

Knowledge, awareness and practices of dental health care waste disposal – survey of dental professionals in Mysore district

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ABSTRACT

Dental practices generate large amounts of dental waste which is of environmental concern. Adequate knowledge, information on handling, segregation and disposal of dental wastes are important elements of dental health care. The aim of the study was to determine knowledge, awareness and dental behaviour of general dental practitioners on health care waste management of Mysore district, India. A total of 120 private dental practitioners participated in the pilot tested self administered questionnaire regarding policies, practices and awareness relating to bio medical waste ($P < 0.001$). The resulting data were statistically tested using chi-square test. Results indicate that there was significant difference ($P < 0.05$) regarding awareness and knowledge about management of dental waste among general dental practitioners, lack of segregation of waste, lack of waste management agency. There is need for availability of few more specialized health care waste management services in Mysore district and provide information to the dental practitioners about availability of these services. There is a need for regular continuous dental education programmes on dental waste management to private dental practitioners.

Key words : Bio-medical waste (BMW), Bio-medical waste management and handling (BMWH), General dental practitioners, Health Care Waste (HCW).

Introduction

Dental hospital is a complex multidisciplinary system which consumes lots of items for delivery of dental care (Pushpanjali *et al.* 2003). Health care waste disposal at the dental clinic level has become a prime concern due to its multi dimensional ramifications as a risk factor to the health of patients, staff and extending beyond the boundaries of the establishment to the general population.

Dental clinics generate a number of hazardous waste that is detrimental to the environment. Dentists are encouraged to practice pollution prevention activities in their practices to reduce the amount of hazardous materials requiring disposal. In a nutshell, waste management has two vital parts, man-

agement of hazardous waste generated from different sources which involve careful segregation, collection, transport, and final disposal of various types of waste on one hand and on the other hand effective training and supervision of various categories of personnel involved in whole waste management system (Bhaskar *et al.*, 2011).

The Biomedical Waste Management and Handling rules have been notified in 1998, the rules were amended twice in 2000, primarily to address administrative matters (Govt. of India, 1998) (Table 1). The Rules now called the Bio Medical Wastes (Management and Handling) Rules 2011 has been notified for information of the masses and feedback received from all fronts would be considered by the Central Government. The new Rules on BMW are elaborate,

stringent and several new provisions have been added in it. One of the features of the new rules in 2011 is that now every occupier, operator regardless of the number of patients being serviced has to seek prior authorization from the prescribed authority which is the State Pollution Control Board for States (Bio medical Waste and Handling Rules 2011) (Table 2). In terms of quantum of waste generated from the states, Karnataka tops the chart with 62,241 kg/day of BMW (Govt. of India 1998, Manual on Hospital waste management 2000). To our modest estimation, an average running dental clinic may produce around 0.5-1.0 Kg of waste per day.

It is imperative that waste should be segregated and disposed off in a safe manner to protect the environment as well as human health. It is ideal and desirable that occupational safety be a prime consideration for any system of waste management. Therefore, the aim of the study was to ascertain the information about the knowledge and practices of dental practioners in the disposal of health care waste.

Material and Methods

AIMS and Objectives

To assess the knowledge, awareness and practices of

dental waste management among general dental practitioners of Mysore district.

Objectives

1. To assess the awareness regarding BMW(bio medical waste) management
2. Practices of disposal of BMW by private dental practitioners
3. Awareness regarding color coding of dental waste.

Materials and Methods

1. Study design: An epidemiologic survey was conducted to assess the awareness and practices of dental waste management among General dental practitioners of Mysore district.

2. Source of data: Questionnaire was designed to obtain information about the awareness of Bio medical waste management (BMWM) procedures used for disposal of dental waste from dental practices during the period of August 2012- December 2013.

3. Study population: The participants were members of IDA Mysore branch. A total of 260 dentists

Table 1. Schedule I and II of biomedical Waste (management and Handling Rules) 1998.

