

“Bio-medical waste Disposal”- A Survey to assess the Knowledge, Attitude and Behaviour among Dental personnel in Kanpur City, (U.P.), India

Dr. Lakshmana Rao. Bathala¹, Dr. Rajashekar Sangur², Dr. Tanu Mahajan³,

Dr. Pawanjeet Singh Chawla⁴, Dr. Ankit Mehrotra⁵, Dr. Parul Singhal⁶

¹ Department of Prosthodontics, Lenora Institute of Dental Sciences, Rajahmundry-533103, (A.P), India

^{2,3,4,5} Department of Prosthodontics, Rama Dental College, Hospital & Research Centre, Kanpur-20824, (U.P.), India

⁶ Dept. of Prosthodontics, RUHS, College of Dental Sciences, Jaipur (Govt. Dental College), Rajasthan, India

ABSTRACT

Objective: To investigate the knowledge, attitude and behaviour of dental personnel in Kanpur city, (U.P), India towards bio-medical waste disposal management in dentistry.

Method : A Cross-sectional descriptive study was conducted over a period of 3 months from November 2012 to Jan 2013. A pre-tested self-administered questionnaire was given to a total number of 423 dental personnel including Faculty, Post graduate students, Interns, Under graduate clinical students of a teaching institute and Private Practitioners in Kanpur city, India.

Results : A total of 406 dental personnel, including 41 Faculty, 36 post graduate students, 93 interns, 149 Clinical under graduate students and 87 Private practitioners participated in the study. Statistics was analysed by Dichotomisation analysis.

Conclusion : All the dental personnel required to undergo continuing training programme on bio-medical waste management.

Keywords: Rapid development, effectiveness, assessment, monitoring, management, planning

I. INTRODUCTION

Hospital waste management has been brought into focus in India recently, particularly with the notification on the bio-medical waste (management and handling) rules 1998[1], the rule which made it mandatory for all the health care establishments to segregate, disinfect and dispose their waste in an eco-friendly manner[2]. Dental clinics generate a number of biomedical wastes, including blood-soaked materials, human tissue, and the materials like scrap amalgam, photochemical waste (developer & fixer), lead foil from traditional x-ray packets, and disinfectants etc used in the dentistry are challenging to the environment and wisely handling and disposal them is critical[3],[4].

The World Bank's health care waste management guidance note lists, four steps to healthcare waste

management: 1) segregation of waste products into various components that include reusable and disposable materials in appropriate containers for safe storage; 2) transportation to waste treatment and disposal sites; 3) treatment; and 4) final disposal [5],[6].

II. METHODS AND MATERIAL

A Pre-tested self-administered questionnaire was developed after literature search and review (Appendix-1). The questionnaire was distributed to a total of 423 dental personnel including Faculty, post graduate students, Interns, clinical undergraduate students (third and final year) from a private dental college and local private practitioners in Kanpur, over a period of 3 months from December 2013 to February 2014. A total of 406 people responded. 12 private practitioners rejected and 5 personnel responded after 3 months which were

excluded from the study. All data management and analysis was carried out using Dichotomization Analysis.

III. RESULT AND DISCUSSION

Results

The results show that, awareness about the Legislative act of the bio-medical waste (management and handling) Rules 1988, which is applicable to the safe management of bio-medical waste was known to only few (16%) participants, and majority (84%) stated that they were not aware of it. (Fig-1).Regarding waste management plan, 79% mentioned that their health care set up having the waste management plan(Fig-2). About bio-medical waste management practices concern, it was found that majority claimed that they were following burning procedure (65%), followed by autoclaving (48%), deep burial (26%), segregation (9%), and the least was incineration (8%) (Fig-3). 97% were of the opinion that bio-medical Waste should be segregated in to different categories (Fig-4), and majority (50%) felt that it is the responsibility of auxiliary staff. Regarding colour coding, 72% agreed that they use colour coding for the bio-medical waste disposal, but only 7% were able to match the colour coding exactly, when they asked to match the colour coding (Fig-5). In relation to bio-hazard symbol, 82% stated that they were aware of it, but in reality 77% were not in position to identify the symbol correctly (Fig-6). 38% of the participants stated that, they were disposing the bio-medical waste in to municipal corporation bin, (31%) as in general waste, (29%) in to hospital waste collection and only 2% mention about other ways of disposing.

