

## Original Article

## AWARENESS OF BIOMEDICAL WASTE MANAGEMENT AMONG DENTISTS OF PESHAWAR

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### ABSTRACT

**Aims and Objective:** This study was conducted to decide the wakefulness in regards to biomedical (BM) squander management policy & practices and awareness regarding needle-stick injury among dentists of four different dental hospitals in Peshawar.

**Material and Methods:** A cross-sectional KAP study was conducted from December 2016 to March 2017 in four Dental hospitals of Peshawar, using a survey form with closed-ended questions. It was circulated among dental practitioners (having clinical experience of more than two years) through convenience sampling. The questionnaire was utilized to survey their insight into the biomedical medicinal waste transfer and needlestick injuries. Each questionnaire was scored and graded as the excellent, good or poor level of knowledge for each participant.

**Results:** Of the 150 survey forms, 130 were returned and the appropriate responses were reviewed. The outcomes demonstrated that there was a decent level of learning and familiarity with biomedical waste generation hazards, management, and needlestick injuries. Poor level of knowledge on BM waste management practice was found. Nobody had a great level of awareness about biomedical waste management.

**Conclusion:** The study concluded that there in spite having good attitude and knowledge about BM waste management, practices are poor among dentists working in different hospitals of Peshawar.

**Keywords:** Biomedical waste, needle-stick injuries, dental hospitals of Peshawar, KAP (Knowledge, attitude, and practice)

### INTRODUCTION

Biomedical waste can be defined as any leftover substance that is produced during diagnosis, treatment, immunization or research activities involving humans or animals.<sup>1</sup> A study conducted in Karachi (Pakistan) showed that in general hospitals, daily there is a production of almost 2kgs of biomedical waste per bed,<sup>2</sup> while annually 250000 tons of waste is generated through hospitals in Pakistan.<sup>3</sup> In the present era, there is the increased demand for oral health care. Thus there is a rapid growth in some oral health care providers, dental clinics, and dental hospitals. Ultimately there is an increase in biomedical waste burden by dental

setups.<sup>4</sup>

Dental procedures lead to the formation of dangerous biomedical (BM) surplus, which is called "Dental waste." It includes all materials used in dental clinical procedures, along with dead cells/tissues that have been removed during the practices.<sup>5</sup> Dental waste generated by dental hospitals is both in liquid, and solid form, 6 its is further categorized as "Risk" and "Non-risk" wastes. 7 Ninety percent of the solid waste comprises of plastic barriers for safety.<sup>8</sup>

In practices, it has been found that hospital waste is not properly managed,<sup>9</sup> as has been recommended by Pakistan's Hospital waste management rules 2005.<sup>10</sup> The increasing prevalence of diseases like AIDS, hepatitis B, and C is a very serious concern. Thus proper waste management becomes more important. A study in Peshawar revealed that in 60% of the hepatitis B

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cases, the etiology was unknown while 33.3% of the hepatitis C cases had a history of dental treatments.<sup>11</sup> Apart from these infectious diseases, metallic waste emerging from dental treatments, e.g., cadmium, chromium, mercury, amalgam, etc. are hazardous to living organisms.<sup>12</sup> Similarly sharps like scalpels, burs, files, syringes, etc. are harmful and unfortunately, fifty percent of the syringes are reused.<sup>13</sup> Knowledge about waste disposal is the first step towards its appropriate management. Highest globally HBeAg of over 50% was found in 0-9 yrs old girls. Prevalence of HBeAg was 20%-50% at reproductive age. The overall decrease in HBeAg between 1990 and 2005 prevalence which was more among girls of Oceania (23.3% decline), south and south-east Asia (14% decline).

Therefore, the present research was carried out to evaluate the knowledge and attitude among oral human services specialist in dental colleges of Peshawar, Pakistan.<sup>14</sup>

## MATERIAL AND METHODS

A validated structured questionnaire was applied to collect data. The questionnaire consisted of four different sections. Section (1) was used to collect data about a biomedical waste generation, health hazards and legislation, section (2) was based on the level of awareness about biomedical waste management practices, section (3) was about attitude / behavior assessment towards biomedical waste and section (4) was used to assess the knowledge about needle-stick injuries.

The questionnaire had 31 structured questions and was distributed among 150 dentists having more than at least two years of clinical exposure. Total of 130 filled forms was retrieved from dentists of Public and Private sector dental hospitals of Peshawar district (Khyber Pakhtunkhwa), including Khyber College of Dentistry (KCD), Sardar Begum Dental College and Hospital (SBDC), Rehman College of Dentistry (RCD) and Peshawar Dental College (PDC) through convenience sampling.

