RESEARCH ARTICLE

THE STUDY OF AWARENESS AND PRACTICES REGARDING BIOMEDICAL WASTE MANAGEMENT AMONG THE MEDICAL AND PARAMEDICAL STAFF IN TERTIARY CARE HOSPITALS IN CENTRAL INDIA

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ABSTRACT

Introduction: Biomedical Waste causes hazardous impacts on health and the environment. Biomedical waste is also depending on the medical specialties and developed or developing countries. In India, biomedical waste is produced approximately 2/kg/bed/day. India produces 960 million tons of solid waste yearly. As a result, this research was conducted to examine the awareness amongst the staff of tertiary care hospitals as regards BMW management practices in order to examine the respondent's Knowledge, Attitude, and Practice. **Methodology:** The analysis was a descriptive cross-sectional hospital based at a tertiary care hospital. The data on biomedical waste's knowledge, attitudes, and practice was collected from a variety of healthcare workers, paramedical staff, and nurses working in the hospital. The data was gathered by predesign and pretested structured questionnaires. Ethical approval is taken from the respective committee. **Results:** The study revealed that although the attitude about biomedical waste management was high among the nursing staff than the other paramedical staff which was having knowledge and practice comparatively low. **Conclusions:** There should be repetitive training programs for medical and paramedical staff. Continuing health education programs are yet another effective method in imparting awareness among the health care personals.

INTRODUCTION

Biomedical waste (BMW) is hazardous to human health. It is a serious and emerging issue in India as well as in the world. The waste is produced in large amounts across the world.[1] The increasing amount of biomedical waste cause various adverse effects not only to humans but to the environment. It is also creating problems for the government as well as municipalities for proper disposal. It creates ecological imbalance and environmental imbalance. As per the data available from developed nations, around 1-5 kg/bed/day of biomedical waste is produced.[2] The Biomedical waste is also depending on the medical specialties and developed or developing countries. In India, biomedical waste is produced approximately 2/kg/bed/day.[2] According to various studies; approximately 960 million tons of solid waste are being produced in India yearly. There are 290 million tons of inorganic waste from the mining and industrial sectors, 350 million tons of organic waste from agricultural sources, and 4.5 million tons of hazardous waste.[3] Gradually the awareness level is increased about the hazardous effect of BMW in development and the implementation of strict laws against it has risen the issue in the country.[4] The hospital waste contains various organic and inorganic pathogens in very high concentrations. If it is disposed of in the environment untreated then these pathogens can spread into the environment and call ill effects on humans as well as on the environment. Therefore, inappropriate disposal of biomedical waste not only causes air, water, and soil infection but also has negative effects on human health.[2] Every health facility generates biomedical waste but proper waste collection, segregation as well as disposal of waste is not handled. Biomedical waste segregation should be done at the generation site. The contractor and other workers must educate on segregation and collection of waste and must do as per so. Improper segregation and biomedical waste disposal are dangerous to all people[2]. The situation is the same in an Indian metropolis. Different medical specialty produces a different amount of waste and mixing infectious waste with non-infectious waste causes hazardous effects. Therefore, the government created a "hospital waste management" guidebook to raise awareness among waste producers. To make sure the waste management process is implemented in line with biomedical waste (Management and Handling) regulations, 1998 and 2016.[4,5] It was observed that the staff's

attitude and knowledge of waste management are crucial for the segregation of waste and its disposal.[5] Awareness of the hazardous effect of biomedical waste, proper segregation of waste, knowledge of color-coded bins, disposal of liquid and human waste, and knowledge of guidelines of disposal of waste, segregation at the site of origin, and their practice among the staff member can help to find the solution in coming environmental problems. As a result, this research was conducted to examine the respondents' Knowledge, Attitude, as well as Practice in order to determine the knowledge level of BMW management techniques among the staff members of tertiary care hospitals. Therefore, the authorities will be able to build a plan for future improvement based on the existing level of employee understanding of BMW management.

