Received: 23rd April 2015 Accepted: 20th July 2015 Conflicts of Interest: None

Source of Support: Nil

Original Research

Management of Biomedical Waste: An Exploratory Study

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How to cite the article:

Abhishek KN, Suryavanshi HN, Sam G, Chaithanya KH, Punde P, Singh SS. Management of biomedical waste: An exploratory study. J Int Oral Health 2015;7(9):70-74.

Abstract:

Background: Dental operatories pose a threat due to the high chances of infection transmission both to the clinician and the patients. Hence, management of dental waste becomes utmost importance not only for the health benefit of the dentist himself, but also people who can come into contact with these wastes directly or indirectly. The present study was conducted to find out the management of biomedical waste in private dental practice among 3 districts of Karnataka.

Materials and Methods: The study population included 186 private practitioners in 3 districts of Karnataka (Coorg, Mysore, Hassan), South India. A pre-tested self-administered questionnaire was distributed to assess the knowledge and practices regarding dental waste management. Descriptive statistics was used to summarize the results.

Results: Out of 186 study subjects, 71 (38%) were females and 115 (62%) were males. The maximum number of participants belonged to the age group of 28-33 years (29%). Undergraduate qualification was more (70%). 90 (48%) participants had an experience of 0-5 years. Chi-square analysis showed a highly significant association between participant who attended continuing dental education (CDE) program and their practice of dental waste management.

Conclusion: Education with regards to waste management will help in enhancing practices regarding the same. In order to fill this vacuum CDE programs have to be conducted in pursuance to maintain health of the community.

Key Words: Biomedical waste management, knowledge, practice, private dental practitioners

Introduction

The health care sector includes a diverse range of health care facilities, which have a size assortment from large general and specialist hospitals to small municipal dispensaries and D-type centers. All these facilities are an integral part of our society with an endeavor to reduce health problems and to eliminate imminent jeopardy to people's health. In the course of curing health problems the health care sector produce a huge amount of bio-medical waste which may be hazardous to all those who come in contact with this waste. Hazardous waste management is a concern for every health care organization.[1]

Dental practices generate large amounts of waste paper, plastic, latex, and glass, much of which is contaminated with body fluids. An increasing variety of items that have hitherto been reused are now designed to be disposable, such as custom tips and triple syringe tips. Operating gloves are worn for almost all patient contact, resulting in a substantial increase in the amounts of latex and vinyl entering the waste stream. Surgical instruments such as local anesthetic needles, scalpel blades, and suture needles constitute a special category of contaminated sharp items. Dental practices also produce small amounts of waste mercury, silver and various solvents, and other chemicals.[2]

Waste disposal from dental practices can be divided into two main areas. First, there is environmental burden of a variety of hazardous products, and second, the more immediate risks of potentially infectious material that may be encountered by the individuals handling the waste. In 1998, the Ministry of Environment and Forest in India defined biomedical waste as, "Any waste generated during the diagnosis, treatment or immunization of human beings or animals or in research activities used in production or testing of biologicals." Dental waste is a subset of the hazardous biomedical waste. Dental practices generate large amounts of cotton, plastic, latex, glass, sharps, extracted teeth, and morally it becomes the responsibility of the health care provider. Chemical wastes such as lead foil mercury from amalgam restorations, photographic chemicals like fixer, and developer are also generated in dental practice, which if not safely disposed can pose a threat to the environment and public health. Hospital-acquired infections have been estimated at 10% in the South-East Asia region and identified as one of the indicators needed

for the management of waste; an alarming situation. WHO reported a 50% reuse in India of syringes and needles which are meant for single use.[3]

As healthcare providers dentists have an ethical responsibility and as per the precautionary that states that "when an activity raises threats of harm to the environment or to human health, precautionary measures should be taken even if some cause and relationships are not fully established scientifically."[4]

Hence, the present study was designed to find out the management of biomedical waste in private dental practice among 3 districts of Karnataka.

Materials and Methods

Cluster sampling was done to recruit 186 study participants, from 3 districts of Karnataka (Coorg, Mysore, Hassan), South India. The ethical approval for the study was obtained from the Institutional Ethical Committee of Coorg Institute of Dental Sciences, Virajpet, Karnataka, South India. Informed consent was obtained from the all private practitioners.

A pre-tested, self-administered, closed-ended questionnaire was designed for recording all the relevant data pertaining to general information of the study participants and knowledge and practices regarding dental waste management in a private clinic.

