Original Research Article

Awareness of biomedical waste management among clinical teaching staff in a private medical college in rural area of Maharashtra

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ABSTRACT

Background: Biomedical waste has become a serious health hazard in many countries, including India. The waste produced in the course of health care activities carries a higher potential for infection and injury than any other type of waste. The main aims and objectives of this study are to assess the knowledge, attitude and practices among the clinical teaching staff of a private medical college regarding biomedical waste management.

Methods: An observational, cross-sectional study was conducted among the clinical teaching staff of a private medical college regarding biomedical waste management. All the clinical teaching staff members enrolled on the roll muster were included. The data collection was done by interview technique using a pretested, structured questionnaire.

Results: Awareness about the number of categories of segregation of biomedical waste was found in 99% of the respondents. However 94% participants among them knew correctly the colour code of segregation but parcentage details of these categories varied from 49% to 90%. Percentage of actual practice of biomedical waste management varied from 57% to 77%.

Conclusions: The staff had exemplary knowledge of basic questions like number of categories of BMW segregation; however details of these categories were known to a somewhat fewer people. Awareness was much more in in clinicians who are having experience of less than 5 years. There is a need of organization of seminars to update their knowledge regarding biomedical waste management.

Keywords: Biomedical waste, Recyclable waste, Sharp metallic objects, Inspection of health facilities

INTRODUCTION

Biomedical waste has become a serious health hazard in many countries, including India.[1] "Bio-medical waste" means any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps, including the categories mentioned in Schedule I appended to the Government of India's Bio-Medical Waste (Management and Handling) Rules 2016.[2]The waste produced in the course of health care activities carries a higher potential for infection and injury than any other type of waste.[3] Improper disposal methods of these wastes may lead to the spread of serious and harmful diseases such as AIDS, hepatitis B and C, and tuberculosis (TB) among the healthcare personnel, waste handlers, patients and their visitors, and community where the waste is indiscriminately deposited.[4] It is estimated that annually about 0.33 million tonnes of hospital waste is generated in India and, the waste generation rate ranges from 0.5 to 2.0 kg per bed per day.[5] Bio-medical waste treatment and disposal facility means any facility wherein treatment, disposal of

bio-medical waste or processes incidental to such treatment and disposal is carried out, and includes common bio-medical waste treatment facilities. The Schedule II of these rules describe the Standards for treatment and disposal of bio-medical wastes.[1]

In Medical College Hospitals, there is a dedicated clinical teaching staff and other paramedical staff who are always in contact with bio-waste management. The clinical teaching staff must possess the appropriate knowledge in order to deal with the waste generated in the hospital. Adequate knowledge about the health hazard of hospital waste, proper technique and methods of handling the waste, and practice of safety measures can go a long way toward the safe disposal of hazardous hospital waste and protect the community from various adverse effects of the hazardous waste.

Hence, the present study is an attempt to assess the knowledge, attitude and practice regarding biomedical waste management among the clinical teaching staff of a Medical College in a rural area.

Aims and objectives

To assess the knowledge among the clinical teaching staff of a private medical college regarding biomedical waste management, to study the attitude of clinical teaching staff of a private medical college towards biomedical waste management and to find out the practices of clinical teaching staff of a private medical college regarding biomedical waste management.

METHODS

It was an observational, cross-sectional study. It was conducted from May 2018 to July 2018 among the teaching staff of clinical departments of a Private Medical College and Hospital. The sample consisted of all the teaching staff members in the clinical departments enrolled on the roll muster.

In a study carried out by Das SK, Biswas R. percentage of health providers who know about permanent disposal

methods of BMW was 67.7%.[4] With 95% confidence interval (α=0.05) and allowable error 15% of the prevalence, the sample size was 81. However, there were total 115 teaching staff in the above‑ mentioned departments. So, all of them were considered as study population except 5 drop outs who refused to participate in the study. All willing participants were informed about details regarding the purpose of this study, and prior informed written consent was taken from each of them.