MATERIALS AND METHODOLOGY

The study was carried out at NKPSIMS, Nagpur is a tertiary care hospital having facilities like OPD, IPD, Operation Theater (OT), Biomedical Waste Management (BMW) Unit, Pharmacy etc. It was a descriptive cross-sectional hospital-based study carried out during July to December 2017. The data on knowledge, attitudes & practice of BMW was collected from a variety of healthcare workers, paramedical staff, and nurses working in the hospital. The total study population was 150. The staff members were randomly selected, ensuring adequate representation of staff members. The study population comprised of the following: Nursing staff – 100, Paramedical staff – 50. Staff members who worked more than six months in the hospital were included in the study. Those staff members who were not willing to give consent for the analysis were excluded from the study. Ethical approval is taken from the respective committee.

The data was gathered by predesign and pretested structured questionnaires. Before the collection of data, each participant properly explains the study's objective. The data collection is done in the morning before OPD starts. Those staff members give consent for the study included in the research. The questionnaire included questions on knowledge of BMW, attitude regarding BMW, and practice of BMW in the hospital by medical and paramedical staff. The questionnaire was prepared based on hospital waste management guidelines provided by the world health organization (WHO). Data collected was recorded on a computer using "Microsoft Excel" and statistical software epi info used for analyses. The primary data was compiled, analyzed, and based on the finding.

RESULTS

The study was carried out at the NKPSIMS, Nagpur. It is 650 bedded hospital having all types of facilities like OPD, IPD, Operation Theater (OT), Biomedical Waste Management (BMW) Unit, Pharmacy, etc. In this study, the majority of the participant were of 25 to 35 tears age group that is 50% and the other large group is of 36 to 45 years age group which is 40% (Table 1). Most of the participants were female which is 83.3% and 16.7% of participants were male (Table 2). The participants (94.6%) agreed that all patient-related healthcare-related waste is hazardous to other people and BMW rules apply to all hospitals.
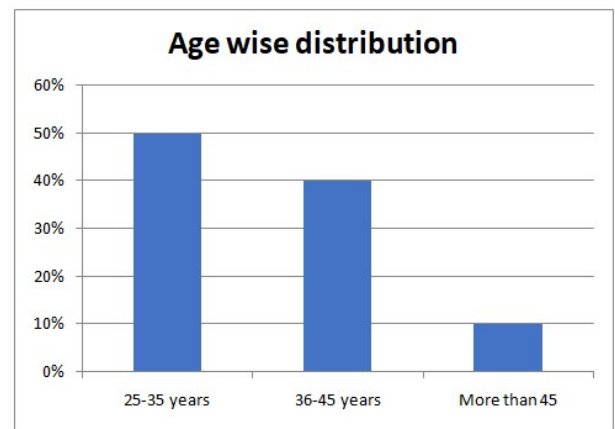

Table 1. Age-wise distribution of the medical and paramedical staff of tertiary care hospital
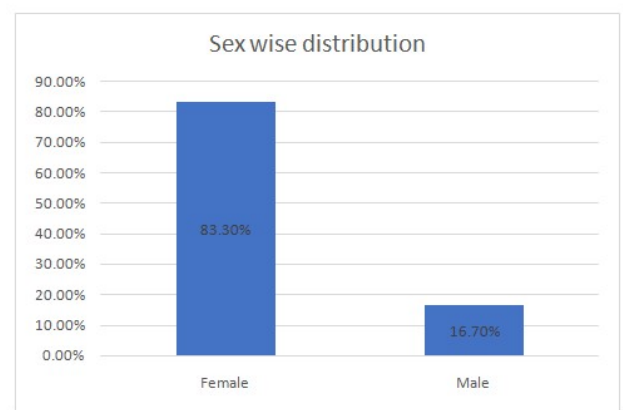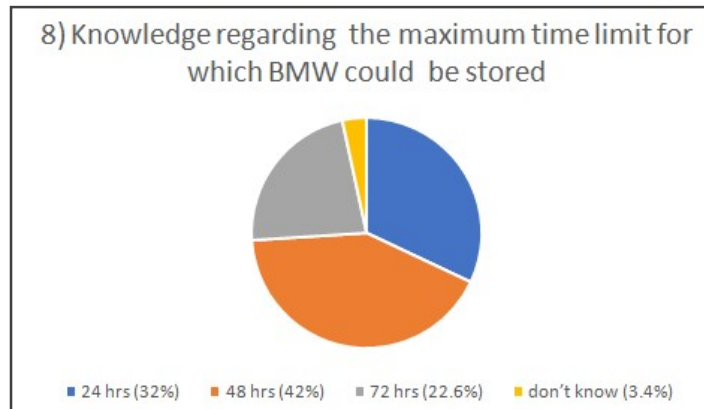

