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# Knowledge, Attitude & Practices of Biomedical Waste Management among Teaching staff in Tertiary care centre in Bihar

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## Abstract

**Background:** Biomedical waste from hospitals become one of the most serious health hazard in many countries. The waste produced during the course of conducting any types of health care activities will carries a higher potential risk for infection and injury than any other type of waste produced. The objectives of this study are to assess the knowledge, attitude and practices among the teaching staff of a medical college regarding biomedical waste management. **Material & Methods:** This is an observational, cross-sectional study. this study was conducted among the teaching staff of state run Government Medical college regarding biomedical waste management.. 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 percentage details of these categories varied from 46% to 92%. Percentage of staff who are performing regularly actual practice of biomedical waste management varied from 55% to 79%. It was also noticed that only 65 (59.09%) participants have undergone training in biomedical waste management during their career. **Conclusion:** It was concluded from this study that the teaching staff had sufficient knowledge about basic questions like number of categories of BMW segregation; however, details of these categories were known to a only to few people. It was also noticed that the lesser experience staff had a better knowledge & understanding of Biomedical waste management compared to the more experienced staff. All The teaching staff working here had positive attitude towards biomedical waste management.
**Keywords:** BMW segregation, biomedical waste.

## Introduction

Biomedical waste from hospitals become serious health hazard in many countries.[1] "Bio-medical waste" defined as any waste 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 during the course of any types of healthcare services carries a very higher risk for infection and injury than any other type of waste produced. [3] Expansion of health care facilities and the advancement of modern technologies of treatment as well as the recent trend of using various disposables has led to a very high burden of health care-related wastes. Since the last three decades, unregulated handling of BMW is emerging as a serious threat to human health and safety, and many researchers have documented this as a priority area.[4,5] 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.[6]

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.[7] Teaching faculty and other paramedical staff were always in contact with bio-waste. The clinical staff should must have the appropriate knowledge to deal with the waste generated in the hospital permisses. Adequate knowledge of the health hazard of hospital waste materials, 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 practices and protect the community from various adverse effects of the hazardous waste.

Hence, the present study is conducted 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 & Objectives

The present study is conducted to assess the knowledge of biomedical waste management among the clinical teaching staff & to find out attitude & practice of clinical teaching staff regarding biomedical waste management.

### Material & Methods

The present study was conducted at a State Government run medical college situated in Bihar. The study was conducted from August 2020 to October 2020. The sample consist various teaching staff of medical college. The sample size calculated from the study of Das et

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al [6] for the percentage of health provider know about permanent disposal methods of Biomedical waste was 67%, with 95% confidence interval (alpha=0.05) and allowable error 15% of the prevalence, the sample size was calculated to be 81. However there were about 170 teaching staff in the medical college, few of them refused to participate in the study and few of them not responded further so only 110 participants were enrolled in the study based on their consent to participate in the study.

Data collection were started after obtaining Ethical clearance from Institute ethical committee of the medical college. The data were collected by interview method using pre designed and pre tested structured questionire, the data consist of various sociodemographic profile, working period in the department and Knowledge attitutude and practices regarding Biomedical waste Management.

The data collected were entered in Microsoft Excel, and analysed by using appropriate statistical test

**Results**

The present study was carried out at a state Government run tertiary care hospital to find out the awareness of biomedical waste management among teaching staff. A total of 110 participants were interviewed for the purpose of conducting the study. All the participants interviewed were having allopathic Medical qualifications. as far the experience is concerned, it was found that 70 (63.63%) respondents were had experience of less than 5 years and 40 (36.36%) respondents had experience of more than 5 years. Total 109 (99%) respondents were aware about the different categories of of biomedical waste segregation methods and 94% of participants among them were correctly know the various colour code of BMWsegregation.

Table 1 shows the number of correct answers given by the participants. in this study the participants were divided in two groups on the basis of their years of experience. It is found from Table 1 that for almost all the questions related to segregation of different types of biomedical waste, the percentage of correct answers were much more in participants who are having experience of less than 5 years. At the same time it was noticed that knowledge regarding disposal of glassware, metallic implants, catheters, urine bags and expired medicines is found comparatively less among the participants having experience of more than 5 years than those having relatively less work-experience. On applying chi square test, these differences were not found to be statistically significant.

Figure 1 shows the response of the participant on the question related to disposal of radioactive waste. It was again observed that less experienced teaching staff were answered the question correctly as compared to those having experience of more than 5 years. on applying Chi Square test , the difference was found statistically significant, χ2=4.53, DF=1, p<0.05.

In the second part, questions was asked to participants related to attitude towards biomedical waste management.

Table 2 shows the positive responses to the questions and they were compared on the basis of the experience of the participants. It was found that all (100%) of participants stressed the need of organization of seminars to update their knowledge regarding segregation & disposal of biomedical waste management. All of the participants were agreed that State government should form an advisory committee to overseeing the activities carried out at all the health facilities.However, in this study it was found that only 19.09% of survey participants felt that few more additional categories may be added in to existing four categories and 72.72% of the participants told that excessive segregation of biomedical waste is very much tedious procedure for hospital personnel. However on applying chi square test in this the differences were not found to be statistically significant.It was also noticed in this study it was found that only 65 (59.09%) participants had participated in training in biomedical waste management in their career.

