



Knowledge, Awareness and Attitude regarding Biomedical Waste Management among Medical Students in a tertiary health Care centre: A Cross Sectional Study

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ABSTRACT

Biomedical waste management is mainly to reduce waste generation, efficient collection, handling and disposal in such a way that it controls infection and provides safety for working in the system. This study was a cross sectional study, among medical student in two professionals. The study population included 250 Medical students, who were grouped into two subgroups as 1st and 2nd professionals. The study was done by using a predesigned questionnaire. After collecting data, data were tabulated before data analysis. Proportions and percentage were used to interpret the result. Information collected through questionnaire included Knowledge, Attitude and Practices regarding waste management. After concluding the results, regarding the colour coding and segregation of waste, first professional student are less aware and knowledgeable as compare to second professional. Further intervention can be done by providing intensive training and orientation classes among medical students for future practical application.

KEYWORDS

Knowledge, Awareness, Attitude, Biomedical Waste Management

INTRODUCTION

Bio Medical Waste means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals, or in research activities pertaining there to or in the production or testing of biological.^[1] Medical students are going to be one of the important components of healthcare system, they should have proper and sufficient knowledge on biomedical waste management. Government of India has notified the Biomedical Waste (Management and Handling) rules 1998 with subsequent amendments (June 2nd 2000, September 2003 and 2011). The purpose of BMW is mainly to reduce waste generation, to ensure its efficient collection, handling, as well as safe disposal. Lack of awareness and inadequate knowledge has led to the hospitals becoming the hub for spreading illness.

The problem of waste management has arisen recently in developing countries where there is little history of the implementation of formal and informal community environmental education awareness program.^[2] It is estimated that 10-25% of the healthcare waste generated is hazardous & causes serious health problems.^[3] BMW management is currently a burning issue more so with the increasing health care facilities and increasing waste generation.^[4] Improper Hospital Waste Management has serious impact on our environment. This study was conducted to understand the awareness among the medical student in our institution as regards to BMW management practices to study the Knowledge, and Attitude.

OBJECTIVES

To assess the knowledge, awareness and practice regarding BMW management among the medical student in a tertiary care centre in North India.

MATERIALS AND METHODS

This study was a cross sectional study, among medical student in two professionals. The study population included 250 Medical students, who were grouped into two subgroups as 1st and 2nd professionals. The study was done by using a pre designed, semi-structured questionnaire. Informed consent was obtained from the study participants. After collecting data, data were edited and tabulated before data analysis. The data was coded and double checked into a work sheet on Microsoft excel sheet. Data compilation and analysis was done using software SPSS 20 version. Proportions and percentage were used to interpret the result. Information collected through questionnaire included 1. Knowledge regarding waste management 2. Attitude regarding waste management 3. Practices regarding waste management.

RESULTS

A total of 250 medical students took part in the study. Their knowledge, attitude and Practice regarding BMW were assessed by using predesigned and semi-structured questionnaire. The data was analysed using proportions and percentages.

Table 1 show that 50.4% of MBBS 1st professional student had the knowledge of colour coding and segregation. It also shows poor knowledge regarding the color coding for waste separation, biomedical waste management and handling. Approximately 62.4% of MBBS 2nd professional have good knowledge regarding color coding for waste separation. 2nd professional as comparison to 1st professional medical student have good knowledge regarding health care waste hazardous, waste management handling, biomedical waste management and plan[Table1]. None of the medical students have received training regarding Bio Medical Waste management.

Table no.1- Response on Knowledge assessment regarding bio-medical waste management

S. N.	Question regarding Knowledge assessment on biomedical waste management	MBBS 1st Professional n=125(%)	MBBS 2nd Professional n=125(%)
1	Have you any training in Biomedical waste management?	0(0)	0(0)
2	Are all healthcare wastes hazardous?	71(56.8)	77(61.6)
3	Does your university have a Waste Management Plan and Team?	81(64.8)	113(90.4)
4	Do you know about clinical waste management process?	78(62.4)	109(87.2)
5	Do you know about the color coding for waste separation	63(50.4)	78(62.4)
6	Do you know the university have standard storage room for keeping hospital infectious waste	82(65.6)	98(78.4)
7	Do you know where is the location of the storage area of clinical wastes in university	73(58.4)	112(89.6)
8	Know about Biomedical Waste (Management & Handling) Rules	68(54.4)	114(91.2)
9	Do you need a separate permit to transport biomedical waste?	78(62.4)	96(76.8)
10	Do you re-cap the used needle?	69(55.2)	118(94.4)

Majority of the 2nd professional medical student had increase level of attitude regarding dispose of all kinds of bio medical waste as shown in Table 2. 65.6% of 2nd professional and 54.4% 1st professional medical students have awareness regarding discard of all types of biomedical waste[Table2].

Table no.2-Response on Attitude assessment regarding bio-medial waste management.