Table 2. Sex-wise distribution of the medical and paramedical staff of tertiary care hospital

82.6% of respondents are not agreeing with that any plastic waste not use for biomedical waste disposal. While 69.4% of participants had not attended any training in BMW management and 30.6% of participants attended some classes in BMW management in the hospital. In the study, most of the participants like 68% were aware of the image/logo of BMW and only 66% of participants were aware of the segregation of BMW while 34% of participants were not that much confident about the segregation of BMW. 70% of participants are aware of the color coding of BMW while 61.3% of participants were not those much confident about the BMW color coding (Table 3). As per guidelines, 42% of participants were saying that 48hrs is the maximum time limit for which BMW could be stored. In the attitude questions, 94% participants were agreeing that BMW must be segregated into various forms and participants feel that BMW management must be part of medical and para medical staff. As the majority like 82% of participants were agreeing that, their attitude regarding "waste management" must be in coursework for medical and paramedical staff. 95.3% of participants were saying that they need further training on BMW. Most of the participant belief that they are not having sufficient understanding of BMW. All participants recommended daily cleaning of the hospital (Table 4). In the practice questions, 82% of participants know that their hospital has tied up with waste management companies. 87.4% of participants used categories-wise disposal of all waste to some extent while 12.6% of participants were disposing of all types of waste in general waste which is a major issue.

Table 3. Knowledge regarding BMW in the medical and paramedical staff of tertiary care hospital
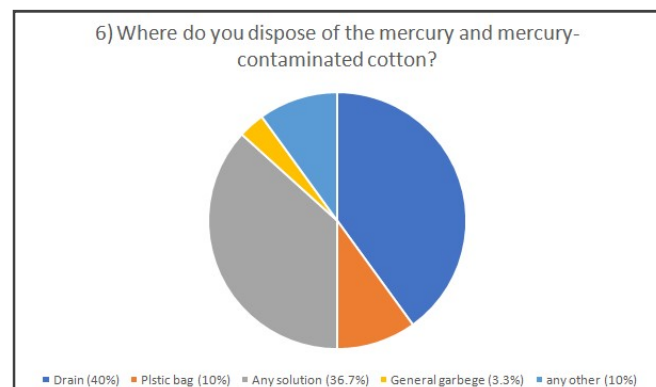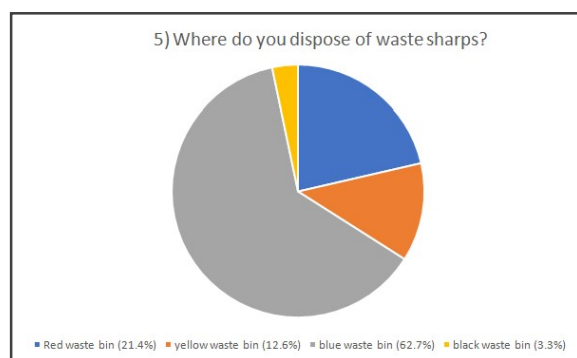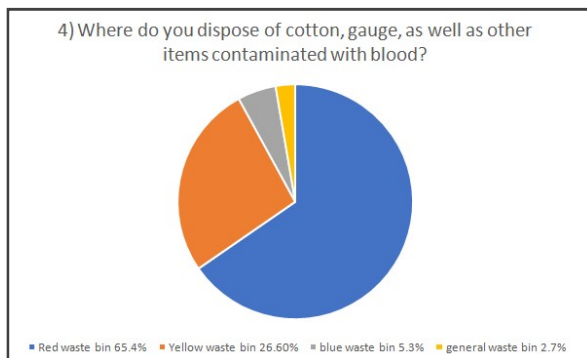
Knowledge regarding BMW	Yes N (%)	No N (%)
1) Patients related to healthcare waste hazards	142 (94.6%)	8 (5.4%)
2) Awareness of BMW rules applicable to all hospitals	132 (88%)	18 (12%)
3) Any plastic bags used for waste disposal	26 (17.4%)	124 (82.6%)
4) Done training in BMW management	46 (30.6%)	104 (69.4%)
5) Awareness of the Image/ logo of BMW	102 (68%)	48 (32%)
6) Awareness of the separation of BMW	99 (66%)	51 (34%)
7) Awareness of color coding of BMW	92 (61.3%)	58 (38.7%)

