

Biomedical dental waste management and awareness of waste management policy among private dental practitioners in Mangalore city, India

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Abstract:

Aim: To assess (1) Awareness towards waste management policy and practices. (2) Approach towards waste management policy and practices. (3) Performance in waste management policy and practices among the private dental practitioners in the city of Mangalore, India. **Study Design:** A cross sectional study. **Study subjects and methods:** Ninety six private dental practitioners of Mangalore city responded to the self administered questionnaire on biomedical dental waste disposal. Questionnaire contained seventeen closed end type of questions. The questionnaire was designed in an appropriate way such that the objectives of the study were met. Data was analyzed using SPSS version 15. **Results:** A survey was conducted among 109 private dental practitioners in the city of Mangalore with a self administered questionnaire out of which 96 responded (88.07%). Overall 97.9% of the practitioners were aware of the waste management policy, 47.9 % were handing over the waste to municipal garbage collectors, 54.2% felt that there was a lack of awareness regarding the existing health care waste management services within the city, 44.8% contacted the certified waste carrier services, 42.7% discarded blood soaked swabs and gauze in specific colour coded plastics during disposal. **Conclusion:** From the study it was found that a large number of practitioners are aware of the legislation policy but 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. Hence there is a need to educate the dental practitioners regarding proper practice measures.

Key words: Bio medical waste, private dental practitioners, Dental office waste, self administered questionnaire.

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Introduction:

With the advancement in the field of science and research work, the quantity of bio hazardous waste products being produced is also increasing at an alarming rate, creating an instability in the ecosystem. Hence the need of the day is to create a pollution free environment to keep the earth safe and disease free for a healthy living.

At many places authorities are failing to install appropriate biomedical dental waste management systems for a variety of reasons such as non availability of appropriate waste management technologies, inadequate financial resources and absence of professional training on waste management (1).

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 maybe encountered by the individuals handling the waste (2). 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" (3). Dental waste is a subset of the hazardous biomedical waste. Dental practices generate large amounts of cotton, plastic, latex, glass, sharps, extracted teeth and other materials much of which may be contaminated with body fluids (4). Chemical wastes such as lead foil,

mercury from amalgam restorations, photo graphic 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 (5). WHO reported a 50% reuse in India of syringes and needles which are meant for single use (6).

The National Institute of Health and Family Welfare in India has put forth an act called, "Biomedical waste (management and handling) rules of 1998, and as amended in 2000. This act demands that each health care institution needs to have a biomedical treatment facility. The act further defines a biomedical treatment facility as, any facility wherein treatment, disposal of biomedical waste or process incidental to such treatment or disposal is carried out (3). It is also important to know what an "authorization" means to understand the study better. It means a permission granted by a prescribed authority for generation, collection, reception, storage, transportation, disposal and /or any other form of handling biomedical waste in accordance with these rules and any guidelines issued by central Government, Ministry of Environment and Forest on 20th July, 1998 also in exercise of powers conferred by section 6,8 and 25 of environment (protection) act, 1986 the Central Government notifies rules for management of biomedical waste (3).

The colour coding system followed for waste disposal falls under the same act. The rules put forth by the Government have been mandatory for health care establishments to segregate, disinfect and dispose their waste in an eco friendly manner (7). Dental practitioners are therefore expected to be conversant with the rules and regulations governing the management and disposal of biomedical waste generated in their dental practice. In addition, they are expected to adhere to these rules and regulations to ensure their safe disposal for maintenance of safe and healthy environment.

A study conducted in New Delhi, India amongst the 64 dentists who form the teaching staff in a Government Institution(s) reported that the majority of the respondents were not aware of the proper clinical waste management (8).

Although very little is known about disease transmission from biomedical waste, both American Dental Association and Centre for Disease Control

recommend that medical waste disposal be carried out in accordance with regulation (9).

This study aims at shedding light on how private dental practitioners in city of Mangalore manage dental waste generated in their dental practice; and explore their awareness on safe disposal of dental waste.

Study subjects and methods

The study was of a cross sectional questionnaire type and the study population included all private dental practitioners in Mangalore city who were listed in the Indian Dental Association – Dakshina Kannada Directory. A total of 280 dentists were listed in the Indian Dental Association - Dakshina Kannada directory out of which 109 dentists were selected by stratified cluster sampling. Visiting dental consultants and people affiliated to dental colleges and hospitals who do not have private practice were excluded.

A questionnaire was designed to obtain information about the procedures used for disposal of waste in and from dental practices in the private dental clinics. The questionnaire was pilot tested on a small group of 10 private dental practitioners who were requested to complete it and indicate any questions they found were unclear. Confidentiality was maintained by giving codes for reference to the participants and those codes were known to the chief investigators. The questions were framed in three sets; knowledge based, attitude based and those regarding behavior of dentists in relation to dental health care waste management.