Data collection was started after obtaining approval from the Institutional Ethical Committee of Medical College and Hospital. The data collection was done by interview technique using pretested, structured schedule consisting of two parts. First part included the basic profile of the participants containing details of various sociodemographic variables, such as age, gender, residence, working status, working place, and working period. In the second part the questions were divided into three categories: Knowledge, attitude and practice towards biomedical waste management.

The data was entered in Microsoft Excel. Data analysis was carried out by using appropriate statistical tests of significance.

RESULTS

The study was carried out in a tertiary care hospital to find out the awareness of biomedical waste management among clinical teaching staff. Total 110 participants were interviewed. Out of them 17 (15.45%) were professors, 22 (20% were associate professors, 25 (22.72%) were assistant professors and 46 (41.81%) were tutors. All the participants were having allopathic medical qualifications. While considering the experience, it was observed that 71 (64.54%) respondents had experience of less than 5 years and 39 (35.45%) had experience of more than 5 years. Total 109 (99%) respondents were aware about the number of categories of segregation of biomedical waste however, 94% participants among them knew correctly the colour code of segregation.

Table 1: Knowledge of segregation of biomedical waste among clinical staff based on their experience.

Questions regarding segregation of	Experience >5years (n=39)	Experience <5 years (n=71)	Total (n=110)	χ^2 value at DF=1
	N (%)	N (%)	N (%)	
Recyclable waste	32 (36.78)	55 (63.21)	87 (79.09)	0.32
Glassware and metallic body implants	25 (38.46)	40 (61.53)	65 (59.09)	2.26
Chemical Waste	27 (39.70)	41 (60.29)	68 (61.81)	1.40
Objects that could cause punctures and cuts	38 (35.18)	70 (64.81)	108 (98.18)	0.18
Catheters and urine bags	20 (37.03)	34 (62.96)	54 (49.09)	0.11
Waste scalpels and blades	36 (36.00)	64 (64.00)	100 (90.90)	0.14
Expired and discarded medicines	26 (40.00)	39 (60.00)	65 (59.09)	1.43

Table 1 shows the number correct answers given by the participants. Here the participants are divided into their years of experience. It is observed from Table 1 that for most of the questions regarding segregation of different types of biomedical waste, the percentage of correct answers is much more in clinicians who are having experience of less than 5 years. At the same time it may also be noticed that knowledge regarding disposal of waste glassware, metallic body implants, catheters, urine bags and expired medicines is found comparatively less among the subjects having experience of more than 5 years than those having relatively less work-experience. However on performing chi square test, these differences were not found to be statistically significant.

Figure 1 shows the response to the question related to disposal of radioactive waste. It was observed that a significant number of the less experienced teaching staff answered the question correctly as compared to those having experience of more than 5 years. When Chi Square test was performed, difference was found statistically significant, $\chi^2=4.57$, DF=1, p<0.05.
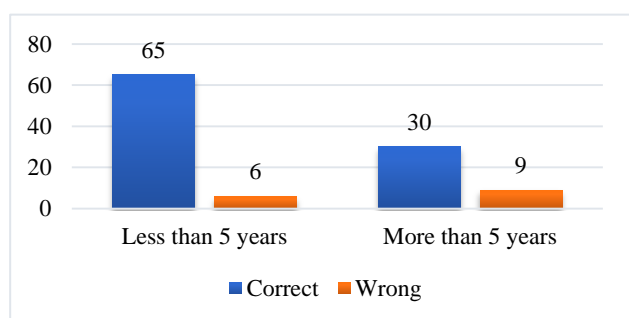

Figure 1: Knowledge of disposal of radioactive waste among clinical staff based on experience.

In the second part, questions regarding attitude of the participants towards biomedical waste management were asked to the participants.

Table 2 depicts the positive responses to the questions and they are compared on the basis of the experience of the participants. It was found that 99.09% of participants stressed the need of organization of seminars to update their knowledge regarding biomedical waste management. Similar number of participants agreed that State government should constitute an advisory committee for overseeing the activities carried out at health facilities.

However, only 22.72% participants felt that few additional categories may be added in to existing four categories and 68.18% of the participants told that excessive segregation of biomedical waste is too tedious for hospital personnel. However upon performing chi square test, the differences are not found statistically significant.

