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Knowledge, Attitude, Practices regarding Bio Medical Waste Management among Interns at Tertiary Care Hospital

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ABSTRACT

Introduction: Among the key factors influencing the success of BMWM is the Knowledge, Attitude, and Practice (KAP) of healthcare workers (HCWs) responsible for managing such waste. The Knowledge, Attitude, and Practice (KAP) model is an effective framework for understanding and improving BMWM in healthcare settings. The main objectives focused on KAP of internees working at hospital, Interns are also responsible for collection, segregation, transport and proper disposal of Bio Medical Waste management while doing any procedures to patients.

Materials and Methods: This is a observational, descriptive, cross sectional study in which a pre-structured questionnaire consisting of 31 questions to assess knowledge, attitude and practices on BMW management was designed based on the biomedical waste management guidelines. This questionnaire was distributed to all interns who expressed their interest to participate in this study.

Results: All the internees have good knowledge regarding health hazard associated with bio medical waste but 132 (88%) out of 150 internees were aware of universal precautions regarding BMWM and only 86 (57.3%) were aware of recent modifications of BMWM. Out of 150 internees, 136 (90%) stated bio medical waste should be handled with utmost care and 96 (64%) consider disposal of health care waste as financial and extra burden. Only 110 (73.3%) out of 150 internees had practice of segregation of general waste from clinical waste and disposal of bio medical waste

Conclusion: Knowledge about the formulated guidelines of biomedical waste management are clearly known in interns but the attitude and practices are little poor. Attitude and practices of segregation and disposal of biomedical waste can be improved by regular intensive training sessions should be planned by administration and by strong impulse from infection control team on patient care area working professionals.

Keywords: Attitude, Biomedical waste, Knowledge, Practices, Interns

INTRODUCTION

"Biomedical or Hospital waste" refers to any waste generated while providing healthcare, performing research and undertaking investigations or related procedures on human beings or animals in hospitals, clinics, laboratories or similar establishments. Bio-Medical waste includes all the waste generated from the Health Care Facility which can have any adverse effect to the health of a person or to the environment in general if not disposed properly. All such dangerous infectious or hazardous waste which can adversely harm the environment or health of a person is considered as infectious and such waste has to be managed as per BMWM Rules, 2016 [1].

Government of India has promulgated Medical Waste Management rules in 1998 and was came into effect from January 2003. These rules elaborately explained about collection, segregation, transportation, treatment and proper disposal of waste. 10% is infectious waste like human or animal tissues, dressings, soiled items, laboratory samples etc [2]. BMW is forming approximately 1-2% of total municipal solid waste stream [3]. In India, each bed generates one to two kilogram of waste every day, which adds up to 330,000 tonnes of waste yearly [4].

Biomedical waste has potential to injure, infect or harm not only to patients, visitors and health care personnel, but also to the environmental and law-enforcing agencies, media, and the general public also [5]. Bio Medical Waste Management

Rules 2016 categorizes the bio-medical waste generated from the health care facility into four categories based on the segregation pathway and color code. Various types of bio medical waste are further assigned to each one of the categories, like Yellow Category, Red Category, White Category, Blue Category. The first five steps in the management of biomedical waste (Segregation, Collection, pre-treatment, Intramural Transportation and Storage) is the exclusive responsibility of Health Care Facility. Government of India took a great initiative to regulate the handling, segregations, storage and disposal of biomedical waste due to the increasing population, urbanization, and expansion of health care facilities. There are challenges and lacunae with biomedical waste management like poor managerial commitment, poor infrastructure, logistic issues, insufficient resources, knowledge gap in staff and unfavorable attitude in health care personnel.

The foremost crucial thing is management or government authorities should strictly impose the guidelines to be followed with proper resources and logistics. Administration of the health care institutions should make sure to implement biomedical waste management practices as per the guidelines.

Among the key factors influencing the success of BMWM is the Knowledge, Attitude, and Practice (KAP) of healthcare workers (HCWs) responsible for managing such waste. The Knowledge, Attitude, and Practice (KAP) model is an effective framework for understanding and improving BMWM in healthcare settings. Understanding the KAP of healthcare workers is essential for identifying gaps in awareness, resources, and practices that may contribute to improper waste disposal. So the main objectives focused on KAP of internees working at hospital, Interns are also responsible for collection, segregation, transport and proper disposal of Bio Medical Waste management while doing any procedures to patients.