Colour-coding	Type of Containter	Waste Category
Yellow	Plastic bag	Human and animal waste, soiled dressing (impression material)
Red	Disinfected container/plastic bag	Microbiology and biotechnology waste, solid waste (disposal items other than sharps such as tubings, catheters, intravenous sets)
Blue/white translucent	Plastic bag/puncture-proof container	Waste sharps
Black	Plastic bag	Discarded medicines and cytotoxic drugs, incineration ash, chemical waste, liquid waste.

Table 2. BMW Rules-2011 vs. 1998 (courtesy: Biomedical waste rules made stringent. Available from:<http://www.cseindia.org/node/3702>).

2011	1998
Every occupier generating BMW,irrespective of the quantum of wastescomes under the BMW Rules andrequires to obtain authorization	Occupiers with more than 1000 beds required to obtain authorization
Duties of the operator listed	Operator duties absent
Categories of Biomedical Waste reducedto Eight	Biomedical waste divided in tencategories
Treatment and disposal of BMW mademandatory for all the HCEs	Rules restricted to HCEs with more than 1000 beds
A format for annual report appendedwith the Rules Form VI i.e. the report of the operatoron HCEs not handing over the BMWadded to the Rules	No format for Annual Report Form VI absent

agreed to participate in the questionnaire and 120 responded. The response rate was 46.15%

4. Questionnaire development and screening validation: The screening questionnaire had a total 27 questions. Prior to the study, the questionnaire was tested for comprehensibility and relevance among ten dentists. The purpose of the questionnaire and how they should be answered was explained, and whenever necessary further information was provided.

Questionnaire Description

The questionnaire was designed to assess the knowledge of the dental practioners with respect to bio medical waste management systems. The questions were based on knowledge, attitude and practices regarding dental waste management - BMW management policies, awareness of BMWH rules, frequency of disposal of waste, Practice of segregation, common problems faced in the management of waste disposal in the clinic.

Participation confidentiality

Each dentist was presented with a separate copy of the questionnaire personally by the investigators (M&R) and requested to answer the questions which was collected on the same day or the previous day. Written notification was received from the private dental practitioners confirming that the participation in the study was voluntary. Informed consent was duly signed by the participants included in the study.

Data Analysis

Data gathered was statistically analyzed using SPSS software version 16 using chi-square test. The chi-square values were calculated. P-value of $p < 0.05$ was considered to be significant.

Results

Demographic details

Age ranged from 31-50 years with mean age of 42.6 years. Among the participants, 59.2% were males and 40.8% were females. Of the participants 21.7% had been into practice for < than 5 years and 76.3% for more than 10 years. 100% dentists were aware of guidelines promulgated by the government of India regarding BMW. 16% dentists were practicing the BMW disposal policy for dental waste. 75.8% den-

tists have shown concerns regarding responsibility for safe management of BMW but 24.2% only are aware of their responsibility (Figs. 1, 2).

Regarding Practices

Amount of waste generated 79.2% of dental clinics generated up to 2 kgs of dental waste with 76.7% dental clinics disposing waste once in two days and 23.3% disposing waste once in more than 2 days (Figs. 3, 7). There was significant difference in

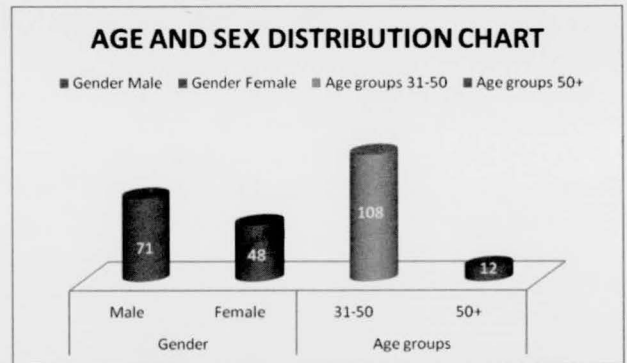


Fig. 1. Age distribution of Participants

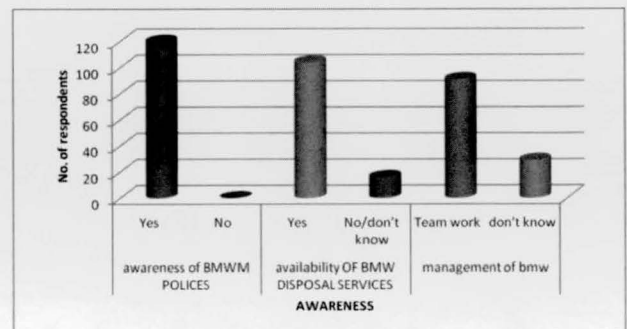


Fig. 2. Awareness regarding BMW management policies and its management and availability of disposal services.

