ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
Index Copernicus Value: 49. 23

*International Journal of Medical Science and Innovative Research (IJMSIR)*
*IJMSIR : A Medical Publication Hub*
*Available Online at: www.ijmsir.com*
*Volume – 3, Issue –2, April - 2018, Page No. : 230 - 235*

# KAP study regarding Biomedical Waste Management (BWM) among the undergraduate medical students: A cross-sectional study.

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**Type of Publication:** Original Research Paper

**Conflicts of Interest:** Nil

## Abstract

**Purpose:** BMW management is a team work requiring cooperation and coordination of doctors to ward boys. An undergraduate student being the future doctors; are exposed to various BMW during their course of training in hospital. Hence adequate and appropriate knowledge about proper handling methods of BMW in them is a must so that they not only are protected themselves but also protect the community from hazards of BMW. This study was conducted to understand the awareness about BMW among the undergraduates so that if unsatisfactory-appropriate measures can be taken to improvise at the earliest.

**Material and methods:** A cross sectional study was conducted including all the 2nd year MBBS students of JNMC, KAHER, Dr. Prabhakar Kore Hospital and Medical Research Center, Belgaum. A total of 157 MBBS students were given the pre-validated, semi structured questionnaire to fill. Percentage was used to analyze the data.

**Results:** A total of 157 undergraduate MBBS students took part in the study. Results show that majority of the students had a good knowledge about BMW & its management and also knew about the color coding for the segregation of the same.

**Conclusion:** Importance of training the undergraduates about BMW needs to be emphasized. Strict supervision and surveillance should be done on day-to-day basis to see that policies are followed properly. Training of undergraduates in BMWM before their clinical postings should be made mandatory.

**Keywords:** Biomedical Waste, Biomedical waste management, KAP, MBBS students.

## Introduction

Biomedical Waste (BMW) is defined as any waste that is generated during diagnosis, treatment/ immunization of humans or animals or in the research activities pertaining to or in the production or testing of biological including categories viz General waste, Infectious waste, Sharps, Pharmaceutical waste, Pressurized containers. It includes various categories mentioned in schedule 1 of Government of India's biomedical waste management and handling rules 1998.[1]

With increasing number of Hospitals/ Nursing homes day by day production of BMW has increased. It is estimated that about 1 to 2 kg of waste is generated per bed per day, which accounts to 3 million ton of waste per year and 8% annually in India.[2] Of the total waste produced by hospitals 75-90% is general and non-hazardous and the remaining 10-25% is infectious waste carrying high potential of infection and injury.[3]

In July 1998, Government of India has framed rules through the ministry of Environment and Forest (MOEF) so as to form uniform guidelines, code of practices for the whole nation to follow regarding Biomedical waste segregation, storage, transport, treatment and disposal at each level. Amendment of this rules was done subsequently in June 2000, September 2003 and 2011.[4]

The main aim of this rule/ law was to reduce waste generation, to ensure its proper collection, handling with safe disposal.

Even with all these rules laid down by the government, not all hospitals/ nursing homes follow them. Due to which the BMW has become a threat to not only health care providers but also to community.

BMW management is a team work requiring cooperation and coordination of doctors to ward boys. An undergraduate student being the future doctors; are exposed to various BMW during their course of training in hospital. Hence adequate and appropriate knowledge about proper handling methods of BMW in them is a must so that they not only are protected themselves but also protect the community from hazards of BMW.

A number of studies are done in various states of India, which have revealed that awareness about BMW among the health professionals is unsatisfactory.[5,6,7] Thus this study was conducted to understand the awareness about BMW among the undergraduates so that if unsatisfactory- appropriate measures can be taken to improvise at the earliest.

**Material and Methods**

Study design- Cross sectional.

Study type- Observational

Study place- Jawaharlal Nehru Medical College, KAHER, Dr. Prabhakar Kore Hospital and Medical Research Center, Belgaum.

Study Population- 157 students in 2nd year MBBS, who were present on the day of data collection were enrolled for participation in the study.

Sampling method- Universal sampling method

Methodology- All the students were given pretested, semi-structured questionnaire after explaining the purpose of the study in detail.

Questionnaire included various aspects about BMW and BMWM. Students were encouraged to give their frank opinion and their anonymity was maintained by asking them not to mention their name/ roll number on the forms. After 45 minutes students were asked to submit their forms individually on the same day.

Statistical analysis- Data was entered in Microsoft Excel. Percentage was used to analyze the data.

**Results:**

A total of 157 undergraduate MBBS students took part in the study. Tables 1, 2 and 3 represent the responses for various questions related to Knowledge, attitude & practice of BMW & BMWM among the students. Results show that majority of the students had a good knowledge about BMW & its management and also knew about the color coding for the segregation of the same.