Figure 2 reveals that 83 (75.45%) out of 110 participants agreed on the fact that training on biomedical waste management should be compulsory for UG students. on applying chi square test the association is found to be significant, χ2=5.08, DF=1, p<0.05.

on asking questions on practices related to biomedical waste management rules, 106 (96.36%) participants were informed that their hospital staff segregates biomedical waste into four categories.

In Table 3 the positive responses among the participants were compared with their experience and chi square test was applied to find out association. It is observed from the Table 3 that the percentage of correct answers on questions related to practice of segregation of biomedical waste is much more among clinicians who are having experience of less than 5 years. It was also found that only 58.18 % of participants could answer correctly about segregation of waste glassware which is a very low. However, the differences were not found statistically significant.

Figure 3 shows the response to question related to disposal of foetus below viability period. only 63(57.27%) out of 110 participants were answer correctly. Among these, only 25 (22.72%) participants having experience of more than 5 years could give correct answer regarding response to question about disposal of foetus below viability period. When Chi Square test were applied, the difference was found to be statistically significant, χ2=4.116, DF=1, p<0.05.

**Table 1: About knowledge of Segregation of Biomedical waste among clinical staff on basis of their experience**

| Questions on segregation of BMW | Experience > 5 years( n=40) | | Experience <5 years (n=70) | | Total (n=110) | | χ2 value at DF=1 |
|---|---|---|---|---|---|---|---|
| | N | (%) | N | (%) | N | (%) | |
| Recyclable waste | 34 (36.17) | | 60(63.82) | | 94(85.45) | | 0.35 |
| Glassware and Metallic body implants | 24(36.36) | | 42(63.63) | | 66(60) | | 2.12 |
| Chemical Waste | 25(36.76) | | 43(63.23) | | 68(61.81) | | 1.37 |
| Objects that could cause punctures and cuts | 39(35.77) | | 70(64.22) | | 109 (99.09) | | 0.11 |
| Catheters and urine bags | 18(34.61) | | 34(65.38) | | 52(47.27) | | 0.15 |
| Waste scalpels and blades | 35(35) | | 65(65) | | 100(90.90) | | 0.14 |
| Expired and discarded medicines | 25(40.32) | | 37(59.67) | | 62 (56.36) | | 1.41 |

**Table 2: Attitude of study participants towards Biomedical waste management based on their experience**

| Attitude | Experience > 5 years( n=40) | Experience <5 years(n=70) | Total (n=110) |
|---|---|---|---|
| | N (%) | N(%) | N(%) |
| **Organization of seminars regarding biomedical waste disposal** | 40(36.36) | 70(63.63) | 110(100) |
| **Regarding constitution of an Advisory committee by State government .** | 40(36.36) | 70(63.63) | 110(100) |
| **Addition of extra categories for Biomedical waste management** | 8(38.09) | 13(61.90) | 21(19.09) |
| **Excessive segregation of biomedical waste is too tedious for hospital personnel.** | 30(37.5) | 50(62.5) | 80(72.72) |

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

| Questions on practices of segregation of BMW | Experience > 5 years( n=40) | Experience <5 years(n=70) | Total (n=110) | χ2 value at DF=1 |
|---|---|---|---|---|
| | N (%) | N(%) | N(%) | |
| Sharp metallic objects | 25(34.24) | 48(65.75) | 73 (66.36) | 0.001 |
| Waste glassware | 22(34.37) | 42(65.62) | 64 (58.18) | 0.441 |
| Contaminated recyclable waste | 28(37.33) | 47(62.66) | 75 (68.18 ) | 1.31 |
| Waste antibiotics and cytotoxic drugs | 33(37.93) | 54(62.06 ) | 87 ( 79.09 ) | 0.17 |
| Metallic body implants | 23(32.85) | 47(67.14) | 70 ( 63.63 ) | 1.02 |
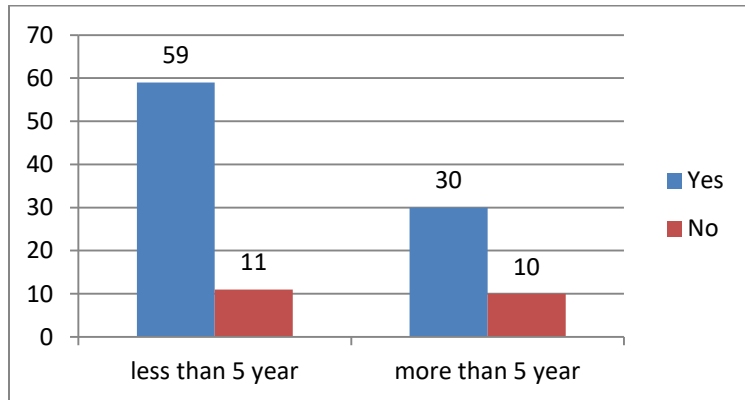