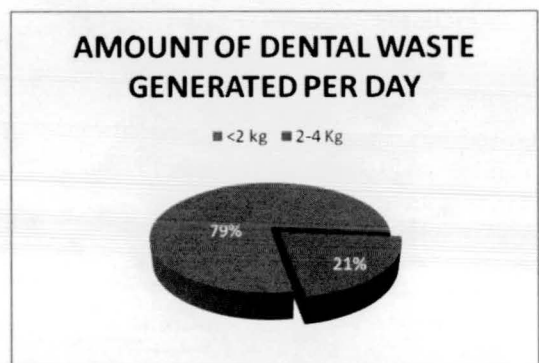


Fig. 3. Quantity of dental waste generated per day in a dental clinic

responses to the questions regarding correct disposal of plastic items, impression materials, gypsum casts and practice of disinfecting impressions before disposing with 8.3% dentists being aware of it (Figs. 4-6). With regard to the disposal of sharps, human anatomic waste and disposal of amalgam/mercury -11.7% of dentists were aware of them.



Fig. 4. Practice of disposal of plastic items in color coded bags

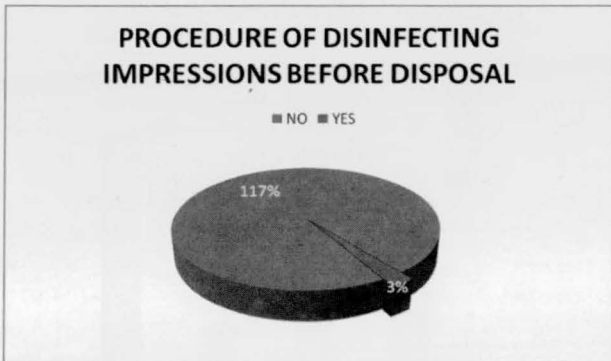


Fig. 5. Protocol of Practice of disinfecting impressions before disposal.

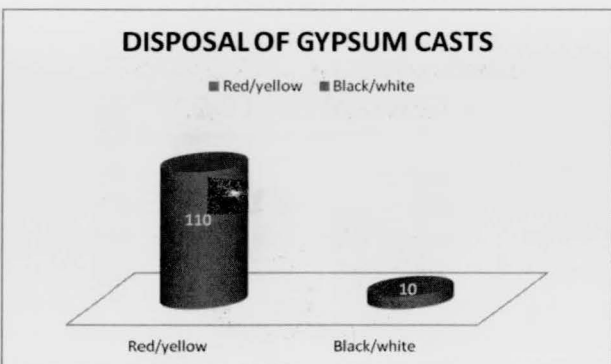


Fig. 6. Awareness of disposal of gypsum casts in Black/white color coded bags

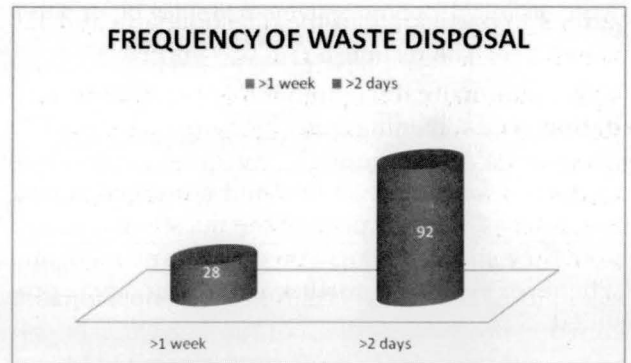


Fig. 7. Duration of disposal of dental waste

13.3% of participants dispose the dental waste as general waste and garbage bins, 86.7% hand over to waste management services (Fig. 8). 2.5% of the participants had experienced needle stick injuries more than 6 times and 97.5% had experienced such an incident (Fig. 10). 26.7% of the recently qualified practitioners reported that the health care waste management is a burden which was due to non availability of waste management services, 37.5% due to