None of the participants claimed that, they were disposing the silver amalgam waste separately, and they were not having any facilities like amalgam separators, filters in their health care set up. Used x-ray fixer and developer solutions were directly pouring in to the drain, but none of them were having the facilities to send the solution for recycling. 61% declared that they have not undergone any training program on bio-medical waste management, and 56% mentioned that they are not receiving any literature on annual bio-medical waste management, but everybody wanted to attend the training program. 100% participants vaccinated for Hepatitis B.

While assessing the attitude towards the safe management of bio-medical waste, majority (81%)

agreed that the safe management of bio-medical waste is an issues. 79% agreed that it is the responsibility of the generator, and 94% felt that it is a team work. 72% were of the opinion that it is extra burden of work and 53% felt that it is an increase of financial burden on health care setup (Fig-7). In the present study majority of the respondents were not aware of legal issues involved. But the positive sign regarding attitude assessment was majority percentage accepted that it is an issue and that needs to be tackled and effective management is based on team work.

Discussion

In many countries the dentists are not following properly the bio-medical waste disposal methods. Dumping directly either in to the domestic rubbish stream or in to the waste paper bin and contaminated sharp items are in to general house hold waste. According to Panchanuwat K et al [7] stated, in Bangkok the most waste was disposed of in to the domestic rubbish stream. Treasure et al[8] identified in their study on Newzealand dental practices, majority dentists are disposing contaminated bloody swabs in to the waste paper bin, and contaminated sharps items(nearly 25%) in to general house hold waste. Farmer GM et al[9] in their pilot study in Melbourne found that, up to 91% of total waste contains was cross infection control items, such as gloves, single-use cups, and protective coverings.

It is the duty of the dentist to evaluate each waste generates from their practice should be determine whether it is hazardous waste or not. A waste that has not been evaluated must be assumed to be hazardous. Thousands of tons of hazardous and non-hazardous waste producing in the world every year. According to World Health Organization during 1999-2000, Searo and the 11 south-east Asian countries together produce both hazardous and non-hazardous waste around 3, 50,000 tons per year. [2].

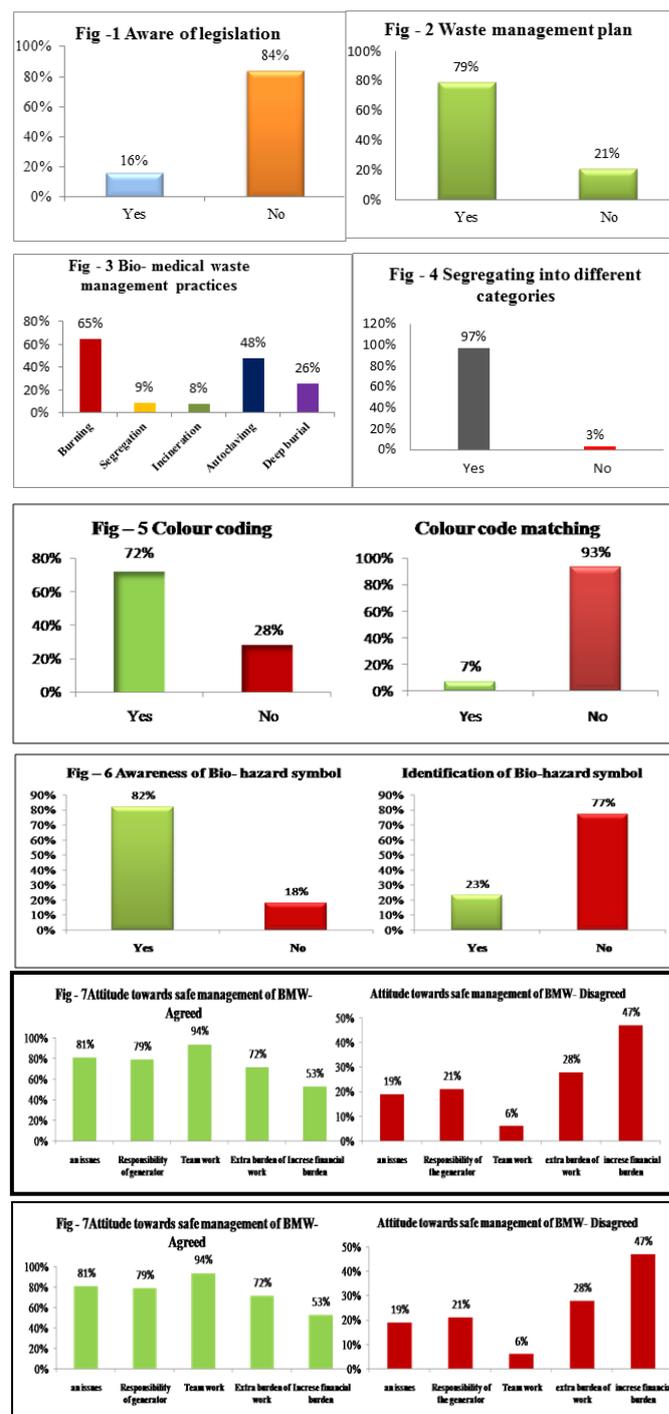
Teeth with amalgam fillings should be neutralized ideally with **“tuberculocidal disinfectant solution”** by immersion method for 30 minutes in a sealed container, because amalgam vapours release during sterilization. Treated teeth can be rinsed with water and are ready to disposal. Teeth without amalgam restorations can be placed directly in to a biohazard bag or sharp container [11],[12].