MATERIALS AND METHODS

This is a observational, descriptive, cross sectional study was undertaken at the department of Microbiology, Government Medical College, Anantapuram during the study period from March 2024 to July 2024. An Institutional ethical committee approval was obtained prior to the study. Details of the study and its public health significance were explained in detail to the study participants. To assess the knowledge, attitude and practice of Biomedical Waste management, internees those who are taking training at our government general hospital were selected, as they are involved in direct patient care, manages various healthcare activities like IV cannulation, injection, blood transfusion services etc and they are also responsible for collection and proper disposal of Biomedical waste into various color code bags.

A pre-structured questionnaire consisting of 31 questions to assess knowledge, attitude and practices on BMW management was designed based on the biomedical waste management guidelines [1]. Random sample selection was chosen in this study to avoid the subjective bias. This questionnaire was distributed to all interns who expressed their interest to participate in this study.

Bio Medical Waste Management Knowledge questionnaire as follows:

1. Are you familiar with the practices of Biomedical Waste Management (BWM) in a hospital setting?
2. Do you believe that biomedical waste poses a severe risk to public health?
3. Do you know about biohazard signal?
4. Do you recap the used needle?
5. According the guidelines for the Biomedical Waste Management (BWM) "The maximum amount of time that biomedical waste should be stored is as follows: a) 24 hours; b) 48 hours; and c) 72 hours
6. Do you know the correct method of handling Biomedical waste based on the categories?
7. Are you aware of all universal precautions regarding BMWM?
8. Which color-coded bag is used to dispose of blood bags?

1) Red; 2) Yellow; 3) Blue; 4) White

9. Which color-coded bags are used to dispose of glass waste?

a) Yellow b) Red c) Blue d) White

10. Which color-coded bags are used to dispose of chemical waste and anatomical waste?

a) Yellow b) Blue c) White d) Red

11. Which color-coded bags are used for disposing of contagious plastic waste?

a) Yellow b) Blue c) White d) Red

12. Are you aware of the most recent modifications to the Biomedical Waste Management Guidelines?

Attitude Questionnaire

1. The greatest care should be taken when disposing of biomedical waste

2. Consider as a biomedical waste management as a part of job responsibility
3. Needles that are used should be thrown away right away.
4. The handling of biomedical waste requires teamwork.
5. Do you think safe disposal of healthcare waste as an extra and financial burden
6. Before being disposed of, laboratory liquid waste needs to be pre-treated.
7. Medical waste bags and containers need to be labeled with the biohazard symbol.
8. Plastic items that are contaminated and used gloves should be autoclaved before being disposed of.
9. Wearing protective gear is required for healthcare workers who handle contagious diseases.
10. Disposing of biomedical waste in a dump yard is the least favored technique.

Practice Questionnaire
1. Are you familiar with the correct way to cover the waste bins?
2. Are you familiar with using foot-operated bins to prevent cross-contamination?
3. Are you aware that we ought to throw away expired medications in yellow bags?
4. Are you aware that used needles should be disposed of in a needle destroyer?
5. Do you know how to separate waste into bins according to color codes?
6. Do you know how to dispose of glass and sharp objects in a puncture-proof box?
7. Are you familiar with the transportation of medical waste for processing?
8. Are you aware that when handling hazardous biomedical waste, PPE is required?
9. Are you aware that the samples we gather should be disposed of safely?

The questionnaires were distributed to all interns to answer within the stipulated time. The respondents were asked to return the questionnaire immediately. All the results were entered into spread excel sheet and analyzed. Results of the descriptive statistics were expressed as number, percentages.

RESULTS

A total of 150 internees included in the study were analyzed for knowledge ,attitude and practices about bio medical waste management by using 3 domains.