The reliability (Cronbach's alpha) of the questionnaire was tested in a pilot study and was found to be acceptable the questionnaire elicited the sociodemographic characteristics as well as knowledge and practices regarding dental waste management. The study was conducted during the 1st and 3rd week of October 2012. Questionnaires were distributed to 186 private practitioners personally and they were given sufficient time to answer the questionnaire and the questionnaire was collected back on the same day or the next day. Those who participated in the pilot study were excluded from the main study.

Statistics used

The data analysis was done using the statistical software SPSS version 17. Descriptive statistics summarized the results. Statistical significance was analyzed using Chi-square test. The level of significance was set at 5%.

Results

A total of 186 participants were recruited for this study, with a 100% response rate. As shown in Table 1, 115 (62%) participants were males and 71 (38%) were females. The maximum number of respondents belonged to the age group of 28-33 years (29%). Respondents with undergraduate qualification were more (70%) compared to postgraduate qualification (30%). 90 (48%) participants had an experience of 0-5 years.

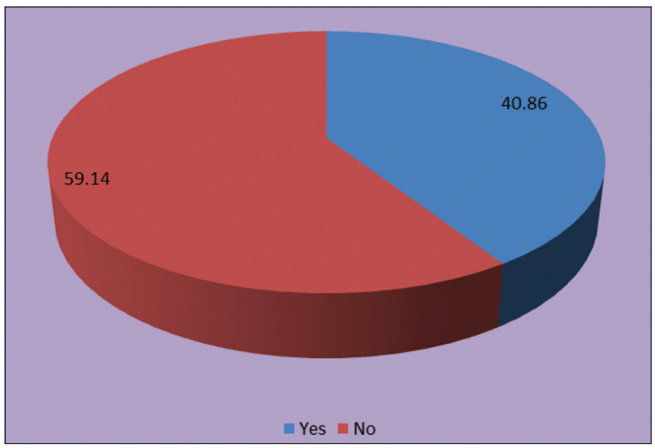
Table 2 shows that the distribution of respondents by knowledge and practice questions. Out of 186 study participants, 110 (59.14%) were replied that there has been continuing dental education (CDE) programs conducted on waste management by their regional Indian Dental Association (IDA) branch (Graph 1) and 104 (55.91%) participants have attended CDE programs on dental waste management (Graph 2). Graphs 3 and 4 show that the distribution of respondents by correct knowledge and practice answers.

Table 3 shows the association between CDE program and knowledge scores of dental waste management. Knowledge score was good among 52% (54) subjects who attended CDE programs.

From Table 4, it is evident that good waste management practice was observed in those who attended CDE programs (64 [61.5%]) compared to those who did not attend

Table 1: Distribution of study subjects according to age, gender, qualification, and year of experience.

Sociodemographic variables	*n* (%)
Age (years)	
23-28	24 (12.9)
28-33	54 (29)
33-38	40 (21.5)
38-43	25 (13.4)
43-48	13 (7)
48-53	19 (10.2)
53 and above	11 (6)
Gender	
Male	115 (62)
Female	71 (38)
Qualification	
BDS	130 (70)
MDS	56 (30)
Experience (years)	
0-5	90 (48)
6-10	48 (26)
>10	48 (26)



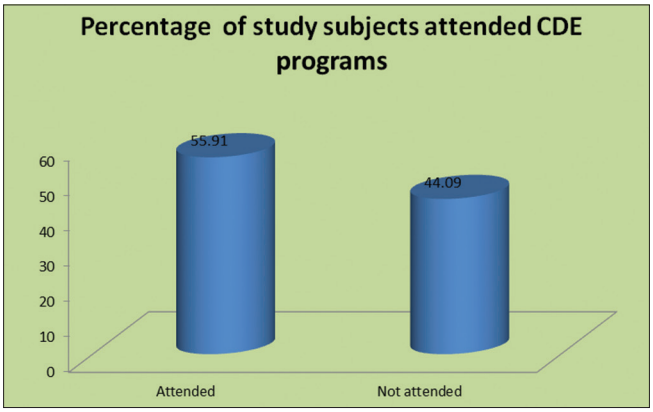
Graph 1: Has there been any continuing dental education programs conducted on waste management by your regional Indian Dental Association branch?

Table 2: Distribution of respondents by question and score.