According to Rowe NH et al amalgam particles are a source of mercury, which is known to be neurotoxic, nephrotoxic and bio-accumulative[13] metal. As per Chin G et al [14] the environmental impact of dental mercury is mainly due to the poor management of dental amalgam waste. Amalgam waste should be placed in “white rigid” receptacles with a mercury suppressant, and it should be sent to mercury recovery process prior to final disposal[15]. To minimize amount of mercury vapour emitted from waste amalgam, ADA recommends that it should be stored under a small amount of “**photographic fixer**” in a closed container. Unused elementary mercury should be stored in a tightly sealed container, and should be sent for recycling. Scrape amalgam should be stored in “**sponge type Mercontainer tm**”. All the dental clinics should use some type of basic filtration system to reduce the amount of mercury solids passing into the sewer system. The amalgam separators can remove 95% of mercury waste which is entering in to the sewer system [16]. X-ray fixer is a hazardous material and should not be rinsed down the drain. Used fixer solution contains approximately 4000mg of silver per litre, and should compulsorily be sent for recovery unit. The ‘**de-silvered**’ fixer can be mixed with water and disposed down the sewer. Spent/ used developer can be diluted with water and then poured in to the drain. Unused x-ray film can be sent to recycler. Lead containing foils should be sent for recycling, because there is a possibility of leaching of lead [16].

The needles should be destroyed by needle destroyers or by using syringe melting and disposal system. The mutilated sharps should be placed in puncture proof sharp container with **1%Naocl** for disinfection [17]. Sharps are regarded as highly hazardous health care waste since they can cause injuries and puncture wounds. Due to exposure of the contaminated sharps, the risk of transmission of blood borne pathogens, such as HIV, Hepatitis B and C is always possible. According to W.H.O many cases of infection with various pathogens due to exposure to improperly managed health care waste was documented. According Darkish R.O et al[18] reports from U.S environmental protection agency (EPA), the no. of viral Hepatitis B infections resulting from exposure to sharp injuries among U.S dentists is less than 1% and in dental assistants 5-8%.

Pharmaceutical waste is considered to be hazardous non-infectious waste and it should be disposed off properly. Glutaraldehyde and Ortho-ptihaldehyde(Opa) which are the active ingredients of several brands of sterilizing solutions, before pouring them into the sanitary sewer, they should be neutralize with ‘glycine’. Electronic devices, batteries, fluorescent lamps etc comes under “**universal wastes**” and considered, as hazardous wastes, should be managed under the universal waste management regulations [16].