Overall, the knowledge was graded as excellent if the respondent answered 8-10 questions correctly, average if they responded 4-6 questions correctly and poor if they responded correctly to 3 or fewer questions. The level of accurate and inaccurate responses for each inquiry from every contributor was obtained.

## RESULTS

The analysis was conducted on 130 respondents who returned the completed questionnaire to the research group. Out of the 130 respondents, 33.1% were from KCD, 26.2% from SBDC, 24.6% were from PDC, and 16.2% were from RCD. 77.7% of the respondents were postgraduate trainees or medical officers, 16.2% were assistant professors, and only 6.2% were associate professors and above.

Table 1 indicates the correct responses by the study participants regarding all the four sections of Biomedical waste management (BMWWM) in dental hospitals.

Overall, none of the respondents had excellent knowledge about BM waste generation (Figure 1), only 0.8% was observing excellent practices against BM waste (Figure 2), 96.2% had a good attitude towards BM waste management (Figure 3), and 20% had excellent knowledge about needle stick injuries (Figure 4)

Since the study was conducted in four different dental hospitals of Peshawar, offering academic and clinical services in the field of dentistry, we stratified the knowledge of all above four sections regarding different institutes as well as different academic positions interviewed. We recorded a statistically significant difference among various institutes regarding BM waste generation ( $p < 0.001$ ), BMWWM attitude ( $p < 0.028$ ) and knowledge about needle stick injuries ( $p < 0.001$ ). See tables 2. However, while stratifying the BMWWM knowledge, BMWWM attitude, BMWWM practices and needle stick injuries with regards to academic positions we couldn't observe any statistical difference (table 3)

## DISCUSSION

Concern related to biomedical waste is mainly due to spread of bacteria and viruses which is a risk factor for human health and responsible for various infections.<sup>2</sup> In dental hospitals, sharp instruments, and materials used are in direct contact with saliva, blood and therefore is a direct source of infection. Metal-based dental materials like amalgam etc, used in dental hospitals for restoration purpose have a direct effect on human health if not disposed of properly.<sup>3</sup> To prevent infection within a hospital or its periphery, it's crucial that the biomedical waste should be properly disposed of by the management committee of the hospital.<sup>1</sup> According to our study, 90.8% of

**Table 1 Parameters and the correct percentage response about BM waste among oral health care workers in dental colleges of Peshawar (n = 130).**

<b>Section 1: Knowledge about BM waste generation, hazards, and legislation</b>	
Parameter	Correct response %
Knowledge about BM waste generation & legislation	60%
Agency that regulates waste generated at dental hospitals	47%
Importance of awareness regarding BM generation hazards and legislation	78%
BM waste storage duration according to guidelines	37%
Volume of mercury enough to contaminate a lake	23%
Personnel responsible for safe transport of BM waste	10%
Separate permit required for transporting BM waste	63%
<b>Section 2: BM waste management Practices</b>	
Parameter	Correct response %
Color coding of BM waste collection	51%
Compliance with the color coding of BM waste	57%
Updated guidelines for BM waste disposal practices at institute	52%
Disposal of hazardous BM waste	35%
Patient confidential documents are disposed of in recycle bins	46%
Autoclaving / disinfecting BM waste	19%
Proportion of infectious waste from a health care facility	3%
Color code of non-hazardous waste	25%
Discarding amalgam filled extracted teeth	28%
Incineration of amalgam waste	75%
<b>Section 3: BM waste management attitude</b>	
Parameter	Correct response %
Safe management of healthcare waste is not an issue at all	49%
Waste management is teamwork	82%
Safe management efforts by the hospital increase the financial burden on management.	60%
Safe management of healthcare waste is an extra burden on work	40%
Continuing dental education program about biomedical waste management	71%
Voluntarily programs that enhance knowledge about waste management	85%
Infectious waste should be sterilized from infections by autoclaving before shredding and disposal	65%
Effluent treatment plant for disinfection of infected water should be set up in dental colleges	74%
<b>Section 4: Needle Stick Injuries</b>	
Parameter	Correct Response %
Is needle stick injury a concern?	86%
Re-capping of the used needle?	86%
Discarding the used needle immediately	65%
Awareness about the consequences of needle-stick injury	74%
Sustained a needle-stick injury during the last 12 months	47%
Immunized against hepatitis B	69%