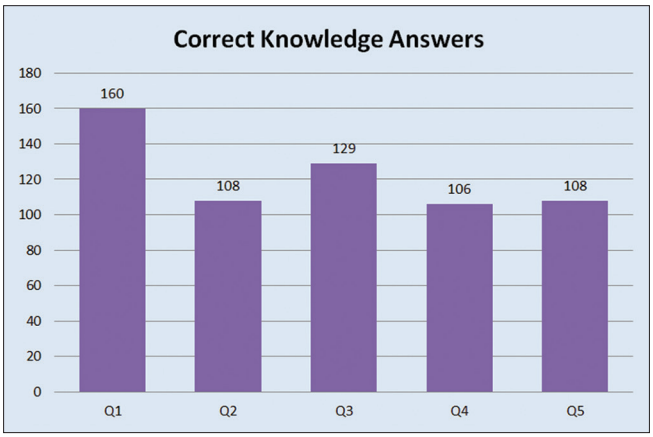
Serial number	Questions	*n* (%)
1	Where should the dental waste be disposed?	
	a) Disposing in the nearby garbage collection bins	9 (5)
	b) Dumping in low lying area	16 (8.5)
	c) Certified waste carrier service	160 (86)
	d) Don't know	1 (0.5)
2	The color coding for hospital waste given by biomedical waste management in India is	
	a) Yellow, Red, White, Black	108 (58)
	b) Red, Green, Yellow, White	58 (31)
	c) Pink, Green, Black, Red	12 (6.5)
	d) Don't know	8 (4.5)
3	The most effective way to remove accidental spill of mercury in the clinic is	
	a) Use vacuum cleaner	20 (11)
	b) Sweeping and mopping	29 (15.5)
	c) Mercury spill kit	129 (69)
	d) Don't know	8 (4.5)
4	The excess mercury obtained during amalgam mixing can be discarded	
	a) Into the drain	28 (15)
	b) Into the dustbin	38 (20.5)
	c) Into the developing solution	106 (57)
	d) Don't know	14 (7.5)
5	The cotton, gauze used during extraction can be disposed in	
	a) Into the dustbin	29 (15.5)
	b) Is burnt	108 (58)
	c) Thrown in low-lying areas	46 (25)
	d) Don't know	3 (1.5)
6	Are you registered with a certified waste carrier service to recycle or dispose the biomedical waste in your clinic?	
	a) Yes	126 (67.5)
	b) No	79 (42.5)
7	Which color coding bag do you use to dispose syringes, needles, scalpels?	
	a) Yellow	29 (15.5)
	b) Red	26 (14)
	c) White	94 (50.5)
	d) Black	37 (20)
8.	How do you dispose health care waste in your clinic?	
	a) Dump directly into garbage bins	5 (2.5)
	b) Handling it over to garbage collectors	46 (24.5)
	c) Handling it over to biomedical waste management agency	126 (68)
	d) Dumping it in some isolated areas	9 (5)
9.	Do you use puncture proof containers to discard needles in your clinic?	
	a) Yes	138 (74)
	b) No	48 (26)
10.	Do you segregate the waste before disposal?	
	a) Yes	131 (70.5)
	b) No	55 (29.5)
11	Do you use color coded bins for disposal of waste in your dental operatory?	
	a) Yes	126 (68)
	b) No	60 (32)
12.	Which are the most common problems in the management of health care waste in your clinic?	
	a) No problem	58 (31)
	b) Lack of time	50 (27)
	c) Extra expenses	29 (15.5)
	d) Lack of information and non-availability of agency service	49 (26.5)
13	Do you think you need more knowledge regarding dental waste management?	
	a) Yes	155 (83)
	b) No	31 (17)

Contd...

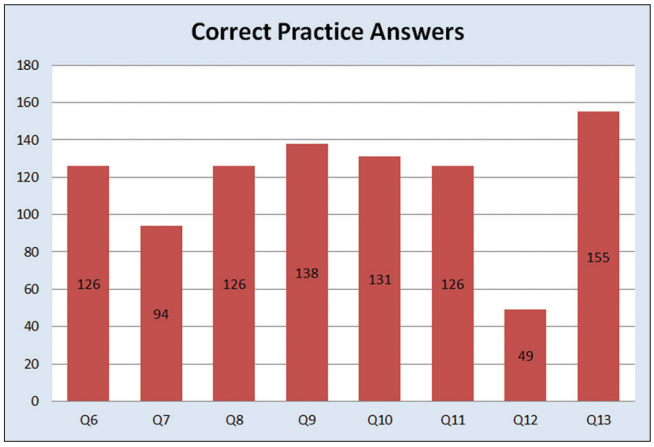
Table 2: *Continued...*



Graph 2: Have you attended any continuing dental education programs on dental waste management?



Graph 3: Distribution of respondents by correct knowledge answers.



Graph 4: Distribution of respondents by correct practice answers.

