A Cross Sectional Study on the Awareness on the Bio-Medical Waste Management among Medical Students in a Tertiary Care Hospital Chennai

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Abstract

Introduction: Biomedical waste (BMW) collection and proper disposal have become a substantial issue for both the general and the medical community. In the present-day scenario, approximately 25% of biomedical waste is found to be hazardous and may affect the health of both general community and medical personnel. Medical students as future professionals are soon going to be an integral part of health care system. They should have proper and sufficient knowledge on BMW management. Moreover, the awareness about various aspects of BMW management has to be assessed frequently too.

Objective: The objective of the study was to assess the awareness of know on biomedical waste management at tertiary care hospital, (Saveetha Medical College) among medical students.

Methodology: This was a cross-sectional study done at Saveetha Medical College and Hospital. A total of 100 MBBS students were included in the study with their prior consent. A pre tested semi structured questionnaires was given to participants. The data was analyzed using software SPSS.

Results: 53% were boys and 47% were girl students. Among various questions asked in the Questionnaire, the overall knowledge on the awareness of biomedical waste disposal among medical students was 46.8%.

Conclusion: There is a lack of appropriate knowledge about biomedical waste management, awareness and practices of proper waste disposal. Hence, there is a need of training and programmes regarding health care waste management.

Keywords: *Biomedical management, healthcare, waste disposal, awareness, biohazards infectious, hospital.*

Introduction

With the growing industrialization and advancement in the medical technology, a greater population is having access to health services than before[1]. The increased accessibility of healthcare facilities has not only significantly improved lifestyle of general population but also harms the community health due to the release of tremendous amount of biomedical waste. 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 frequently visited by people without any distinction between sex, age, caste or religion. Biomedical waste is forming approximately 1%–2% of the total municipal solid waste stream [2]. Bio-medical waste (BMW) refers to the waste generated during the diagnosis, treatment or immunization of human beings or animals or in the research activities pertaining

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thereto or in the production or testing of biological and including categories viz., pathological waste, general waste, chemical waste, radioactive waste, infectious waste, sharps, pharmaceutical waste and pressurized containers[3]. Certain types of health care waste cause a greater risk. These include infectious waste (15-25% of health care waste) among which are body part waste (1%), sharp waste (1%), pharmaceutical or chemical waste (3%) and radioactive and cytotoxic waste or broken thermometers (less than 1%) BMW generated in the hospital fall under two major categories– non-hazardous and biohazards. Elements of non-hazardous waste are cardboard, non-infected plastic, packaging material, paper Etc.

Biohazards waste again falls into two types: (a) infectious waste (b) noninfectious waste. Inappropriate treatment and disposal of waste can transmit diseases. Legal provisions [Biomedical Waste (management and handling) Rules 1998] exist to minimize the damage of hazardous and infectious hospital waste on the public. This law is also applicable to people who receive, store, treat, collect, dispose, generate, or handle BMW, types of waste and treatment and disposal options under rule 1998. The BMW should be segregated into containers/ bags at the point of generation of the waste. The issue of waste management has risen up recently in countries that are developing where there is a small part of the application of formal and informal community environmental education awareness program [4]. It is estimated that 10-25% of the healthcare waste generated is hazardous & causes serious health problems [5]. The hospital waste management has diverse ramifications as it not only affects the health of patients but also of healthcare workers (doctors, nurses, sanitary staff, etc.) and public. Health care waste is a diverse mixture, which is very problematic to manage as such. A major issue related to present biomedical waste management is that many hospitals dispose their waste in an inappropriate, random and indiscriminate manner which results in wide spread of serious diseases like hepatitis, human immunodeficiency virus etc. A novel guideline consists of 1–17 rules, I–VI schedules and I–VI forms. The 2011 draft demarcated 8 categories of biomedical waste (down from 10 categories in the 1998 notification) [6]. Each institution has its own guidelines and protocol for supervision of biomedical waste. These guidelines and protocols should strictly be followed at every level of transportation, storage, generation, collection, disposal and treatment. At the level of generation itself, biomedical waste should be segregated into color-coded bags or containers. All those involved in different levels from generation to disposal are potentially at risk of serious health consequences. The risk group includes doctors, nurses, auxiliaries, hospital staffs and workers handling and disposing such waste [7]. Due to negligence in implementation of the rules and insufficient training to healthcare personnel, there is an indiscriminate disposal of biomedical waste[8].