It was also noticed that only 62 (56.36%) participants have undergone training in biomedical waste management during their career.

Figure 2 reveals that 89 (80.90%) participants out of total 110 participants agreed that biomedical waste management training should be made compulsory for UG students. Here chi square test for association is found significant, $\chi^2=5.08$, DF=1, p<0.05.
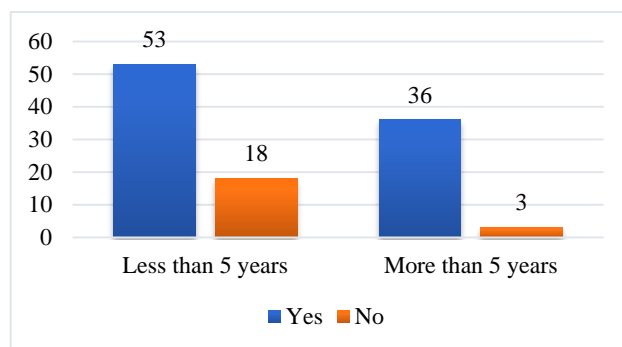

Figure 2: Response to question whether biomedical waste management training should be made compulsory for UG students.

While responding to the questions regarding practice of biomedical waste management rules, 105 (95.45%) participants informed that their hospital segregates biomedical waste into four different categories. The responses regarding segregation of biomedical waste of different types by clinical staff based on their experience were also taken.

Table 2: Attitude of participants towards biomedical waste management based on experience.

Questions related to Attitudes of participants	Experience >5 years (n=39)	Experience <5 years (n=71)	Total (n=110)
	N (%)	N (%)	N (%)
Organization of seminars regarding biomedical waste disposal	39 (35.78)	70 (64.22)	109 (99.09)
State government to constitute an advisory committee for overseeing the activities carried out at health facilities.	39 (35.78)	70 (64.22)	109 (99.09)
Addition of more categories to biomedical waste management	10 (40.00)	15 (60.00)	25 (22.72)
Excessive segregation of biomedical waste is too tedious for hospital personnel.	29 (38.67)	46 (61.33)	75 (68.18)

In Table 3 the positive responses of participants are compared based on their experience and chi square test was applied to test statistical association. It is observed from the Table 3 that for most of the questions the percentage of correct answers (Question regarding practice of segregation of biomedical waste) is much more in clinicians who are having experience of less than 5 years. Only 57.27% of participants could answer correctly about segregation of waste glassware which is a very low figure. However, the differences were not found statistically significant.

Table 3: Practice of segregation of biomedical waste among clinical staff based on experience.

Question regarding practice of segregation of biomedical waste	Experience >5 years (n=39)	Experience <5 years (n=71)	Total (n=110)	χ^2 value at DF=1
	N (%)	N (%)	N (%)	
Sharp metallic objects	27 (35.52)	49 (64.47)	76 (69.09)	0.001
Waste glassware	24 (38.09)	39 (61.90)	63 (57.27)	0.449
Contaminated recyclable waste	30 (38.96)	47 (61.03)	77 (70.00)	1.379
Waste antibiotics and cytotoxic drugs	31 (36.47)	54 (63.52)	85 (77.27)	0.169
Metallic body implants	22 (31.88)	47 (68.11)	69 (62.72)	1.031

Figure 3 depicts the response of participants to question regarding disposal of foetus below viability period. Here only 54 (49.09%) of total 110 participants could answer correctly. Among these, only 14 (25.92%) participants having experience of more than 5 years could give correct answer regarding response to question about disposal of foetus below viability period. When χ^2 test was applied, the difference was found to be significant, χ^2=4.208, DF=1, p<0.05.
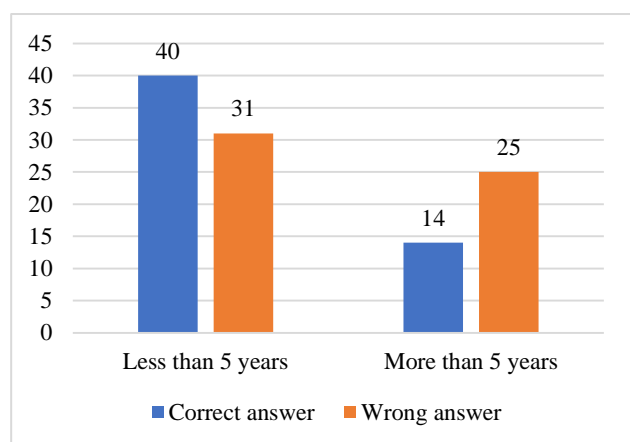

Figure 3: Response to question about disposal of foetus below viability period.