**Figure 1: Knowledge of disposal of radioactive waste among clinical staff based on experience**
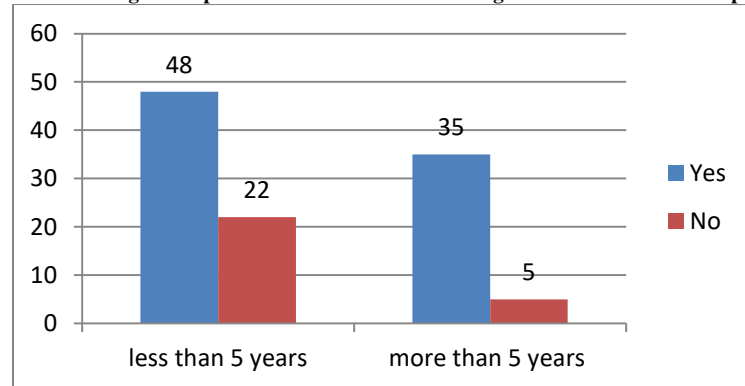


**Figure 2: Response to question whether biomedical waste management training should be made compulsory for UG students**
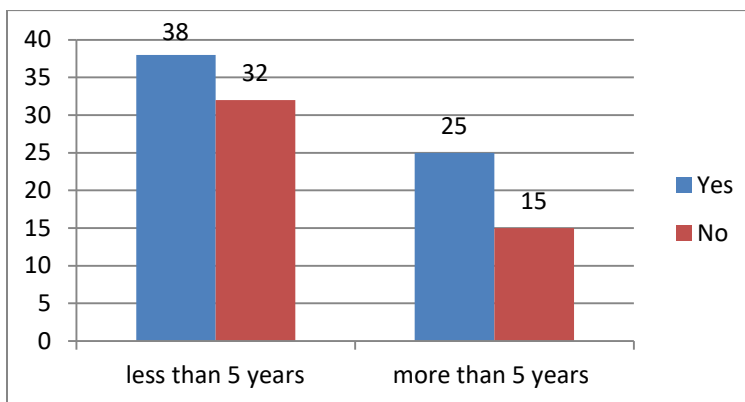


**Figure 3: Response to question about disposal of foetus below viability period**

**Discussion**

The present study was a cross-sectional study carried out in a state Government run tertiary care hospital. This study aimed to assess the

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knowledge, attitude, and practice of clinical teaching staff about biomedical waste management.

In our study the awareness about Biomedical waste management was 99%. While in the study by Madhukumar et al[8] it was 76.8% among doctors. In our study 94% of participants were able to give correct answers to the questions related to colour coding of BMW. In other studies conducted by Bansal et al and Vishal et al; it was found that the knowledge about colour coding among medical personnel was found to be 55.17% and 60.5% respectively.[9,10] Another study carried out by Nema et al, was based on scoring system, found that the medical professionals i.e., doctors and interns were having awareness of 44% and 36% about health care waste management respectively.[11] However in our study it was found to be 94% which is much higher than these studies, because in our study the participant were consisted of teaching staff only

similar study carried out by Bansal et al, the percentage of segregation of sharp waste such as contaminated needle was 71.55% among doctors while in our study it was reported to be 99.09%.[9] In a similar study carried out by Selvaraj et al, 59% of the practitioners were able to answer more than 3 questions regarding colour coding correctly.[12] In our study more than 58% of participants answered 8 questions regarding colour coding correctly.

As far as attitude of the participants towards Biomedical waste management in the hospital is concerned, all of the participants in our study showed a positive attitude and agreed that it is very much important to segregate all types of Biomedical waste into various categories. Similar findings are also reported in the study by Madhukumar et al, wherein 82% of the participants were agreed to segregate various Biomedical waste in different categories.[8]

As far as the conduction of seminar for updating the knowledge, better understanding & implementation of biomedical waste management ruled were concerned, 100% participants (n=110) in our study have agreed that such seminars should be conducted regularly. Similarly in other study by Nema et al, has also pointed out the need of training programmes at regular intervals in the form of seminars, workshops and symposia on biomedical waste management to create awareness among medical and paramedical staffs.[11] In the study by Maduka et al has mentioned that effect of regular motivation on employee productivity is important to the organization.[13]

As far as practices on segregation of various Biomedical waste were concerned, the study of Selvraj et al revealed that only 55% of the practitioners segregated waste at the point of their generation.[12] In comparison, in our study the range of percentage falls between 55% and 79%.

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.[14] Similar findings regarding the teaching staff were also reported in our study.

## Conclusions

It was concluded from this study that the teaching staff had sufficient knowledge about basic questions like number of categories of BMW segregation; however, details of these categories were known to a only to few people. It was also noticed that the lesser experience staff had a better knowledge & understanding of Biomedical waste management compared to the more experienced staff. All The teaching staff working here had positive attitude towards biomedical waste management.

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