**Table 2: Dental institution wise distribution of BMWM**

<b>Category about BM waste management</b>		<b>KCD</b>	<b>SBDC</b>	<b>PDC</b>	<b>RCD</b>	<b>P value</b>
BMWM knowledge	Excellent	0%	0%	0%	0%	<0.001
	Good	55.8%	91.2%	50%	85.7%	
	Poor	44.2%	8.8%	50%	14.3%	
BMWM Practices	Excellent	2.3%	0%	0%	0%	0.82
	Good	23.3%	32.4%	31.2%	28.6%	
	Poor	74.4%	67.6%	68.8%	71.4%	
BMWM Attitude	Excellent	0%	0%	0%	0%	0.028
	Good	100	97.1%	87.5%	100%	
	Poor	0%	2.9%	12.5%	0%	
Needle stick injury	Excellent	30.2%	0%	37.5%	4.8%	<0.001
	Good	51.2%	50%	56.2%	42.9%	
	Poor	18.6%	50%	6.2%	52.4%	

Table 3: academic position wise distribution of BMWM

Category about BM waste management		Prof / Assoc. Prof	Asstt. Prof	MO / Trainees	P Value
BMW knowledge	Excellent	0%	0%	0%	0.501
	Good	50%	71.4%	69.3%	
	Poor	50%	28.6%	30.7%	
BMW Practices	Excellent	0%	0%	1%	0.845
	Good	25%	38.1%	26.7%	
	Poor	75%	61.9%	72.3%	
BMW Attitude	Excellent	0%	0%	0%	0.307
	Good	100%	90.5%	97%	
	Poor	0%	9.5%	3%	
Needle stick injury	Excellent	12.5%	28.6%	18.8%	0.280
	Good	50%	61.9%	48.5%	
	Poor	37.5%	9.5%	32.7%	

