

# Feedback Survey on Awareness and Management of Bio-Medical Waste among Dental Health Care Personnel in Kashmir, India

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## ABSTRACT

**Introduction:** Dental practices generate huge amounts of biomedical waste. Knowledge and awareness among dental health care personnel about the hazards related to biomedical waste is vital and critical to protect health personnel from its hazards. The present study was conducted to assess the level of awareness and attitude among dental health care workers which included dentists and dental auxiliaries in Kashmir division, Jammu and Kashmir State, India.

**Material and methods:** A total of 408 registered dentists and 456 dental auxiliaries who were working with dentists which included dental hygienists and dental assistants were included in the study. The questionnaire based cross sectional study was conducted among dentists and both operating and non-operating dental auxiliaries. Paired t-test was used to compare the descriptive statistics.

**Results:** The results based on the responses of the 864 participants showed dentists had fairly better knowledge than dental auxiliaries and the results were statistically significant. It was observed that only 24.01% of the dentists had an excellent awareness while 64.03% of the Dental auxiliaries had poor awareness regarding biomedical waste management practices. More than 50% of the dentists had an average or good attitude while 60.96% of dental auxiliaries had a poor attitude towards sterilization, disinfection and labelling of biomedical wastes.

**Conclusion:** It was concluded that the awareness, knowledge and practices regarding biomedical waste was higher in dentists than dental auxiliaries, however it was not satisfactory.

**Keywords:** Bio-medical Wastes, Occupational hazards, Waste Disposal, Disinfection, Healthcare establishment, Infectious waste.

The absenteeism of correct waste management, lack of awareness about the health hazards from these harmful wastes, inadequate financial and human resources and poor waste disposal systems are the most critical problems connected with medical waste. Haphazard disposal of BMW and contact to such waste poses a serious danger to both environment and health of individuals. Hospital waste requires precise treatment and management before its final disposal. The threat is further amplified by the prevalence of life threatening diseases such as Human Immunodeficiency virus (HIV) and Hepatitis B and C.<sup>4</sup> The Ministry of Environment and Forests has formulated the Bio-Medical Waste (Management and Handling) Rules, 1998, which are meant to improve the waste management system for hospital wastes in India.<sup>1</sup> General Hospitals, health care centers and other healthcare establishments in the country contribute to the production of significant quantity of harmful waste, posing grave problems for its disposal. The main problem arises with the open dumping of the hospital refuse which gets mixed with domestic waste leading to various types of environmental as well as potent human hazards.<sup>5</sup>

Sufficient knowledge about the health threat of hospital waste and the appropriate methods of handling such wastes is essential for the protection of health care providers, workers, waste management staff as well as general population from various harmful effects of the hazardous BMW. Even though globally there is an increased awareness about health hazards of BMW among health care professionals and in spite of the recent advances in appropriate management techniques of these wastes, numerous studies on awareness about hazards of BMW across the country reveal that the knowledge and practices of waste disposal and its hazards among health professionals have been found to be unsatisfactory.<sup>6,7</sup> The present study was conducted to assess the level of awareness regarding BMW, attitude and practices among dental health care workers which included both dentists and dental auxiliaries in Kashmir division of Jammu

## INTRODUCTION

In the progress of curing illness, the health care sector produces massive amount of bio-medical waste which may be harmful to all those who come in contact with this waste. Biomedical waste (BMW) is the term applied to the waste that is generated during diagnosis, treatment or immunization of human beings or animals or in the research activities pertaining thereto or in the production or testing of biological including categories viz., general waste, pathological waste, radioactive waste, chemical waste, infectious waste, sharps, pharmaceutical waste and pressurized containers.<sup>1</sup>

Dental waste is a subcategory of dangerous biomedical waste. Dental practices also generate huge amounts of cotton, latex, plastic, glass, sharps and extracted teeth and other materials which may be contaminated with blood and body fluids.<sup>2</sup> Hazards arising due to waste disposal from dental practices creates an environmental burden by variety of hazardous products and adds to the direct risk of possibly infectious material that may be faced by the individuals handling these wastes.<sup>3</sup>

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and Kashmir state, India.