8) Knowledge regarding the maximum time limit for which BMW could be stored

■ 24 hrs (32%) ■ 48 hrs (42%) ■ 72 hrs (22.6%) ■ don't know (3.4%)

Table 4. Attitude regarding BMW in the medical and paramedical staff of tertiary care hospitals

Attitude regarding BMW	Yes N (%)	No N (%)
1) Do you agree that distinct categories should be used to segregate biomedical waste?	141(94%)	9 (6%)
2) Do you believe that bio-medical waste management must be required coursework for medical and paramedical staff?	123 (82%)	27 (18%)
3) Do you believe you have a sufficient understanding of waste management?	67 (44.6%)	83 (57.4%)
4) Do you believe that you need any more training in the management of biological waste?	143(95.3%)	7 (4.7%)

Table 5. Practice regarding BMW among the medical & paramedical staff of tertiary care hospital

Practice of BMW	Yes N (%)	No N (%)
1)Does your hospital have a relationship with a waste management firm?	123 (82%)	27 (18%)
2)Do you dispose of all medical waste in general waste?	19 (12.6%)	131 (87.4%)
3)Do you separate biomedical waste into several categories before disposal?	112 (80%)	38 (18%)

4) Where do you dispose of cotton, gauge, as well as other items contaminated with blood?

■ Red waste bin 65.4% ■ Yellow waste bin 26.60% ■ blue waste bin 5.3% ■ general waste bin 2.7%

5) Where do you dispose of waste sharps?

■ Red waste bin (21.4%) ■ yellow waste bin (12.6%) ■ blue waste bin (62.7%) ■ black waste bin (3.3%)

6) Where do you dispose of the mercury and mercury-contaminated cotton?

■ Drain (40%) ■ Plstic bag (10%) ■ Any solution (36.7%) ■ General garbege (3.3%) ■ any other (10%)

Majority of the participants that is 65.4% dispose of cotton, gauge, and other items contaminated with blood in yellow waste bin while 26.6% and 5.3% used redwaste bin and blue waste bin respectively. Majority of participants that is 62.7% were using blue waste bin for sharps disposal while 21.4%, 12.6%, and 3.3% were using red, yellow waste bin, and black/ general waste bin respectively. On asking mercury and mercury contaminated cotton disposal, most of the participants was in favors of drain that is 40 %.