B.Graphs :



IV. CONCLUSION

It is our duty to respect and safe guard the environmental health. The proper disposal of infectious waste is a growing problem in many developing countries; the situation will become worse if it is not managed in a sustained way. Every concerned health personnel are expected to have proper knowledge, practice, and capacity to guide others for waste collection, proper handling techniques and management. The involved personnel must be trained in appropriate handling, storage and disposal methods. Dentists are encouraged to follow best management practices when disposing hazardous wastes. All the dental personnel as required to undergo continuing training programme on bio-medical waste management.

V. REFERENCES

- [1] The Gazette of India. Bio-Medical Waste (Management and Handling) Rules 1998. No 460 July 27 th 1998 and Amended No.375 June 2nd 2000. Or Govt. of India, "Bio-medical waste (management and handling) rules". The gazette of India. Ministry of Environment and Forests.1998.
- [2] Sharma M: Hospital Waste Management and Its Monitoring, 1 st ed. New Delhi, India, Jaypee brother's Medical publication; 2002.
- [3] Best management practices for hazardous dental waste disposal.Novascotiadentalociationwebsite.http://www.nsdental.org/media_uploads/pdf/95.pdf. Accessed November 2, 2009.
- [4] Taiwo JO, Aderinokun GA. Assessing cross infection prevention measures at dental clinic, university college hospital, Ibadan. Afr J Med Sci 2002; 31 (3): 213-7.
- [5] Pichay TJ. Dental amalgam: regulating its use and disposal. J Calif Dent Assoc. 2004; 32(7):580-582.
- [6] Johannessen LM, Dijkman M, Bartone C, Hanrahan D, Boyer G, Chandra C. health care waste management guidance note. Washington Dc: The International Bank for Reconstruction and Development/The World Bank; 2000.
- [7] Panchanuwat K, Drummond BK, Ttreasure ET. An investigation of the disposal of dental clinical waste in Bangkok. Int Dent J1998; 48(4):369-73.
- [8] Treasure ET, Treasure P. An investigation of the disposal of hazardous wastes from Newzealand dental practices. A Community Dent Oral Epidemiol 1997; 25(4):369-73.
- [9] Farmer GM, Stankiewicz N, Michael B, Wojcik A, Lim Y, Ivkovic D et al. Audit of waste collected over one week from ten dental practices. A pilot study. Aust Dent J 1997; 42(2):114-7.
- [10] Survey of hospital waste management in SEA region. WHO: Health situation in the South East Asia Region. 1998-2000.Khanna publishers, New Delhi 1999. p 1-34.
- [11] US department of labor, occupational safety and health administration. 29 cfr part 1910.1030 - blood borne pathogens. Occupational exposure to blood borne pathogens; needle stick and other sharps injuries, final rule. Federal register, 2001; 66 (12):5317-5325. As amended from and including federal register 1991; 29 cfr part 1910.1030.
- [12] Horsted-Bindslev P. Amalgam toxicity--environmental and occupational hazards. J Dent 2004; 32(5):359-65.
- [13] Rowe NH, Sidhu K S, Chadzynski L, Babcock R F. Potential public health risks related to mercury/amalgam discharge from dental offices. J Mich Dent Assoc. 1996;78(2):32-6.
- [14] Chin G, Chong J, Kluczevska A, Lau A, Gorjy S, Tennant M. The environmental effects of dental amalgam. Aust Dent J 2000; 45(4):246-9.
- [15] Agarwal B, Kumar M, Agarwal S,Singh S, Shekhar A. Bio-medical waste and dentistry. j oral health comm dent 2011;5(3):153-5.
- [16] National guidelines on hospital waste management. Biomedical waste regulations. Environmental regulations and best management practices; available from: <http://www.crd.bc.ca>. [last accessed on 2011 Sep 21] .
- [17] Management of sharps. Available from: http://www3.5ho.int/injecion_safety/en/. [last accessed on 2009 Dec 03].
- [18] Darkish RO, Al-Katib AL. Evaluation of dental waste management in two cities in Palestine. East Meditterr Health J 2006; 12(2):217-22.