S. N.	Questions regarding attitude on biomedical waste management	MBBS 1 st Professional n=125 (%)	MBBS 2 nd Professional n=125 (%)
1	Do you dispose all kinds of waste into general garbage?	68(54.4)	82(65.6)
2	Do you segregate the biomedical waste according to different categories?	79(63.2)	94(75.2)
3	Where do you dispose cotton, gauze and other items contaminated by blood? a.Red plastic bag b.Yellow plastic bag c.Blue plastic bag d.Black plastic bag	89(71.2)	118(94.4)
4	Where do you dispose pharmaceutical waste? a.Red plastic bag b.Yellow plastic bag c.Blue plastic bag d.Black plastic bag	76(60.8)	119(95.2)
5	Where do you dispose sharps waste? a.Puncture proof container b.Yellow plastic bag c.Blue plastic bag d.Black plastic bag	83(66.4)	120(96)
6	Can clinical waste cause risks and health hazards to your health when infected	93(74.4)	118(94.4)
7	Are bags and containers for clinical waste marked with the international symbol?	88(70.4)	119(95.2)
8	Do you know about colour-coding segregation of BM waste?	81(64.8)	112(89.6)
9	You dispose the hazardous liquid waste in which Color coded container or bag. a.Red plastic container b.Yellow plastic bag c.Blue plastic bag d.Black plastic bag	79(63.2)	114(91.2)
10	You discard used rubber materials (gloves, catheter, other tubings) in which color coded container / bag, a.Red plastic container b.Yellow plastic bag c.Blue plastic bag d.Black plastic bag	86(68.8)	116(92.8)

Questionnaire on the practice of BMW as in Table 3 showed that segregation & colour coding was not followed properly. Approximately 50% of 1st professional medical students agree with segregation and follow the colour coding for bio medical waste management as compare to less than 65% of 2nd professional medical students agree with segregation and follow the colour coding for bio medical waste management [Table 3]. More than 90% medical student think they require training on biomedical waste management.

Table no.3- Assessment of Practice on bio-medical waste management

S. N.	Questions regarding Practice assessment on biomedical waste management	MBBS 1st Professional	MBBS 2nd Professional
1	Do you segregate biomedical wastes into different categories?	63(50.4)	81(64.8)
2	Do you think your knowledge regarding biomedical waste management is adequate	90(72)	97(77.6)
3	Do you think you require any further training on biomedical waste management?	114(91.2)	121(96.8)
4	Do you segregates general waste from clinical waste ?	73(58.4)	81(64.8)
5	Do needle stick and sharps injuries need to be reported?	49(39.2)	57(45.6)
6	Wearing personal protective equipment is necessary	125(100)	125(100)
7	Universal precaution to be followed for all sample received	119(95.2)	122(97.6)
8	Do you follow colour coding for biomedical waste management?	63(50.4)	77(61.6)
9	Do you think that infectious waste should be sterilized from infections by autoclaving before shredding and disposal?	69(55.2)	73(58.4)
10	Will you like to attend voluntarily programmes that enhance and upgrade your knowledge about waste management?	82(65.6)	94(75.2)

Bio Medical Waste (BMW) means any waste, which is generated during the diagnosis, treatment or immunization of human beings, or in research activities pertaining there to or in the production or testing of biological. As medical students are going to be one of the important components of healthcare system, they should have proper and sufficient knowledge on biomedical waste management.

Knowledge about biomedical waste management rules among the 2nd professional medical student was high but was low among the 1st professional medical student. The practice of reporting of injuries resulting from improperly disposed biomedical waste was found to be lowest 39.2% among the 1st professional and was found to be low 45.6% among the 2nd professional in our study. With respect to the attitude regarding the waste management, majority of student felt that it was a team work and all were responsible for safe disposal. The study showed that none of student received any kind of training in BMW management. We can conduct training programs for the student emphasizing on standard precautions and BMW management. This study has also made us realize that such training programs should be conducted regularly and make it compulsory for all medical student to attend.

DISCUSSION

Bio-medical waste means any waste generated during diagnosis, treatment or immunization of human beings or animals. WHO stated that 85% of hospital wastes are actually non-hazardous, around 10% are infectious and around 5% are non-infectious but hazardous wastes. The World Health Organization (WHO) has classified medical waste into eight categories such as General

Waste, Pathological, Radioactive, Chemical, Infectious to potentially infectious waste, Sharps, Pharmaceuticals, Pressurized containers.

Biomedical waste management has recently emerged as an issue of major concern not only to hospitals, nursing home authorities but also to the environment. The bio-medical wastes generated from health care units depend upon a number of factors such as waste management methods, type of health care units, occupancy of healthcare units, specialization of healthcare units, ratio of reusable items in use, availability of infrastructure and resources.^[5]

The doctors, nurses, technicians, sweepers, hospital visitors, patients, rag pickers and their relatives are exposed routinely to Bio-Medical Waste and are at more risk from the many fatal infections due to indiscriminate management. Due to improper management of the biomedical waste this infectious waste gets mixed with solid waste. During the rainy season infectious substance may get added to the ground water and spreads hazardous diseases.