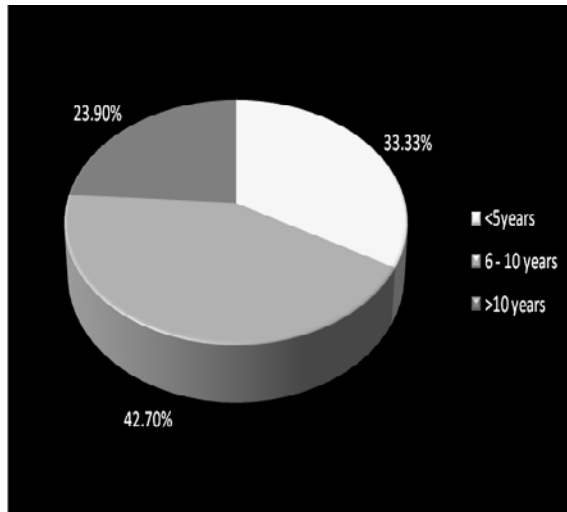
Each dentist was contacted in person by both the investigators and requested to answer it before being collected from them on the same day or the next day. The statistical analysis was done using SPSS-15 version software (10).

Results

Of the 96 practitioners approached, 61.5% had completed post-graduate education and the rest 38.5% undergraduate education in dentistry. The response rate was 88%. Thirty two participants 33.3% had been practicing for less than 5 years, 42.7% for 6-10 years, and 23.9% for more than 10 years (Figure 1).

The analysis showed that 98% of the practitioners were aware of the existing medical waste management policy and practices in India. Nearly half (48%) of the practitioners handed over the dental waste to nearby municipal garbage collector and

44.8% contracted the certified waste carrier services. When enquired about the cause of negligence, it was found that 54.2% felt that there was lack of awareness regarding the existing health care waste management services within the city. This suggested that the dentists needed to receive specific information about the availability of these services.



Pie Chart: Figure 1: Distribution of respondents based on the number of years of practice

On questions asked about segregating waste, only 45.8% used specific colour coded containers and plastic bags to dispose bio medical waste. Hand trituration was used by 56.3% of the practitioners while 42.7% used amalgamators, collection of amalgam scraps to be handed over to the waste management service was followed by 32.3%. A large number of the practitioners (85.4%) discarded extracted teeth directly into regular garbage. Only 1.4% of them had a 'Mercury spill kit' in case of accidental spill of elemental mercury. Digital radiography was utilized by 2.1% while 69.8% followed conventional method of developing radiographs using developer and fixer solutions. Only 20.8% followed manufacturer's recommendations on disposal of used fixer solutions. Lead foils from the used X-ray film packets were collected by 2.7% of the practitioners for recycling. Disposal of blood soaked swabs and gauze in specific colour coded plastics was followed by 42.7% and only 43.8% used puncture proof containers for disposing sharps.

Discussion:

The success of a study based on a self administered questionnaire essentially depends on the manner in which the questions are formatted, question content, analysis and response rate (11). In order to avoid any recall bias most of the questions designed were of

closed end type. Such questions were easy to analyze with response rate being quicker. This helped in covering more number of practitioners within a short period of time and the method was found to be relatively inexpensive.

This study showed that a substantial percentage of practitioners (47.9%) dispose dental waste without segregation and prior disinfection which exposes garbage collectors to a high risk of getting infected from health care waste. In a study of dentists in New Zealand, only 24.4% disposed of contaminated waste sharps items into general household refuse collection (12). It was found in our study that 32.3% of the practitioners collected amalgam scraps to be handed over to the waste management services and 85.4% discarded extracted teeth containing amalgam directly into regular garbage. This result is similar to a study which was conducted among private dental practitioners in Bangalore city, India wherein 39.1% of the respondents were not segregating excess mercury/or amalgam but were discarding it to regular garbage (11). A similar study in 1993 at dental clinics in Northern Sweden in which only 36% of the dentists were segregating excess mercury and/ or amalgam (13). This shows the negligence of health care practitioners regarding the hazardous effects of elemental mercury. Methyl mercury is generally formed by biological action on elemental mercury. This methylated mercury is known to accumulate in the food chain and history states that the Minamata disease of early 1970's in Japan was a result of inorganic mercury methylation from factory affluent by bottom-dwelling organisms in the Minamata Bay of Japan. This incident created quite a stir worldwide and measurement of mercury in all forms of fish became a focal point for environmental scientists. Virtually 100% of elemental mercury is absorbed in the human gut (14).