## MATERIAL AND METHODS

The present study was done in Jammu and Kashmir State of India. The study was conducted for a period of 4 months from the month of June to September 2015. The study population consisted of all the registered dental practitioners, and other dental auxiliary staff in Kashmir division of the state. All the auxiliary staff who were working with dentists which included dental hygienists and dental assistants were also included in the study. The dentists were either working in the government sector as in health centers, district hospitals or teaching hospitals and private sector as in private dental clinics.

Primarily a list of dentists with their address and phone number was acquired from office of the Registrar, State Dental Council, Jammu and Kashmir branch. A total of 523 registered dentists enlisted were included in the study who were either working or residing in Kashmir division of Jammu And Kashmir State. Out of these, only 408 took part in the study due to the availability and consent. Out of these 408 dentists, 34 were BDS final year students. The exact number of the auxiliary staff was not known as they were not registered. Thus a convenient sampling was done as per the availability of such personnel. A total of 456 auxiliary staff completed the questionnaire which included operating and non-operating dental auxiliaries. An informed consent was acquired from the participating personals and clearance taken from hospital administration for conducting the study in hospitals and health centers.

The knowledge and awareness about the bio medical waste management was acquired through a pre-validated instrument taken from a prior study.<sup>8</sup> The instruments consisted of 40 close ended questions, divided into 4 sections with each section consisting of 10 questions, section 1 included questions on Knowledge of biomedical waste generation, hazards and legislation, section 2 included questions about level of awareness on BMW management practice, section 3 included questions about Attitude/ behavior assessment towards BMW and section 4 included questions about Level of knowledge on needle-stick Injuries. Questionnaire was administered at the place of work to all the subjects and taken back on completion on the same day. Confidentiality of the responses by the participants was maintained. The percentage of correct and incorrect answers for each question from all the participants was obtained. Interpretation for the responses was based on the number of questions answered correctly with scores as; Excellent: 8 correct

answers out of 10, Good to average: 4-7 correct answers out of 10, Poor: <4 correct answers out of 10.

## STATISTICAL ANALYSIS

Data was entered in Microsoft Excel 2013 software and analysis was done using Minitab 16.1.1 version of statistical software. Descriptive statistics like percentage, mean, and SD (standard deviation) were computed for data presentation. Paired-*t* test was used for calculating the statistical significance between dentists and dental auxiliaries for knowledge about BMW.

## RESULTS

The results of the present study were based on the responses of the 864 participants which included 408 dentists and 456 dental auxiliaries. Responses from both the groups were analyzed separately and comparison for the knowledge in two groups was done using paired *t* test.

Figure-1 shows the comparison of the correct responses in relation to knowledge about BMW management and legislation. It was seen that the dentists had fairly better knowledge than dental auxiliaries and the results were statistically significant (*T-Value* = 2.96, *p-Value* = 0.016) for the correct answers for knowledge. Results showed that 64.95% of the dentists had positive knowledge about BMW management and legislation in comparison to 19.9% of dental auxiliaries. Results also showed that more than 75% of both the dentists and dental auxiliaries accepted that it is important to know about BM waste generation, hazards and legislation. Dentists (58.9%) had better knowledge regarding the BMW (Management and Handling) Rules and its amendments than dental auxiliaries (30.92%). 72% dentists accepted that BM wastes should not be stored beyond 48 hours in comparison to 48.02% dental auxiliaries. Dentists also had better knowledge about the transportation of BM wastes.