Thus, the present study was aimed to assess the awareness of biomedical waste management among medical students.

Materials and Method

This study was conducted among medical students of **Saveetha Medical College and Hospital, Chennai**. A total of 100 MBBS students were included in the study with their prior consent. The study period was from 21st January 2019 to 30th march 2019. This cross-sectional study was done by using a semi-structured questionnaire which included questions related

- To evaluate the BMW education/awareness
- To evaluate awareness of BMW hazards and legislation
- To evaluate the awareness of BMW management practices.

The validity of the questionnaire was checked. It had 20 questions and they were asked to tick the right option. The participants were assured that it is voluntary and confidentiality would be maintained. The approval from ethics committee was taken prior. The questionnaires were given after to participants after explaining the importance of this study. Informed consent was obtained from the study participants. The questionnaires were anonymously collected from participants after the completion.

Inclusion Criteria:

1. Those who are consenting for the study.
2. 2nd professional and 3rd professional Medical students of Saveetha medical college were included.
3. Age group between 20 - 22.

Exclusion Criteria:

1. Those who are not available at the time of study
2. Those who are not willing to participate.

3. The study participants who didn't give their responses to certain questions.
4. Students of 1st professional was excluded since they don't have clinical knowledge or practice.

The data was entered in Microsoft Excel sheet and analyzed using Statistical method like percentages and chi square test with the help of Statistical Package for Social Sciences (SPSS) software.

Result

A total of 100 students participated in this study. Out of which 53 were male and 47 were female.

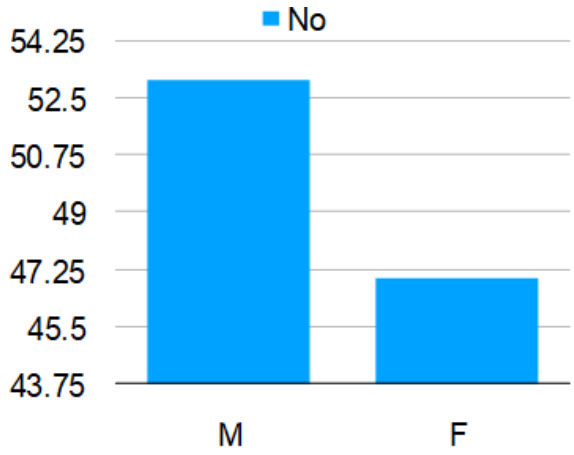

Figure 1. Sex ratio among participants

Majority (94%) participants were aware there is a guideline for biomedical waste disposal in India.

Table 1. Awareness of guideline present

Yes	94
No	1
Don't know	4
Not attempted	1

91% participants practice the color coding for waste disposal. 7% practice sometimes, not often.

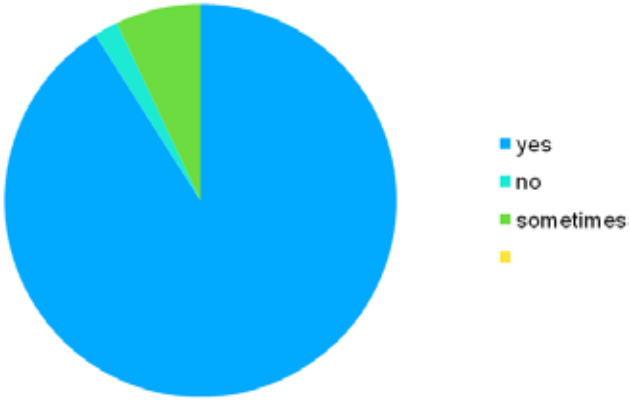

Figure 2. Practice of color coding

96% of participants had knowledge on the definition of biomedical waste management. 3% were unaware and remaining 1% was not sure.

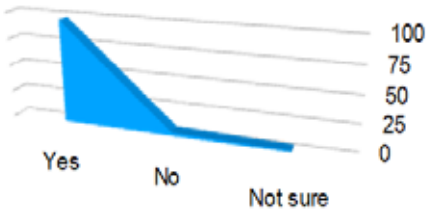

Figure 3. Knowledge of basic definition of BMW

64% students are only interested to take part in training or education program.

Table 2. Willingness to participate in programmes based on BMW

Yes	64
No	14
Cannot comment	22

85% are aware of biomedical health hazards.