DISCUSSION

Hospitals and other healthcare facilities are subject to additional responsibilities regarding the waste they generate.[6] Hospital waste nowadays includes a range of medications used in hospitals and clinics, including radioactive materials, cytotoxic compounds, and antibiotics. The provision of healthcare necessitates several hazardous exposures, necessitating the efficient segregation as well as disposal of biomedical waste.[7] The hazards associated with dental practice waste disposal may be separated into two categories. First, there is a greater environmental burden from a range of hazardous items, and 2nd, there are more direct hazards of potentially contagious compounds that could be mitigated by those who handle the waste.[8] The older "Bio-medical Waste (Management and Handling) Rules" of 1998 and modifications thereof were replaced by the new draft "Bio-medical Waste (Management and Handling) Rules" of 2016 that have been released by the "Ministry of Environment" and "Forests of the Government" of India. The scope of applicability of these rules is one of the new provisions that were introduced to the new regulations. The need that each operator/occupier, regardless of the number of patients being served, get permission and the decrease of the number of waste types from ten to eight, among other things.[9] Knowledge, attitude, and practice function as the "dynamic system" of life itself. Knowledge is the knowledge that is learned or obtained. Congeniality and conversation regarding a wide range of topics are the outcomes. Understanding, experience, judgment, and skill are all components of knowledge, which serve as the fundamental criteria for differentiating between good and evil. An attitude is defined as a way of thinking that is appropriate for the circumstance. Practice entails the consideration of laws and knowledge that result in action. Therefore, it is necessary to have the proper information, a positive attitude, along with good practice to effectively guide and assist patients.[9,10,11] The objective of the current analysis was to analyze the knowledge, attitudes, and practices of healthcare staff about BMW management. It is significant to note that most respondents about 94.6% believed that all waste from healthcare was dangerous. This awareness outperforms the findings of a research performed by Sood et al. among dental healthcare professionals at three private hospitals in Delhi.[4] Only 72 percent (n=192) of respondents were aware that BMW and handling regulations apply to healthcare employees. However, research performed in Amritsar[12]and Delhi[4] found that awareness was 80% and 75%, respectively. 100 percent of respondents were aware that BMW guidelines apply to all hospitals, but 72.7 percent of respondents in the Kothamangalam research were aware of this fact.[13] Only 6% of those surveyed, medical personnel, believed that any colored plastic waste bin could not be utilized for waste segregation. The findings of analysis conducted in Chennai[14] and Davangere[15], where the equivalent

numbers were 28 percent and 27 percent, respectively, contradict the observation. According to research done in Delhi.[16] Only 66% of respondents knew that BMW should be separated, and only 61.3% percent knew that BMW should be color-coded, whereas 30.6% of respondents said they had received training in BMW. The Indian Medical Association of Kerala has a program called IMAGE for the scientific disposal of biomedical waste. Hospital employees are trained by IMAGE to separate biological waste into color-coded waste bin, collect it from hospitals, transport it in particularly constructed covered vehicles, handle it scientifically, and dispose of it at the common facility.[17]About 68% of people were familiar with images and logos.

Nearly all of the respondents who were asked attitude-related questions considered that BMW must be divided into several categories. The outcomes are comparable to those of the Delhi[4] research conducted by Sood et al. The fact that over 82% of respondents believed the subject should be required reading for medical staff, over 86.7 percent of respondents believed their attitude of the subject was insufficient, and over 95.3% expressed interest in receiving more training on the subject demonstrates a very positive attitude toward "healthcare waste" management. The questions that dealt with the practice rather painted a different image. The majority of the personnel (82%) were aware of the institutional relationship with trash management firms. Twenty percent of the respondents threw all types of trash in the regular garbage. This outcome was in contrast to research done in Bangalore by Sudhakar et al. where the similar number was 47.6 percent.[16] The outcomes are better than the Delhi[4] research's findings, which showed a similar value of 36%, and are comparable to the findings in the Amritsar analysis (17.5%)[21]. Out of Medical and paramedical staff of respondents 80% stated that they did separate their BMW into respected categories before disposal. In this regard, the findings are comparable to those of the research done in Bangalore[16] and starkly different from those of the studies performed in Chennai[14] and Davangere[15], where the equivalent percentages were 82.4% and 70%, respectively. It was shown that only 60% of respondents disposed of "blood-soaked cotton" and gauze in red bags. According to research done in Amritsar[21] and Delhi[4], the corresponding percentages were 42 percent and 36 percent. A significant result is that around 40% of respondents disposed of their mercury in drain. In the Chennai analysis[14], the corresponding value was approximately 32 % and, in the Bangalore analysis [16], it was approximately 15%. Most of the respondents dispose of sharps in blue plastic bags while 62.7% of respondents. The 65.4% participants dispose of cotton gauges and other products contaminated with blood in red plastic bags. The Kothamangalam study is that they are 34.5% and 13.6% respectively.[11] Thus, the study sheds light on the current knowledge, and perspective, as well as the practice of BMW. This study indicates that there is a requirement to train the nursing and other paramedical staff regarding the same. It is most important for occupational safety.

CONCLUSION

The study showed that attitude about BMW management was high in nursing staff than the other paramedical staff which was having knowledge and practice comparatively low. There should be repetitive training programs for medical and paramedical staff.

Programs for continuing health education are yet another successful strategy for educating healthcare professionals.

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