- and post-test scores regarding BMWM rules. The training program improved the knowledge of health-care professionals. The findings are comparableto those of other studies.[10]In other studies, the mean difference between the post- and pre-test knowledge scores regarding BMW management was also found to be statistically significant and show similar results, i.e., significant improvement inknowledge about different aspects of BMW handling.[11] Also, the experimental study conducted by Veera M. and Sai K reports that there is improvement in practices related to BMWM after the implementation of the training program. Their findings are in congruence with the present study. In our study in the group of ward attendants the P value is not significant the reason being that they are routinely engaged with biomedical waste management work and also tothe regular onsite training given by the department of Microbiology during weekly infection control rounds has helped them to improve their knowledge and attitude.

Conclusion:-

We conclude that the training programsare very effective in increasing the knowledge of participants regarding rules.Repeated and comprehensive training in both vertical and horizontal modes on BMWM is the only way forward for the better implementation of BMWM rules. Compulsory regular training programs and regular assessments should be included in the yearly performance assessment of all HCWs to increase compliance.

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