The improper management in bio-medical waste causes stern environmental problems that causes air, water and land pollution. The pollutants that cause damage can be classified into biological, chemical and radioactive. There are several legislations and guidelines in India concerning environmental problems, which can be addressed. The classification of radioactive waste generated as part of bio-medical waste is covered. Some of the effects of pollution on air, radio activities, land, health and hazards are discussed.^[6]

The general public's health can also be adversely affected by bio-medical waste. Improper practices such as dumping of bio-medical waste in municipal dustbins, open spaces, water bodies leads to the spread of diseases. Emissions from incinerators and open burning also lead to exposure to harmful gases which can cause cancer and respiratory diseases.^[7-8] According to Rao, Ranyal and Sharm^[9], the key to minimization and effective management of medical waste is segregation (separation) and identification of the waste. They recommend that the most appropriate way of identifying the categories of medical waste is by sorting the waste into colour coded plastic bags or containers. Medical waste should be segregated into containers/bags at the point of generation.

All disposable plastic should be subjected to shredding before disposing off to vendor. Final treatment of medical waste can be done by technologies like incineration, autoclave, hydroclave or microwave.^[9] Dental hospitals use instruments and materials that are directly exposed to blood and saliva and are therefore potential sources of infection. Many chemicals like acrylics, impression materials and mercury used for restorative purposes may have a possible environmental and human health impact if not handled properly.^[10,11]

The improper practice of segregation at the site of origin has been observed which causes mixing of infectious and noninfectious waste. It was observed in that study that there is a big gap between knowledge and attitude of the medical workers and their status or qualification has no role in that.^[12] The information acquired is mostly factual in nature and is not systematized. Begum et al. (2008) found that the majority of the doctors, nurses, and housekeepers have unsatisfactory knowledge and inadequate practice related to health care waste management.^[13]

Lalita et al in her study concluded that majority of the respondents have unsatisfactory knowledge attitude and inadequate practices related to waste management. This study has shown a need to improve the knowledge about waste management to protect the environment from the negative impact of waste. It is recommended to implement the need based training program for students at their school hostels and work places.^[14] Suchitra et al concluded in her study that education has a positive impact on retention of knowledge, attitudes and practices in all categories of staff. There is a need to develop a system of continuous education

for all categories of staff.^[15] Saini et al in her study observed a significant gap in the knowledge, attitude and practice of the consultants, residents and scientists with regard to biomedical waste disposal, to their knowledge/understanding on the subject.^[16]

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Majority of the 2nd professional medical student had increase level of attitude regarding dispose of all kinds of bio medical waste as shown in Table 2. 65.6% of 2nd professional and 54.4% 1st professional medical students have awareness regarding discard of all types of biomedical waste [Table2]. Questionnaire on the practice of BMW as in Table 3 showed that segregation & colour coding was not followed properly. Approximately 50% of 1st professional medical students agree with segregation and follow the colour coding for bio medical waste management as compare to less than 65% of 2nd professional medical students agree with segregation and follow the colour coding for bio medical waste management [Table3]. More than 90% medical student think they require training on biomedical waste management.

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This was similar to the findings of study of Stein et al^[17] reported that among doctors and nurses, only 37% reported that they ever suffered needle stick injury. Low reporting of injuries may be attributed to the fact that most of the doctors and other technical and nontechnical staff are unaware about a formal system of injury reporting which should be established within all the health facilities.

With respect to the attitude regarding the waste management, majority of student felt that it was a team work and all were responsible for safe disposal. The study showed that none of student received any kind of training in BMW management. We can conduct training programmes for the student emphasizing on standard precautions and BMW management. This study has also made us realize that such training programmes should be conducted regularly and make it compulsory for all medical student to attend. Though all the medical students were having the relevant knowledge but they were having varying attitude and awareness. There was a significant difference among them, as far as awareness and attitude of BMW were concerned.

The details of these data have been shown in table no.2 and 3. Begum et al found that the majority of the doctors, nurses, and housekeepers have unsatisfactory knowledge and inadequate practice related to health care waste management.^[13] Lalita et al in her study concluded that majority of the respondents have unsatisfactory knowledge attitude and inadequate practices related to waste management. This study has shown a need to improve the knowledge about waste management to protect the environment from the negative impact of waste. It is recommended to implement the need based training program for students at their school hostels and work places.^[14]

The purpose of BMW is mainly to reduce waste generation, to ensure its efficient collection, handling, as well as safe disposal.

Lack of awareness and inadequate knowledge has led to the hospitals becoming the hub for spreading illness. Common bio waste treatment facility in each city with strict monitoring of these facilities by regulatory agency should be implemented.^[18] It is the primary responsibility of Health administrators to manage hospital waste in most safe and eco-friendly manner. Hence this study was undertaken to know the KAP of BMW in our University, to identify the gaps and to take necessary steps for rectification.

Recommendations & Suggestions: Some suggestions are intensive training programs at regular time interval, orientation programs for all newcomers to understand the hospital function. The entire waste management practices should be a part of practice of the society rather than confining to hospitals and health facilities. Motivation and training of medical student is essential for successful implementation of the BMW management program.

CONCLUSION

Concluding from the results, first professional student are less aware and knowledgeable as compare to second professional regarding segregation, colour coding about biomedical waste management. Further intervention can be done by providing intensive training and orientation classes for new medical students to improve the knowledge and attitude about disposal for future practical application.

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