**Table no 1**: Response on knowledge assessment regarding bio-medical waste management

| Sl.no | Questions regarding knowledge assessment on BMWM | Yes n= 157(%) | No n= 157(%) |
|---|---|---|---|
| 1 | Definition of Bio Medical Waste (BMW) | 143 (91) | 14 (9) |
| 2 | Awareness of BMW Rule/Act, 1998 | 35 (22) | 122 (78) |
| 3 | Awareness about Bio-Hazard Symbol | 96 (61) | 61 (39) |
| 4 | Trained in Bio-medical waste management | 27 (17) | 130(83) |
| 5 | Knowledge about all healthcare wastes being hazardous | 36(23) | 121(77) |
| 6 | Knowledge about the existence of Waste Management Plan and Team in their university | 148(94) | 9 (6) |
| 7 | Knowledge about BMW categories color coding | 124 (79) | 33 (21) |
| 8 | Knowledge about diseases transmitted by BMW | 136 (86.6) | 21(13.4) |
| 8 | Knowledge dispose of BMW | 38(24.2) | 119(75.8) |
| 9 | Knowledge about segregation of biomedical waste according to different categories | 127(80.8) | 30(19.2) |
| 10 | Knowledge about existence of any guideline for color coding at the hospital and college they are working. | 146(92.9) | 11(7.1) |
| 11 | Knowledge about the type of BMW disposal method followed at their hospital.(Correct answer- Incineration) | Correct answer 146(92.9) | Wrong answers 11(7.1) |

**Table no 2:** Response on Attitude assessment regarding bio-medical waste management

| Sl.no | Questions regarding knowledge assessment on BMWM | YES n= 157(%) | NO n= 157(%) |
|---|---|---|---|
| 1. | Do you know the meaning of “Universal precaution” which is to be followed while handling any sample? | 149(94.90) | 8(5.09) |
| 2. | Do you think needle stick & sharps injury to health care providers need to be reported? | 156(99.36) | 1(0.63) |

| | | | |
|---|---|---|---|
| 3. | Do you think waste management is part of your duty as a doctor? | 153(0.97) | 4(2.54) |
| 4. | Is HBV vaccination a must for those handling BMW? | 147(0.936) | 10(6.36) |
| 5. | Do you think your knowledge regarding biomedical waste management is adequate? | 41(26.11) | 116(73.88) |
| 6. | Are you willing to attend any training programs on biomedical waste management if arranged for to enhance & upgrade your knowledge about the same? | 131(0.83) | 26(16.56) |

**Table no 3**: Response on Practice assessment regarding bio-medical waste management

| Sl.no | Questions regarding knowledge assessment on BMWM | Correctly answered n= 157(%) | Wrongly answered n= 157(%) |
|---|---|---|---|
| 1. | Where will you dispose blood contaminated cotton/gauze/bandages? **Correct ans- Yellow plastic bag** | **74(47.13)** | 83(52.87) |
| 2. | Where do you dispose expired drugs/chemical wastes/cytotoxic drugs? **Correct ans-Black plastic bag** | **53 (33.75)** | 104(66.25) |
| 3. | Where do you dispose sharps waste like destroyed needles/ampules/glass vials? **Correct ans-Puncture proof container** | **63(40.12)** | 94(59.88) |
| 4. | Where will you dispose the hazardous liquid waste? **Correct ans-Black plastic bag** | **34 (21.65)** | 123(78.35) |
| 5. | Where will you discard used rubber materials like tubing's, catheters, gloves **Correct ans-blue plastic bag** | **30(19.10)** | 127(80.9) |

## Discussion

In this study, MBBS students were assessed for their Knowledge, attitude & practice of BMW & BMWM. Interestingly study revealed that majority of them had good knowledge & were aware of the topic and its importance.

In our study only 22% of MBBS students were aware of BMW rule/ act 1998, unlike in a study done by Saini et al; and Prakriti.V et al; where 99.1% & 42% of the MBBS students were aware about the law.[8,9] This gap in the knowledge could be due to the difference in exposure to topics among the undergraduates.

79% of the students know about the different categories of BMW which is high as compared to the study done by Bhardwaj. M et al; & Prakriti.V et al; showing 28% & 59% respectively & this difference may be due to the quality of training the students have received at their institute.[9, 10]

Awareness regarding health hazards caused due to improper BMWM among the study participants was found to be 86.6% which is similar to the study findings of Prakriti.V et al;(85%) but in contrast to 100% awareness among the study population in a study by Narang et al;.[9,]

93.6% of the study participants were aware of the importance of HBV vaccination for those handling BMW in this study. These findings were similar to that done by Bhardwaj et al; where 94% were aware of the same,[9] while 58% & 74% of the study group knew about the importance in the studies done by Makadia JS etal; & Prakriti.V et al; respectively.[9, 12] This difference in the knowledge is the reflection of impact of training intervals followed in various institutes for their UG students.

The most important step in BMWM is use of colour coding bag segregation. This knowledge was satisfactory in 40.6% of the participants in our study which is in contrast to the study done by Deo et al; who showed only 20.23% & 26% in a study done by Joe et al;[13,14] while the findings matched to the one done by Prakriti.V et al; showing 56.75% to be aware of this colour code segregation.[9]

## Conclusion

Undergraduates being the future health care providers; they need to understand the importance of Biomedical waste management in their work setup. Hence importance of training the undergraduates about BMW needs to be emphasized. Strict supervision and surveillance should be done on day-to-day basis to see that policies are followed properly. Training of undergraduates in BMWM before their clinical postings should be made mandatory. Though there are topics on BMWM in Community medicine and Microbiology subjects, they is very little information mentioned about the hazards of ill management of BMW, which is very essential for undergraduates to know so that they can act accordingly. This can be still more made impactful by conducted periodic training programs, CME, lectures including live demonstration of BMW segregation and color coding. There is also need of forming a strict regulatory body at the apex level so that they supervise and check all the hospitals/ nursing homes at regular intervals about their following of proper segregation, disinfection, storage, transport and disposal of BMW. Above all the measures, there is the requirement of motivation among the health care providers for routine practice of BMWM.

**Funding:** No funding sources

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