Table-1, section 2, shows level of awareness, attitude about BM waste management practices in both dentists and dental auxiliaries. It was observed that only 24.01% of the dentists had an excellent awareness about BMW, while most dentists (44.11%) had good or average attitude regarding the waste management practices which included awareness about color coding, disposal of sharps, wastes infected with blood or body fluids and hazardous wastes. About 64.03% of the Dental auxiliaries had poor awareness regarding BMW management practices while only 31.86% dentists presented poor awareness. Table-1, section 3, presents the attitude and behavior of dentists and auxiliaries towards BMW management. More than 50%

Section	Health care personal		Excellent	Good/ average	Poor
2. Level of awareness	Dentists	n	98	180	130
		%	24.01	44.11	31.86
	Auxiliaries	n	52	112	292
		%	11.40	24.56	64.03
3. Attitude / Behavior	Dentists	n	156	208	44
		%	38.23	50.98	10.78
	Auxiliaries	n	82	96	278
		%	17.98	21.05	60.96
4. Knowledge of Needle stick injuries	Dentists	n	286	94	28
		%	70.09	23.03	6.80
	Auxiliaries	n	233	150	73
		%	51.09	32.89	16.00

**Table-1:** Frequency distribution of the responses by dentists and dental auxiliaries for section2, 3 and 4 of the questionnaire.

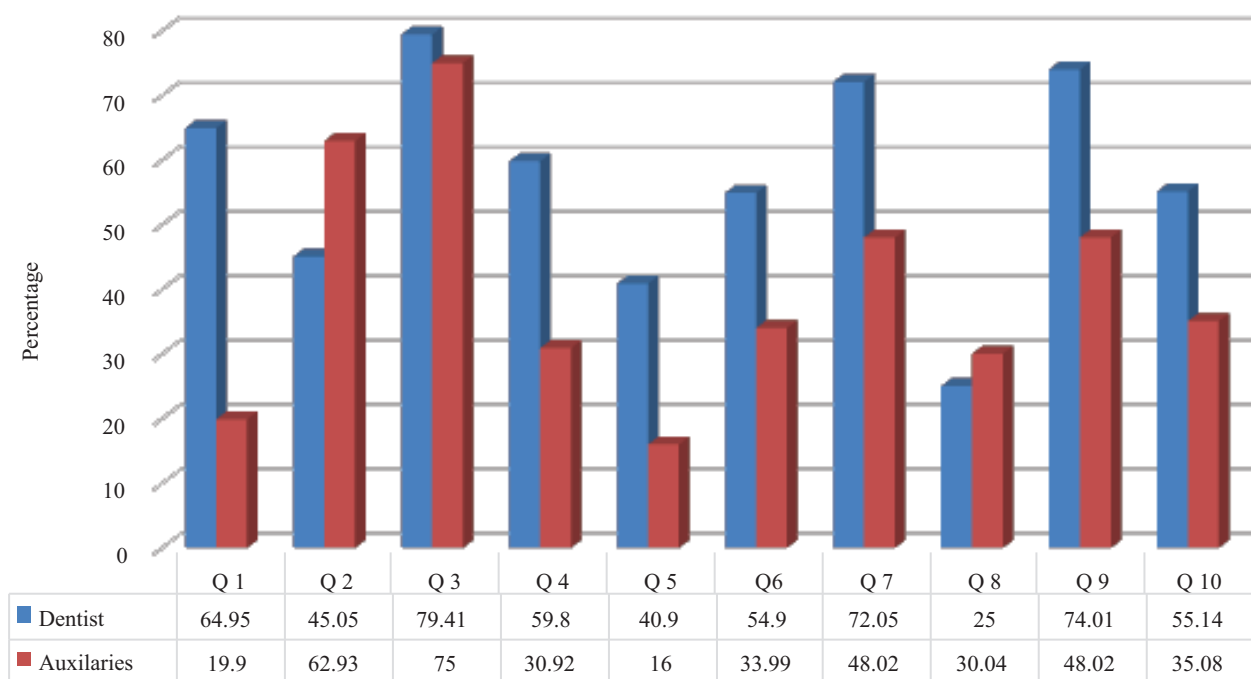


Figure-1: Comparison in knowledge in dentists and dental auxiliaries about biomedical waste management

of the dentists had an average or good knowledge about safe management, responsibility towards BMW. It also shows that only 17.98% of dental auxiliaries had a good/average attitude towards organizing classes or voluntary programs for upgrading knowledge on BMW. The responses in section 3 also showed that 60.96% of dental auxiliaries had a poor attitude towards sterilization, disinfection and labeling of BMW. While only 10% of the dentists had poor knowledge about labeling of BMW and reporting to the pollution control board in case of non-compliance of the rules.