Table 3: Association between CDE program and knowledge scores of dental waste management.

CDE program	Knowledge scores					χ^2 value	df	*P* value
	Very poor	Poor	Average	Good	Total			
CDE								
Attended	10	19	21	54	104	3.72	3	0.294[NS]
Not attended	14	10	20	38	82			
Total	24	29	41	92	186			

NS: Not significant, CDE: Continuing dental education

Table 4: Association between CDE program and practice scores of dental waste management.

CDE program	Practice scores					χ^2 value	df	*P* value
	Very poor	Poor	Average	Good	Total			
CDE								
Attended	7	11	22	64	104	27.85	3	0.0001***
Not attended	20	9	32	21	82			
Total	27	20	54	85	186			

***Highly significant. CDE: Continuing dental education

CDE programs. Association between CDE program and practice scores of dental waste management was statistically significant (<0.05).

Discussion

Although the dental profession is a team work; the settings and instruments used for efficient practice is managed individually. Other than patient treatment the dentist manages a wide range of tasks in day to day practice, including arranging of instruments to maintaining a safe office environment. Hygienic problems of dentistry can be best tackled by the clinicians and the assistant by having a sound knowledge in management of biomedical waste.

To improve information about biological risk, as well as procedure associated to cross-infections prevention, a learning instrument (the questionnaire) on dentist's knowledge and practice has been arranged in order to assess the present situation and to carry out a cultural journey based on the highlighted needs.[4]

Appropriate methods of dental waste disposal are the call of the hour. Even though the policy is given, there is for this continuing updating of knowledge with respect to dental waste management and also monitoring of the practices has to be practiced.[5,6,7] Hence, the present study was conducted to determine the knowledge and practices regarding management of biomedical waste in private dental practice among 3 districts of Karnataka.

Out of 186 subjects, 56% of the participants have attended CDE program, which was conducted by regional IDA branch. This may be attributed to the updated information provided in these programs.

About 69% of the participants were aware about the mercury spill kit being the most effective way to remove accidental spill of mercury in the clinic. 57% of the participants replied that they are discarding excess mercury obtained during amalgam mixing into the developing solution. This is similar to another study conducted at dental clinics in northern Sweden in which 36% of dentists were segregating excess mercury and/amalgam.[3] Disposal of excess mercury without proper precautions is a burden to the environment.[8]

In the current study, only 58% of operatory waste into the dust bin. In spite of great emphasis placed on sterilization and dental waste management in the UG and PG curriculum, the present showed a definite lack of proper practices regarding these aspects of dentistry. However, the method of disposal of bloody swabs was better in present study participants when compared to the dentists in New Zealand wherein 56.4% replied of disposing bloody swabs in general waste. The social desirability drawback of a questionnaire study cannot be excluded in the present study. The results are to be interpreted with caution.

Only 68% of the participants have registered with a certified waste carrier service to recycle or dispose the biomedical waste in their clinic. And only about 68% of the participants were handling it over dental waste to biomedical waste management agency. Within India, there have been no prosecutions of dentists for illegal disposal of clinical waste and it would appear that the fear of prosecution is insufficient to alter behavior.[8]

About 68% of the participants were using color coded bins for disposal of waste in their dental operatory. More than half (50.5) of the participants were using white color coding bag to dispose syringes, needles, scalpels. And 74% of the participants were using puncture proof containers to discard needles in their clinic.

In this study 29.5% of the practitioners disposes off dental waste without segregation, which poses a threat to the collectors of the waste segregation. In a similar study done in New Zealand, only 24.4% subjects disposed of contaminated waste sharps items into general household refuse collection.[2] 28% of the

participants replied that the safe management of health care waste was an extra burden to the private practitioners, which showed their poor and inadvertent attitude toward this aspect of practice.[8,9]

Out of 186 subjects, 56% of the participants have attended CDE program, which was conducted by regional IDA branch. There was a statistically significant (<0.05) association between CDE program and practice scores of dental waste management. This may be attributed to the updated information provided in these programs.

In the present study, 83% of the participants thought that they need more knowledge regarding dental waste management and 26.5% of the participants felt that Lack of information and non-availability of agency service are the most common problems in management of health care waste in their clinic. Specialized waste carrier services are available in most localities, however; there is a need for dentists to receive specific information about availability of services.[2,10]

Conclusion

Dentists need proper knowledge regarding health care waste management becomes important for a healthy dental practice. Most of the dentists have failed to contact and register their clinic under certified waste management services of the city. Lack of professional training has been a major cause for the same.

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