Fig. 8. Practice of segregation of dental waste before disposal

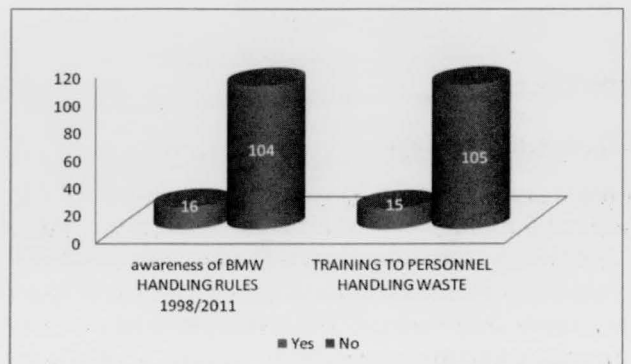


Fig. 9. Awareness of rules laid by Government of India for disposal of BMW

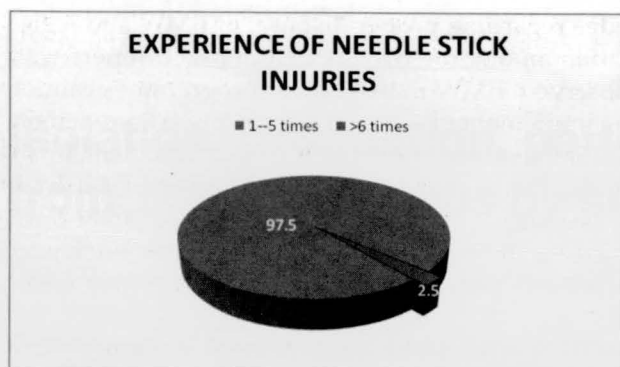


Fig. 10. Experience of iatrogenic injuries

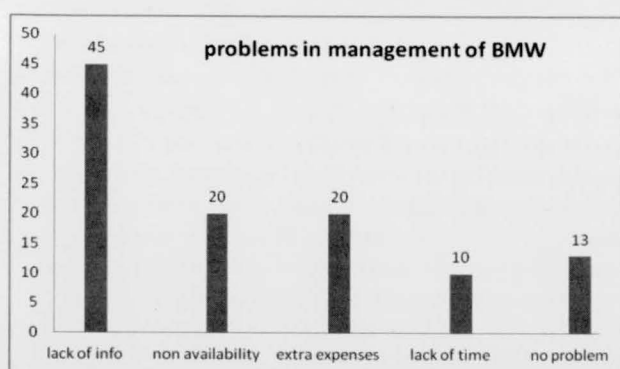


Fig. 11. Hurdles involved in the proper disposal of dental waste

lack of information regarding BMW disposal and 10% had no problem in the management of dental waste. 16.7% experienced non availability of services (Fig. 11).

Discussion

The introduction of disposables in hospitals has brought many ills such as inappropriate recycling, unauthorized disposal and increase in the quantity of dental waste is quite alarming.

Medical care, especially in hospitals, contributes to the pollution of the environment by generating a large quantity of waste. Similarly, the dental health care setup in the form of private clinics does produce a lot of dental health care waste which contribute to the numerous hazardous exposures to various categories of workers (Hegde *et al.*, 2007; Sood *et al.*, 2011). To protect the environment, and community from the infected waste generated by a health care setup including dental health care, BMWH rules was promulgated by Ministry of environment and

Forests, Government of India, under Environment Protection Act(EPA) 1986 and insists on proper segregation and disposal of BMW (Dept of Env. and Land Management Tasmanaia, 1996).

For effective implementation of the rules, there is need to assess the knowledge and practices of private dental practitioners regarding safe disposal of BMW. This study was an effort to investigate dental practitioners' acquiescence with dental health care waste management procedures in Mysore district. As far as the knowledge regarding guidelines laid by the government of India, for management of BMW, it was alarming to note that 100% dentists were aware of it when compared with a previous study, conducted in a teaching hospital in new Delhi only 35.9% of respondents were aware of it (Kishore *et al.*, 2000). Regarding waste management policy adopted in their clinic, 16% of the dentists were following the BMW disposal policy. Thus awareness of the Waste Management policy among dental graduates was low which could be due to lack of proper educational programmes. With regard to safe management of BMW it was reassuring that a majority of dentists agreed that safe management is an issue that needs to be tackled by team-work of doctors and auxiliaries.