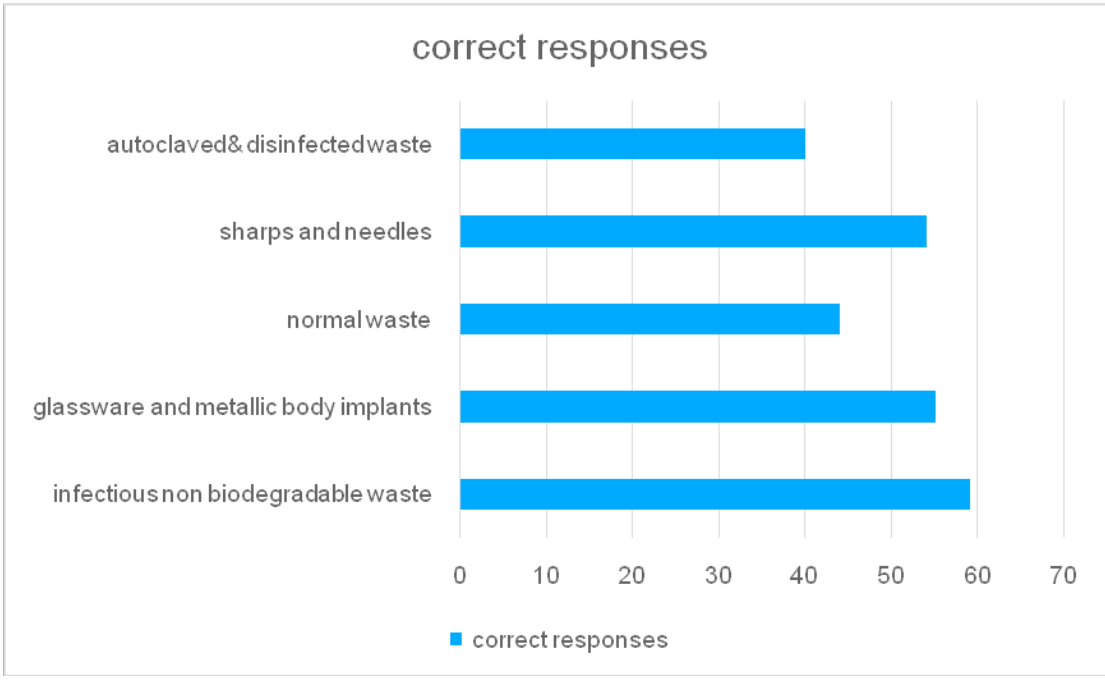

Figure 4. Awareness on health hazards

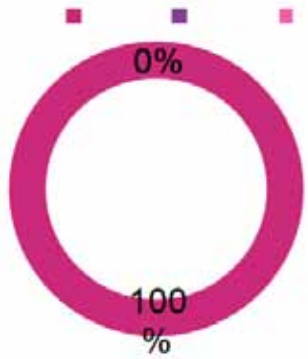

Figure 5. Responses of segregation of waste disposal

Discussion

In this study we assessed the awareness of biomedical waste management among medical students. 53% were male participants and 47% were female participants (fig 1), compared to previous study done by **Prakriti Vohra** showed, 70% were boys and remaining 30% were girls. In our study 94% knew that there is legislation (table 1) whereas 42% of MBBS students had knowledge about BMW rule, 1998 in the above-mentioned study. In a study done by Saini et al [9], 99.1% of study participants knew that there is a guideline for BMW. This difference could be due to 2 reasons:

1. Increase in level of awareness
2. Maybe the study population is entirely different between 2 studies in terms of education level. Awareness regarding health hazards related to improper BMWM in this study was found to be 85% (fig 4). Another study by Narang et al [10] showed (100%). The study piloted by Dr. Monika Bhardwaj, showed 107% knew about health hazards associated with BMW. In this study it showed 95%. Study done by Radha et al [11] revealed that 30% were aware that improper waste management can cause serious health hazards. Majority (96%) had the knowledge on the basic definition of BMWM compared to previous study (fig 3). Our study showed that 91% students follow color coding for segregation (Fig 2) compared to previous study done by Dr Madhu Kumar [12] where 65% of medical students agree with segregation and follow the color coding for bio medical waste management. Majority (64%) were interested in taking part in training programmes conducted by college (table 2). In the previous study done by Dr Madhu Kumar, more than 90% were interested in training programmes. This difference could be because of the lack of interest. A perusal of earlier studies conducted on awareness of BMW in various states of India also reveals that the awareness among health professionals about the hazards and its appropriate management