All the internees have good knowledge regarding health hazard associated with bio medical waste but 132 (88%) out of 150 internees were aware of universal precautions regarding BMWM and only 86 (57.3%) were aware of recent modifications of BMWM. Positive answers to knowledge questionnaire gave by internees were tabulated in Table No.1

Table No. 1 Knowledge questionnaire response by study population

S.No.	Statement	n (%)
1	Are you familiar with the practices of Biomedical Waste Management (BWM) in a hospital setting?	138 (92%)
2	Do you believe that biomedical waste poses a severe risk to public health?	150 (100%)
3	Do you know about biohazard signal?	110 (73%)
4	Do you recap the used needle?	114 (76%)
5	According the guidelines for the Biomedical Waste Management (BWM) "The maximum amount of time that biomedical waste should be stored is as follows: a) 24 hours; b) 48 hours; and c) 72 hours	135 (90%)
6	Do you know the correct method of handling Biomedical waste based on the categories?	138 (92%)
7	Are you aware of all universal precautions regarding BMWM?	132 (88%)
8	Which color-coded bag is used to dispose of blood bags? 1) Red; 2) Yellow; 3) Blue; 4) White	124 (82%)
9	Which color-coded bags are used to dispose of glass waste? a) Yellow b) Red c) Blue d) White	131 (87%)
10	Which color-coded bags are used to dispose of chemical waste and anatomical waste? a) Yellow b) Blue c) White d) Red	133 (88%)
11	Which color-coded bags are used for disposing of contagious plastic waste? a) Yellow b) Blue c) White d) Red	128 (85.3%)
12	Are you aware of the most recent modifications to the Biomedical Waste Management Guidelines?	86 (57.4%)

Out of 150 internees, 136 (90%) stated bio medical waste should be handled with utmost care and 96 (64%) consider disposal of health care waste as financial and extra burden (Table 2).

Table No 2. Attitude questionnaire response by study population

S.No.	Statement	n (%)
1	The greatest care should be taken when disposing of biomedical waste	136 (90%)
2	Consider as a biomedical waste management as a part of job responsibility	129 (86%)
3	Needles that are used should be thrown away right away.	134 (89%)
4	The handling of biomedical waste requires teamwork.	110 (73%)
5	Do you think safe disposal of healthcare waste as an extra and financial burden	96 (64%)
6	Before being disposed of, laboratory liquid waste needs to be pre-treated.	108 (72%)
7	Medical waste bags and containers need to be labeled with the biohazard symbol.	102 (68%)
8	Plastic items that are contaminated and used gloves should be autoclaved before being disposed of.	129 (86%)
9	Wearing protective gear is required for healthcare workers who handle contagious diseases.	110 (73%)
10	Disposing of biomedical waste in a dump yard is the least favored technique.	94 (62%)

Only 110 (73.3%) out of 150 internees had practice of segregation of general waste from clinical waste and disposal of bio medical waste (Table 3).

Table No 3. Practice questionnaire response by study population

S.No.	Statement	n (%)
1	Are you familiar with the correct way to cover the waste bins?	136 (90%)
2	Are you familiar with using foot-operated bins to prevent cross-contamination?	114 (76%)
3	Are you aware that we ought to throw away expired medications in yellow bags?	106 (70%)
4	Are you aware that used needles should be disposed of in a needle destroyer?	102 (70%)
5	Do you know how to separate waste into bins according to color codes?	112 (74%)
6	Do you know how to dispose of glass and sharp objects in a puncture-proof box?	108 (72%)
7	Are you familiar with the transportation of medical waste for processing?	123 (82.7%)
8	Are you aware that when handling hazardous biomedical waste, PPE is required?	114 (76%)
9	Are you aware that the samples we gather should be disposed of safely?	105 (70.3%)

DISCUSSION

Biomedical waste is a very dangerous harmful waste being produced by all health care and research activities. Such waste can transmit more than 30 dangerous blood-borne pathogens. Health of waste handlers and health care professionals are seriously are in danger due to these harmful pathogens and hazardous compounds in biomedical waste [6]. There is a need of great concern in both urban and rural areas of developing nations to frame a strong structure framework for collection, segregation, storage, transportation and treatment of waste [7]. Proper disposal of biomedical waste should be specially focused to avoid the spread of communicable diseases [6].

Observations on Knowledge of study participants:

In the present study hospital biomedical waste management policy, guidelines and public health risks awareness is about 90-100%. 80% of the internees participated in this study are aware of disposal of biomedical waste. 75% of internees know about sharps handling and only 57.4% are well versed with recent modifications of biomedical waste management act.