DISCUSSION

The present study was a cross-sectional study carried out in a tertiary health care centre. The study aimed to assess the knowledge, attitude, and practice of clinical teaching staff regarding biomedical waste management.

The overall awareness about biomedical waste management in our study was 99%. While in the study carried out by Madhukumar et al it was 76.8% among doctors.[6]

Regarding the knowledge of colour coding, 94% of participants in our study were able to give correct answers to the questions related to colour coding In the studies conducted by Bansal et al and Vishal et al; knowledge about colour coding among medical personnel was found to be 55.17% and 60.5% respectively.[7,8] Similarly study carried out by Nema et al, on the basis of scoring system, mentions that medical professionals i.e., doctors and interns having good awareness about health care waste management i.e., 44% and 36% respectively.[9] However in our study it was found to be 94% which is much higher than these studies. A probable reason is that our subjects consisted of teaching staff only.

In the same study carried out by Bansal et al percentage of segregation of sharp waste such as contaminated needle was 71.55% among doctors while our study reported it to be 98.18%.[7] In a study carried out by Selvaraj et al only 59% of the practitioners were able to answer more than 3 questions regarding colour coding correctly.[10] In our study more than 59% of participants answered 8 questions regarding colour coding correctly.

As far as attitude towards biomedical waste management is concerned, all the participants in our study showed a positive attitude and agreed that it is important to segregate biomedical waste into all these different categories. Similar findings are also reported in the study by Madhukumar et al, wherein 82% of the participants were in favour of implementation of the same.[6]

In our study only 2% of participants mentioned that the healthcare professionals need not worry about biomedical waste since they have a lot to focus on. However the study by Madhukumar et al has contrary findings.[6] Her study mentions that the teaching faulty was keen in getting all the rules implemented but majority were not ready to share the responsibilities because the faculty felt that they had shortage of time and that nurses should be

responsible for the same since they are continuously in the wards.

Regarding the concept of conduction of seminars for better understanding and implementation of biomedical waste management, 99.09% participants (n=109) in our study have agreed that such seminars should be conducted. Similarly in her study Nema has also pointed out the need of continuous training programmes in the form of seminars, workshops and symposia on biomedical waste management to create awareness among medical and paramedical staffs.[9] In his study Maduka et al has mentioned that effect of motivation on employee productivity is of paramount important to the organization.[11]

So far as practice of segregation of biomedical waste is concerned, the study of Selvraj et al revealed that only 55% of the practitioners segregated waste at the point of generation.[10] In comparison, our study reports the range of percentage to be between 49.09% and 77.27%.

A study carried out by Yadavannawar et al revealed satisfactory awareness and proper practice of BMW among teaching and non-teaching staff of the hospital.[12] Similar findings regarding the teaching staff are reported in our study.

Suggestions

Seminars, workshops for updating the knowledge of clinicians as well as other hospital employees regarding biomedical waste management must be organized on a regular basis.

CONCLUSION

The staff had exemplary knowledge of basic questions like number of categories of BMW segregation; however, details of these categories were known to a somewhat fewer people. The staff having an experience had a better knowledge of biomedical waste management as compared to the more experienced teachers. The teaching staff has a positive attitude towards biomedical waste management.

Limitations of the study

This study did not include pre, para clinical teaching staff of the institute.

Recommendations

Further studies need to be conducted to assess knowledge, attitude and practice regarding biomedical waste management among private medical practitioners. The comparative studies may be undertaken with inter-group comparisons between health providers from different health institutes.

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