techniques are unsatisfactory[13,14 and 15]. The current study showed that 40% had knowledge on normal waste disposal compared to other studies (fig 5). Majority only had the knowledge on the disposal of infectious non-biodegradable (Fig 5) compared to previous study where 61% had knowledge done by Ananthachari k.r. 56.75% had knowledge on proper biomedical waste disposal (Gini Garima 3). 65% of participants knew about various method of disposal of biomedical waste in the previous study. While, in a study by Bharadwaj et al; only 20.9% of students could accurately determine various method of disposal of biomedical waste. In this study 46.8% only knew about various method of disposal. This percentage is less compared to previous and other studies conducted. This difference may be due to less number of repeated training imparted to students. In year 2002, the World Health Organization (WHO) reported biomedical waste practices in India. WHO reported that 50% reuse of biomedical waste products such as needles and syringes, which are meant for single use [16]. The main intention of BMW is to basically reduce waste generation, to guarantee its well-organized gathering, management, as well as safe disposal. Lack of awareness and inadequate knowledge has led to the hospitals becoming hub for spreading illness. Stringent biomedicalwaste treatment facility in every metropolitan city should be implemented. It is the primary responsibility of Health administrators to formulate hospital waste in most harmless and eco-friendly way. The United Nations Conference on Environment and Development in 1992 recommended the following

Measures:

a. Prevent and minimize waste production

b. Recycle or reuse the waste to the extent possible

c. Manage waste by harmless and environmentally sound method and 7

d. Dispose of the final residue by landfill in confined and carefully designed sites [17].

WHO stated that 85% of hospital wastes are actually non-hazardous, around 10% are communicable and around 5% are non-infectious but harmful wastes. The World Health Organization (WHO) has classifies medical waste into eight categories such as General Waste, Radioactive, Chemical, Pathological and Infectious to potentially infectious waste, Pharmaceuticals, Sharps and Pressurized Containers. In the year 1990, report by the U.S. Agency for Toxic Substances and Disease Registry decided that the general public is not expected to be adversely affected by biomedical waste produced in the conventional healthcare setting. They understood, however, that biomedical waste from those surroundings may cause an injury and exposure perils via occupational contact with medical waste for nurses, doctors and laundry, janitorial and refuse workers. Further, there are chances for the general public to come into interaction with medical waste, such as needles used illegally outside healthcare settings, or biomedical waste generated via home health care [18].

Difficulties involving biomedical waste: A major problem related to current Bio-Medical waste management in many hospitals is that the application of Bio-Waste regulation is substandard as some hospitals are eradicating of waste in a messy, inadequate and indiscriminate manner. Lack of separation practices, causes the mixing of hospital wastes with general waste causing the whole waste stream unsafe. Inappropriate separation ultimately results in an improper method of waste disposal. Inadequate Bio-Medical waste management thus will cause environmental pollution, growth, unpleasant smell and multiplication of vectors like rodents, insects and worms and may lead to the spread of diseases like cholera, typhoid, hepatitis and AIDS through injuries from needles and syringes contaminated with human[19]. Due to unsuitable managing of the biomedical waste this infectious waste gets diversified with solid waste. During the rainy season infectious substance may get added to the ground water and spreads hazardous diseases. Medical waste should be separated into containers/bags at the start of generation. Lack of proper waste management, absence of awareness about the health hazards from biomedical wastes, inadequate financial and human resources and reduced regulation of waste disposal are the most critical problems connected with healthcare waste [20].

The findings from this study:

1. Though all the medical students were having the relevant knowledge, they were lacking the knowledge on waste disposal of different types of waste.

2. The willingness to participate in programmes was poor among students.

3. The total knowledge on biomedical waste disposal

management was 46.8%. This study has certain limitations due to its cross-sectional type. Only the awareness regarding biomedical waste could be assessed in the present study.

Conclusion

Based on the result obtained regular and effective training of the medical students is important. Frequent awareness campaigns and classes should be conducted to improve the knowledge about safe handling and disposal of bio medical waste among medical students for future practical application. There can be training sessions conducted which could help the students in future. This would eventually increase the effectiveness of BMW management among future budding doctors. It can be made mandatory to conduct programmes so that it would help students gain better knowledge and understanding of importance of biomedical waste management and also the practice of safe disposal.

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Ethical Clearence: Obtained

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