Table-1 section 4, shows Level of knowledge among dentists and dental auxiliaries on needle-stick injuries. Higher number and percentage of both dentists (70.09%) as well as dental auxiliaries (51.09%) had excellent knowledge about needle-stick injuries, while least had poor knowledge about it.

**DISCUSSION**

Waste generated in a dental hospitals or clinics is analogous to that produced by other hospitals which includes a large component of general waste and a smaller proportion of hazardous waste.<sup>9</sup> Dental hospitals use instruments and materials that are directly exposed to blood, saliva and therefore are probable causes of infection. Many chemicals like acrylics, impression materials and mercury used in dentistry may have a potential environmental and human health impact if not disposed properly.<sup>10</sup>

Knowledge and awareness among dental health care personnel about the hazards related with the BMW, methods of segregation of wastes is vital and critical to protect health personnel from sharp, infectious and chemical waste. The tremendous growth of Health Care sector such as hospitals and dispensaries in India has generated substantial health care wastes creating a worrying situation for local governments. In India, there are about 6,00,000 hospital beds, over 23,000 Primary Health Centers, thousands of registered and unregistered nursing homes, dispensaries and a very large number private practitioners

including both medical and dental health care facilities in urban and semi-urban localities.<sup>11</sup> According to health information statistics 20% of total beds are in rural hospitals while 80% are in urban hospitals. Concluding from past figures of number of beds and typical quantity of waste generation at the rate of 1 kg per bed per day, it can be projected that about 0.33 million tons of hospital waste is being created per year.<sup>12</sup>

In India, with exemption to a few large hospitals, most of the smaller hospitals and nursing homes lack any operative and safe system of BMW disposal. In view of the serious condition involving BMW, the Ministry of Environment and Forests, Government of India formed the BMW (Management and Handling) Rules, which came into effect on 20th July, 1998.<sup>13</sup> Despite these rules and initiations, a lot of challenges to health care waste management practices are confronted by Indian health care sector. Numerous efforts have been made by environmental regulatory agencies and waste generators for better management of the waste from healthcare, moreover the knowledge of the BMW management in health care personnel shall be of prime importance so as to make these efforts worthy. The present questionnaire based study was done in Kashmir division of Jammu And Kashmir State. The aim of the study was to evaluate the knowledge of the dental practitioners including both the dentists and dental auxiliaries about the BMW and its management. Confidentiality of the responses by the participants was maintained.

The results demonstrate that the overall knowledge as well as attitude of the dentists was better than the auxiliary staff in the study area. However, it was observed that only 24% of the dentists were having excellent knowledge and attitude of the BMW and its management, while most of the dentists 44.11% had an average knowledge about it. Thus, the knowledge about BMW and its management was well below the expected level. These findings are similar to a previous study conducted in Jammu and Kashmir State, where it was observed that overall MBBS doctors were found to be well aware of the adverse

hazards of BMW. On the contrary paramedical staff had poor knowledge about the same.<sup>14,15</sup>

In previous surveys in year 2013 done among dentists in India it has been recorded that more than 60% Dentists and paramedical staff were not aware of legislation applicable to BMW management.<sup>16</sup> On the other hand, it was reported that among 150 dental students in Rural Dental College in Maharashtra only 23% had correct knowledge while 81.55% were aware about the practice of BMW management.<sup>17</sup> Similar results have been put forth by other researchers who reported that among 100 Dental students, staff and private dentists, 60% were of the view that all health care waste was harmful and 75% were aware of BMW regulations.<sup>18</sup>

It has also been seen that many practitioners and auxiliary staff at hospitals and other health care facilities have proper knowledge of BMW and its management but they fail to follow the legislation. This has been also reported previously where it was revealed that a large number of practitioners in Mangalore, were aware of the legislation policy but had failed to contact and register their clinic with the certified waste management services of the city.<sup>19</sup> Similar results have also been reported where many dentists had knowledge about waste management but they lacked an applicable attitude and practices for the problem.<sup>18</sup>