As per the rules laid by Government of India for disposal of BMW, different wastes must be disposed in different color coded bags. In the present study 60% of the dental graduates were not following the rules of proper disposal. Whereas in a study conducted in Bangkok among private dentists only 27.4% were aware of this practice (Punchanuwat *et al.*, 1998). Only 31% of dentists were disposing the plastic items in blue color -coded bags. In a study conducted in Indian hospitals in 2006, a higher level of awareness was observed and all the doctors answered correctly regarding proper disposal of waste (Saraf *et al.*, 2006). The variation in the level of awareness was due to training received in the hospitals (Fig. 9).

It was alarming to observe that in the present study only 10% of dentists were aware of the proper disposal of gypsum casts into black-color coded bag. This study showed that substantial percentage of practitioners dispose waste without segregation and prior disinfection into garbage bins which pose potential threat to garbage collectors. In the present study, only 25% of dentists reported that maintaining of a record of BMW disposal is mandatory. This could be due to ineffective implementation of rules

in the dental clinics. Majority of dentists (100%) agreed that there should be regular educational programmes on BMW management.

In the present study though only 10% of dentists reported that management of Health Care Waste as an extra burden but when questioned regarding the common problem for effective disposal, 37.5% recently qualified dentists reported that there was lack of information, 26.7% considered it as extra expenses and 16.7% reported non-availability of proper waste management services. This study showed that 88.8% of the dentists are not segregating excess mercury/amalgam in comparison to a study done in 1993 among dental practitioners in Northern Sweden, where 36% were segregating excess mercury and amalgam (Ogden *et al.*, 1997) and in a study done in 2008 at Bangalore where 39.1% of the respondents were not following amalgam segregation and disposal (Sudhakar *et al.*, 2008). Disposal of excess mercury without proper precautions is a burden to the environment.

In the present study 31% were following the correct protocol of disposing the waste sharps in a rigid container containing disinfectant solution. 60% disposed in a rigid container, 13.3% disposed it with other solid waste, 16.7% were not aware of proper method of disposal (Fig. 12). Higher percentage of dentists reported needle stick injuries which could be due to improper disposal of sharp waste when compared to a study conducted in Queensland where the prevalence was 27.7% (Leggat *et al.*, 2006). Exposure to needle stick injury might facilitate transmission of blood borne pathogens such as HIV, HBV, and HCV. It is important that strict infection control guidelines are to be adhered following sharp injury and dentists need to be more aware of proper disposal of sharp waste. Poor awareness and knowl-

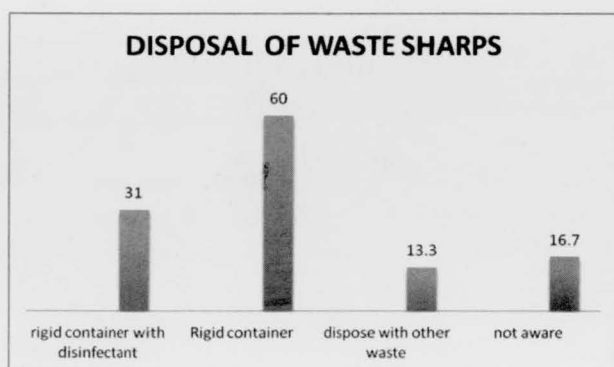


Fig. 12. Protocol of disposal of waste sharps.

edge regarding proper disposal of BMW and legislation among the private dental practitioners was observed. BMW management programmes cannot be implemented without the effective knowledge, willingness, and motivation from all the dental private practitioners. Improper handling of dental waste without proper segregation would not only increase the quantity of waste generated but could also lead to spread of infection in health care workers.