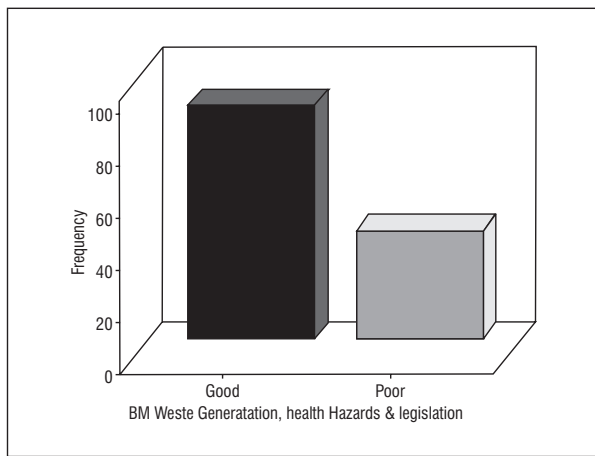


Fig 1 Knowledge

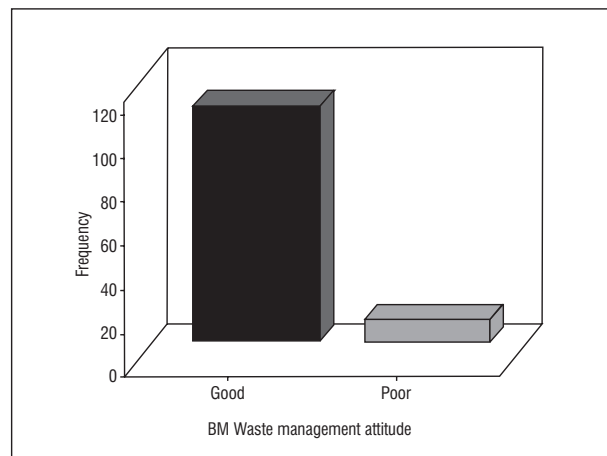


Fig 3 Management

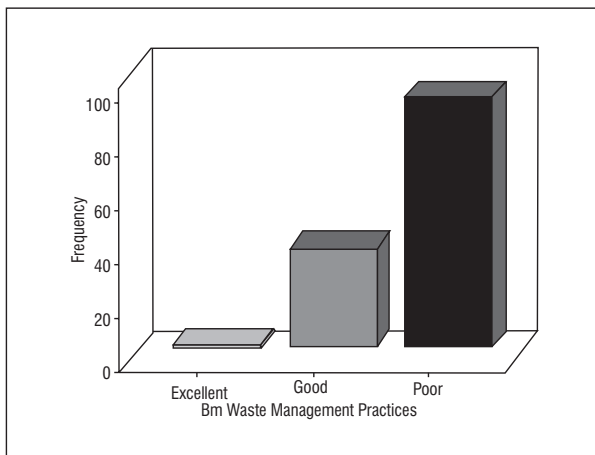
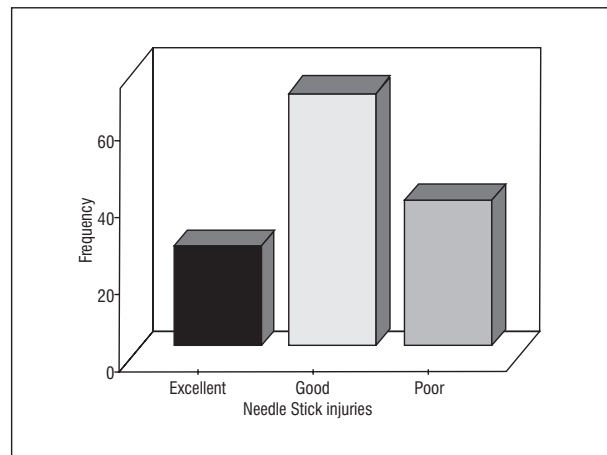


Fig 2 Practices



Needle stick injuries

the dentists didn't even know that who is eventually responsible for the hospital waste disposal.

In the present study, closed-ended questions were used to overcome the recall bias.<sup>15</sup> The participants involved were from both public and private sector dental hospitals of Peshawar. Questions related to awareness of biomedical waste, needlestick injuries, identification of color-coded bags for the hospital waste collection, were asked. The outcomes demonstrated that none of the dental specialists had a brilliant level of learning about BM waste generation and enactment. According to Tenglikar et al, it was perceived that the attitude towards any health behavior depended primarily on the level of knowledge of the subject by the individual.<sup>16</sup> According to study conducted at Imam Reza Educational Hospital in Kermanshah, only 33.9% of respondents had knowledge related to BM waste. Majority of healthcare professionals have intermediate (50.4%) to weak (15.7%) knowledge about waste management and its guidelines.<sup>4</sup>

Overall 96.2% dentists of Peshawar were found to have a good attitude towards BM waste management but unfortunately, only 0.8% were observing excellent practices against BM waste. Similarly, previous studies have shown that though dentists had good knowledge and attitude in practices the case was opposite.<sup>18</sup> In actual practice waste isolation, storage and management was not properly observed in spite of having good knowledge among some oral health care providers.<sup>19</sup> In contrast, the attitude regarding BM waste was low according to the study of Chaudri K et al, which is an alarming condition.<sup>4</sup> Another study conducted at tertiary care hospital of Halwadi, by Kumar et al in which they found that the attitude among health care professionals about biomedical waste management was not satisfactory.<sup>5</sup>

According to our study, only 24.6% of the dentists of Peshawar knew about color-coding for non-hazardous waste and 35.4% were aware of hazardous waste disposal. This reflects that dentists have lack of knowledge related to color coding and their part in BM waste management specifically. Knowledge about color-coding of BM waste among dentists was found deficient by Vanesh Mathur et al, though it is the fundamental topic for further management of waste. Another research carried by Halarul et al concluded that understanding of different groups about color coding is inadequate and there is urgent need to cor-

rect the deficient practices.<sup>7</sup> The larger part disposes of amalgam squander in the garbage, down the sink or as the waste material of hospital. Just (5.9%) had presented an amalgam separator in their dental office. Amalgam squander management protocol and mercury reusing must be built up in Pakistan.<sup>22</sup>

46.9% dentists suffered from needle stick injury in last one year according to our data. 20% had excellent knowledge about needlestick injuries. Stein et al 18 in their research revealed that among doctors and nurses, just 37% revealed that at any point they have experienced needle stick damage. Low revealing of injuries might be credited to the fact that greater number of doctors and other specialized and non-specialized staff are ignorant about a formal arrangement of damage announcing which must be built inside all healthcare offices.<sup>20</sup>

The limitation of the study is that to the extent, the attitude part is concerned, it is hard to tell how truthful the reply was, as many individuals don't comprehend what to state in reply of a question. Overall, the knowledge of the dentist related to disposal of biomedical waste material is poor to good.

## CONCLUSION AND RECOMMENDATION

Within the constraints of this study, it can be believed that there in spite having good attitude and knowledge about BM waste management, practices are poor among dentists working in different hospitals of Peshawar. There is the absence of actual and complete information about biomedical waste management and practices of waste transfer.

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