About waste segregation and color coding procedure of BMW present study showed that dentists had fairly higher knowledge than dental auxiliaries. While in a previous study it was observed that 82.6% among 272 Dental staff were in favor of segregating BMW at the point of origin.<sup>20</sup> While in another study it has been observed that most of the paramedical and nonmedical workers were unaware about proper segregation, transportation and storage of BMW.<sup>21</sup> It has also been reported that inadequate segregation between hazardous and non-hazardous wastes is a problem in many institutions and lack of obligatory rules and regulations for the collection of waste materials from the hospital wards also adds the problem.<sup>22</sup> Such deleterious problems are being faced world over with people having no proper knowledge about segregation and disposal of BMW. Previously concerns have been raised in a Turkish study for wrong handling of BMW at the institutions and non-availability of systematic program for the transportation of the health care waste to the final disposal sites.<sup>23</sup> Similarly a study conducted on assessment of medical waste management practice in the northern part of Jordan exposed that no defined methods for the handling and disposal of these wastes existed.<sup>24</sup>

The improper handling laws or enforcement policies can also be held responsible for the incorrect practices amongst health care personnel. Even though amendments from time to time have been issued for proper management policies of BMW in India, however the level of awareness and attitude has been poor. Previously, lack of knowledge, inappropriate policy/laws and disinclination have been sown to be accountable for the improper management of medical waste in Dhaka City.<sup>25</sup>

It has been reported that doctors were more aware of the risk of HIV and Hepatitis B and C, than the auxiliary staff which could be triggered by improper handling of BMW.<sup>7</sup> While it was observed that only 50% of the dentists were found to be aware towards the risks and followed infection control practices.<sup>26</sup>

The results of the current study reported average knowledge

and attitude towards BMW and its management with fewer positive practices in both dentists as well as dental auxiliaries. It is important to highlight the requisite for effective application of the legislation, implementing accurate management programmes and suitable teaching to staff members to increase the knowledge and awareness concerning BMW management in hospitals.<sup>27</sup> Appropriate measures should be taken to decrease hazardous waste where ever possible or action should be taken to warrant that all generated waste is disposed of in accordance with the rules and environmental legislation.<sup>28</sup>

In modern times, the role of mass media should be used for providing information and instructions about the risks relating to BMW and importance of waste segregation, which should be displayed on posters and in hospitals and places near waste bins and can also be circulated as pamphlets to the concerned staff to increase the awareness of BMW.<sup>29</sup>

## CONCLUSION

Continuing dental education programmes and workshops on cross-infection and BMW management should be piloted for high risk groups who directly or indirectly deal with BMW so as to increase their level of understanding and related risks towards BMW among dentists and other auxiliary staff in various dental teaching hospitals.<sup>30</sup> It can also be stressed that proper waste management procedures should be included as a mandatory part of academic curricula for all health care workers.

Though in the present study all possible measures to reduce any kind of bias were followed but within the limitations of the study recall bias, central tendency bias and social desirability bias cannot be ruled out. It can be concluded that the BMW legislation needs a strict implementation and enforcement.

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Questionnaire	
Q. No.	Section 1: Knowledge of biomedical (BM) waste generation, hazards and legislation
1.	Do you know about BM waste generation and legislation?
2.	What agency (ies) regulate(s) wastes generated at health care facilities?
3.	Do you think it is important to know about BM waste generation, hazards and legislation?
4.	Biomedical Waste (Management & Handling) Rules were first proposed in which year:*
5.	Amendments to the Biomedical Waste (Management & Handling) Rules were made in:
6.	Statement describing one type of BM waste:*
7.	According to the Biomedical Waste (Management & Handling) Rules, waste should not be stored beyond:
8.	One gram of mercury is enough to contaminate the following surface area of a lake:
9.	Who regulates the safe transport of medical waste?
10.	Do you need a separate permit to transport biomedical waste?
*Questions edited for presentation, actual questions may be different.	