There is need for availability of few more specialized health care waste management services in Mysore district and provide information to the dental practitioners about availability of these services. There is a need for regular continuous dental education programmes on dental waste management to private dental practitioners. In a nutshell, real improvement in implementing proper disposal of waste could be accomplished if the private practitioners do not consider it as only a legal necessity, but also a social responsibility. There is a need to sensitize the private dental practitioners regarding proper handling and disposal of dental waste. An important prerequisite and key to successful waste management program is segregation which is the separation of different types of waste as per treatment and disposal option (Meenakshi *et al.* 2013). Segregation and collection of various categories of waste should be done at source, in separate containers so that each category is treated in a suitable manner to render it harmless. For waste management to be effective, the waste should be managed at every step from acquisition to disposal (Govt of India 1998, 2011).

Conclusion and Recommendation

The results of this study have demonstrated a lack of awareness of most aspects of BMW management among General dental practitioners. Society at large, including dentistry is concerned about the environment. Specialized health care waste management services are available at Mysore district but prior information have to be provided to the practitioners about the availability of such services. With new knowledge and the introduction of environmental management, the dental profession may improve its image, become more efficient and effective. It is advantageous to be able to demonstrate environmental concerns and actions to minimize the profession's impact on environment.

References

- Bhaskar Agarwal, Mohit Kumar, Srishti Agarwal 2011. Bio Medical waste and dentistry. *J Oral health Comm Dent.* 5 : 153-156.
- Biomedical waste rules made stringent. Available from: <http://www.cseindia.org/node/3702>. Available from: <Http://www.p2pays.orgret/01/0002htm> for more information.
- CPCB. Manual on Hospital Waste Management. Delhi: Central Pollution Control Board; 2000.
- Department of environment and land management. Guidelines for the management and disposal of medical waste in Tasmania. draft: Env. Tasmania, 1996, hobart, 700.
- Environmental health and safety. Available from: www.unb.ca/safety/biosafety.html Available from: [http://www.ndcnihfw.org/html/Legislations/Biomedical Waste Management](http://www.ndcnihfw.org/html/Legislations/Biomedical%20Waste%20Management).
- Govt of India. Bio-medical waste (management and handling) rules. The gazette of India. Ministry of Environment and forest. 1998.
- Hegde, V., Kulkarni, R.D. and Ajantha, G.S. 2007. Biomedical waste management. *J Oral Maxillofac Pathol.* 11 : 5-9.
- Kishore, J., Goel, B., Sagar, B. and Joshi, T.K. 2000. Awareness about Biomedical waste management and infection control among dentists of a teaching hospital in New Delhi. *Indian Dent Res.* 11 : 157-161.
- Leggat, P.A. and Smith, D.R. 2006. Prevalence of percutaneous exposure incidents among dentists in Queensland. *Aus Dent. J.* 51: 158-161.
- Meenakshi, S., Sunila, B.S. and Raghunath, N. 2013. An emphasis on wide usage and handling of biomedical waste- Dental perspective. *Int J of Sci Research.* 2(1): 7-11.
- Ogden, G.R., Bahrami, M. and Shivarajasingam, V. 1997. Dental students' knowledge and compliance in cross infection control procedures at a UK dental hospital. *Oral Dis.* 3: 25-30.
- Punchanuwat, K., Drummond, B.K. and Treasure, E.T. 1998. An investigation of disposal of dental clinical waste in Bangkok. *International Dental Journal.* 48 : 369-373.
- Pushpanjali, K., Shaik Hyder, Ali and Srivastava. 2003. Safe management of dental health care waste-A practical approach. *Journal of Indian Dental Assoc.* 74:29-33.
- Saraf, Y., Shinde, M. and Tiwari, S.C. 2006. Study of awareness status about hospital waste management among personnel and quantification. *Ind J of Community Medicine.* 31 : 111.
- Sood, A.G. and Sood, A. 2011. Dental perspective on biomedical waste and mercury management: A knowledge, attitude and survey. *Indian J Dent Res.* 22 : 371-5.
- Sudhakar, V. and Janakiram Chandrashekar. 2008. Dental health care waste disposal among private dental practices in Bangalore city, India. *Int Dent J.* 58 : 51-54.