A study from Maharashtra on knowledge and awareness on biomedical waste management among interns observed that 63% interns knew the correct definition of Biomedical waste. 23.5% interns were aware that authorization is required for biomedical waste management by Central Pollution Control board. Only15% of the Interns had undergone the training programme and 60% were keen to attend training program for biomedical waste management. 86% knew about sources of generation of BMW and 94% had knowledge of biohazard symbol. 68% had knowledge of segregation of waste but none had knowledge of correct color coding. 88% said that record maintenance was essential for biomedical waste management. 94% agreed that BMW is team work [8]. Basu et al from West Bengal also assessed Interns knowledge on biomedical waste management. 99.1% had heard about biomedical waste management and 94.4%

knew about the biomedical waste management rules [9]. A study from Khammam, Andhra Pradesh by Madhavi et al stated 94.78% had heard about biomedical waste management and 68% knew about the biomedical waste management rules [10]. Pollution control board authorization requirement for handling and disposal of biomedical waste was understood by 72.22% of Interns, among them only 5.56% interns were able to answer when it is required [11]. In the present study 73% of Interns were aware of biohazard symbol and significance. Kanchi P et al [12] and Pandey A et al [8] documented 94% and 93% of health care staff aware of knowledge of biohazard symbol respectively. Pandey A et al [8] observed 30% were unable to answer about the color coding categories and their respective biomedical waste items which is almost similar to our study. They also concluded that there is no statistical association between training activities and knowledge about color coding, in such scenarios infection control team can provide onsite training skills and direct observation of handling and segregation of biomedical waste.

Observations on Attitude of study participants:

In this study 85-90% of the internees are nodding that biomedical waste is a part of job and need to be handle with care, 72% are considering that pre-treatment is required for few medical waste items and personal protective equipment is required for handling BMW. 60% said safe disposal is required as formulated by government of India.

88.2% of the interns answered correctly that liquids needed to be disinfected before disposal by Pandey A et al [8]. They also said 94% of the interns said that biomedical waste management is essentially teamwork and involves everyone from Class 1 to class IV workers. A study done at Hyderabad by Surya Prakasa Rao et al [13] on interns KAP of biomedical study in which 91% were answered correctly on how to segregate the medical waste and disposal into different categories bins and 67% know that institute has tie up with outsourcing waste management companies. Aradhya Abrol et.al [14] revealed that although the attitude about biomedical waste management was high among the healthcare personnel but the practice was comparatively low. Suchitra et al [15] tested that education has positive correlation on retention of knowledge, attitudes and practices in all categories of staff.

Observations on Practices of Study participants:

On assessment of practices of biomedical waste management only 74% know the color coded bins disposal procedure for biomedical waste and 72% says sharps has to dispose in puncture proof box. Clarity on biomedical waste disposal color code bins is a critical step in the management. Segregation of Bio Medical Waste should be done by generator himself or herself. So, even doctors and internees who visit the patient during clinical rounds and do procedures depending on the patient condition are also responsible for proper disposal of biomedical waste.

Kanchi P et al [12] did a research work in Navi Mumbai, they observed that all the study participants both nurses and interns were aware that personal protective equipment were essential to handle the biomedical waste. In similar to this study Basu et al [9] observed 78.8% of future physicians are aware of segregation of biomedical waste. Pandey A et al [8] noted lower than the present study (68.8%). It's a good note that Kanchi P et al [12] observed 93% of study population were aware of segregation because segregation of biomedical waste is the golden rule in the management.

Necessary to educate health care personnel regarding activities of BMW management, along with this a regular monitoring by supervisors and surveillance by infection control team members and their inputs will help. Regular teaching or training in a monotonously at classrooms will not improve the practices and attitude among health care staff. It is crucial to focus on different modalities of teaching models and enhanced surveillance about non compliance in terms of practices.

CONCLUSION

This study has undertaken mainly to assess the awareness about various aspects of biomedical waste management like knowledge, attitude and practices of disposal. Majority of internees are aware of bio medical waste management and its dire consequences resulted by improper disposal. Knowledge about the formulated guidelines of biomedical waste management are clearly known in interns but the attitude and practices are little poor. Attitude and practices of segregation and disposal of biomedical waste can be improved by regular intensive training sessions should be planned by administration and by strong impulse from infection control team on patient care area working professionals. Hospital acquired infections and occupational injuries are indicators of the management of medical waste, so surveillance by infection control team scrupulously will help to reduce the infections and needle stick injuries rate.

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