Acute symptoms of mercury toxicity are neurological or renal, ranging from paraesthesia (at levels $\geq 500\mu\text{g}/\text{kg}$), to ataxia ($\geq 1000\mu\text{g}/\text{kg}$), joint pain ($\geq 2000\mu\text{g}/\text{kg}$) and death ($\geq 4000\mu\text{g}/\text{kg}$) (15). On analyzing the cause for negligence towards clinic waste disposal, it was found that there was a lack of knowledge regarding the existing certified bio medical waste management services within the city. It was also found that few of the early practitioners (>10 years) had failed to update themselves regarding the recent advances of waste management techniques and were continuing traditional methods.

As 97.9% of the practitioners were aware of the existing medical waste management policy it is clear that their knowledge regarding waste management

policy is good. The outcome of our survey necessitates the need to enforce more stringent laws and measures in a developing country like India, so that it becomes mandatory for all private practitioners to register their clinics under bio medical waste management services. By doing so there will be a constant check on maintenance of bio hazardous wastes disposed from clinics. At the same time more numbers of biomedical waste management services need to be started at an economically feasible rate so that majority of the practitioners would willingly agree to contact the services. Widespread publicity of a few cases of inappropriate health care waste

management services might help to raise public and professional awareness of the possible consequences of improper procedures (4). There is an urgent need for continuing dental education on dental office waste management practices to these dental practitioners.

Conclusion: From the study it was found that a large number of practitioners are aware of the legislation policy but 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.

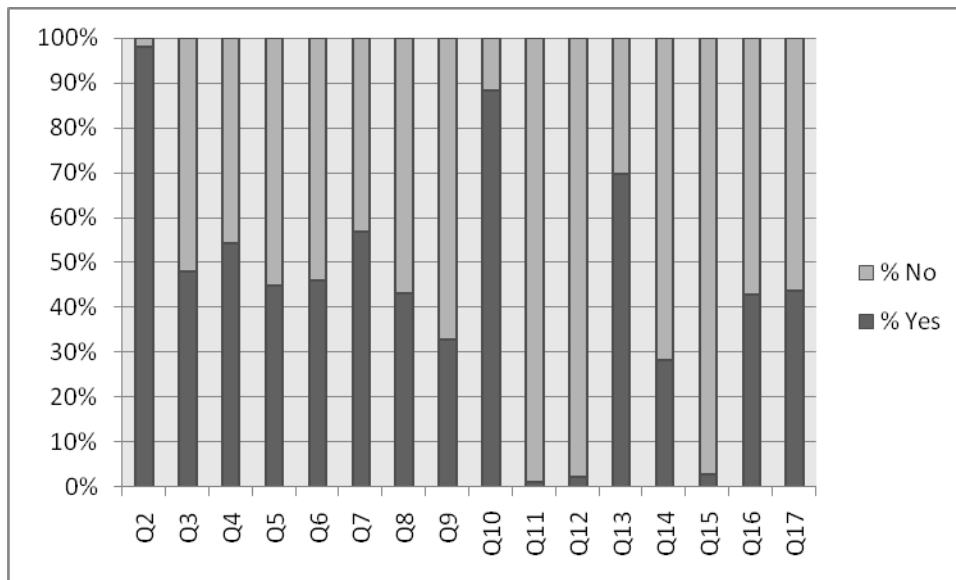


Figure 2: Response to the questionnaire from the participants in our study. Q - represents the questions from the questionnaire.

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Questionnaire

- Q1. How long has it been since you have established your dental clinic?
- Q2. Are you aware of the existing medical waste management policy in India? [Yes/No]
- Q3. Do you hand over dental waste to your nearby municipal garbage collector?[Yes/No]
- Q4. Do you feel that there is a lack of awareness regarding existing health care waste management services within the city? [Yes/No]

- Q5. Do you contact a certified waste carrier service to recycle or dispose the bio medical waste of your clinic? [Yes/No]
- Q6. Do you use specific colour coded containers and plastics to dispose bio medical waste? [Yes/No]
- Q7. Do you use hand trituration for amalgamation in your clinic? [Yes/No]
- Q8. Do you use an amalgamator in your clinic? [Yes/No]
- Q9. Do you collect amalgam scraps and hand them over to waste management service for recycling purpose? [Yes/No]
- Q10. Do you discard extracted teeth containing amalgam directly into regular garbage? [Yes/No]
- Q11. Do you have a ‘Mercury Spill Kit’ in case of accidental spill of elemental mercury? [Yes/No]

- Q12. Do you have digital radiography at your clinic? [Yes/No]
- Q13. Do you use Conventional method for radiography at your clinic? [Yes/No]
- Q14. Do you follow manufacturer's recommendations on disposal of used fixer solutions? [Yes/No]
- Q15. Do you collect lead foil from the used X- ray film packets for recycling? [Yes/No]
- Q16. Do you discard blood soaked swabs and gauze in specific colour coded plastics during disposal? [Yes/No]
- Q17. Do you use puncture proof containers for disposing sharps? [Yes/No]

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