Dental Waste Management Practices Among Dental Professionals In Selected Dental Hospitals/Clinics And Laboratories In South East Nigeria.

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Abstract:
Background: *Dental practice in its act of providing oral healthcare services produces different types of dental waste in clinics and laboratories. Therefore knowledge of the waste management is essential in every dental hospital and laboratory.This study was carried out to ascertain the dental waste management practices among dental professionals in some selected dental hospital/clinics and laboratory in south-east, Nigeria.The study employed cross sectional study design.The research was carried out within seven months (August 2019 to February, 2020) in selected hospitals and clinics in South-East, Nigeria.*
Methodology: *Data were collected using structural pretested questionnaire administered to 160 purposefully selected consenting respondents (Dental Professionals). Data were analyzed descriptively and inferentially using SPSS version 20. The hypotheses were tested at 0.05 level of significance and data generated were subjected to percentage findings presented by the use of tables. Data collected were analyzed and discussed.*
Result: *The data analyzed with Fisher's Exact Test showed that there is statistically significant association (260.162; P<0.05) between Association between years of experience and knowledge on how to sort waste by colour.*
Conclusion: *Based on the finding of this research work, this study shows that majority of the respondents do not have the knowledge and or inherent dangers associated with improper disposal of dental waste but conversely, many of them do not practice it. And this may have an adverse effect in the life of the people and the environmental condition of the area*
Keywords: *waste, dentistry, management, practices, professionals, selection, clinics and hospital.*

I.   Introduction

Dental professionals utilizes varieties of materials to promote and restore oral health and aesthetic well-being of an individual as such produces different types of dental waste in clinics and laboratories[1], which includes Infectious waste, Toxic waste, Domestic and general waste, sharp waste, chemical waste, and pharmaceutical waste[2].

To get accomplished the goal of dental restoration of an individual, heavy metals and other biocompatible materials which produce bio-medical waste, can present potential challenges to the environment. Waste products such as latex, plastics, cotton, glass and other materials that can be contaminated with body fluids such as scalers, needle and syringes, elevators, forcepts[3] are basically common in dental clinics and laboratories in Nigeria.

Sights can be noticed in some government dental clinics/hospitals either because their management appears unable to combat the unlawful and haphazard dumping of hazardous dental waste, which can be seen as

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a clear violation of the Clean air and health ethics of the Nigerian sanitation rules and regulations[4]or they are just incompetent to the ethics of the Dental profession[5]. Improper disposal of these dental wastes can cause harm to the professional, the patient or immediate individuals within the vicinity, waste handlers, the general public and the environment through production of toxin as a by-product of the destruction processes[6]. This therefore calls for proper waste management which focuses on the process of treating solid waste and offer variety of solutions for recycling items that does not belong to trash. It is something that every dental clinic, medical clinic, household and business owners around the globe needs because it disposes of unwanted materials in a safe and sufficient manner[7].

The study investigated dental waste management practices among dental professionals in selected dental clinics/hospitals in South-East, Nigeria. The findings were significant and information's obtained were helpful as a baseline data which could be used by policy makers to develop health strategies aimed at preventing poor dental waste management practices among dental health professionals

II. Materials and Methods

This cross-sectional and descriptive study were carried out among dental professionals of each dental department of the selected hospitals South East Nigeria, from

Study Design: This study employed a cross-sectional, descriptive survey design with the population of the study comprises of selected Dental Professionals in South East Nigeria.

Study Location: This study was carried out in selected hospital in South Eastern Nigeria. South East Nigeria formerly known as Eastern Nigeria, viz: Federal Medical Centre, (FMC) Umuahia, Federal Medical Centre, (FMC) Owerri, University of Nigeria Teaching Hospital, (UNTH) ituku - Enugu, Alex-Ekwueme Federal University Teaching Hospital (AE-FUTHA), Abakiliki - Ebonyi and OdimmegwuOjukwu University Teaching Hospital, (OOUTH) Awka – Anambra state, Nigeria.

Study Duration: August 2019 to February, 2020

Sample size: The sample size of the study comprised of 160 dental professional in the selected hospitals in South East.

Sample size calculation: The sample was drawn from the five selected hospitals through multistage sampling technique. In stage one; the first step were to stratify the selected hospitals by state, hence five strata: Abia, Anambra, Ebonyi, Enugu and Imo. The next step were the selection of hospitals that offer Dental/ oral healthcare services from each stratum using simple random sampling (balloting). The hospitals are Federal Medical Centre, (FMC) Umuahia, Federal Medical Centre, (FMC) Owerri, University of Nigeria Teaching Hospital, (UNTH) ituku - Enugu, Alex-Ekwueme Federal University Teaching Hospital (AE-FUTHA), Abakiliki - Ebonyi and OdimmegwuOjukwu University Teaching Hospital, (OOUTH) Awka – Anambra state, Nigeria. The second stage was the selection of all respondents from each hospital; Federal Medical Centre, (FMC) Umuahia (12 professionals), Federal Medical Centre, (FMC) Owerri (24 professionals); University of Nigeria Teaching Hospital, (UNTH) ituku-Enugu (67 Professionals), Alex-Ekwueme Federal University Teaching Hospital, Abakiliki- Ebonyi (48 professional) and OdimmegwuOjukwu University Teaching Hospital, (OOUTH), Awka – Anambra (9 Professionals).

Inclusive criteria:
1. Current staff (Dental Officers – surgeons, technologist, therapist, Nurses and Dental Surgery Assistance)
2. Dental house officers
3. Interns
4. NYSC member
5. Either Sex
6. Aged $\geq$ 18 years

Exclusive criteria:
1. Students on Clinical and Laboratory attachment
2. Dental Patients
3. Retired Dental officers

Procedure methodology

After a verbal informed consent was obtained, a well-designed and structured pretested close-ended questionnaire were administered to the professionalsand were supervised as they fill-in the questionnaire.

Statistical Analysis

The data generated from the questionnaire were collected and collated by the researcher and were entered into computer software called Statistical Package for Social Science (SPSS) version 20 for both descriptive and inferential statistical analysis. The researcher used simple percentage and frequency to analyze the research objectives and data collected. Pearson product moment of correlation coefficient (PPMC) was used to analyze the research hypotheses. The hypotheses were tested at 0.05 levels of significance. Data were subjected to percentage findings presented by the use of tables.

III. Results

Table 1 presented socio-demographic characteristics of the respondents; 68(42.5%) were males while 92(57.5%) were females. The age of professionals; 18-20 years recorded 07(4.4%), 21-25 years had 49(30.63%), 26-30years recorded 21(13.13%), 31-35 years had 51(31.88%) and 36 years and above had 32(20%). Then, the marital status; 67(41.88%) were single, 88(55%) married and only 5(3.13%) were divorcee. Level of education; 55(34.3%) had HND as highest recorded level of acquired educational qualification followed by B.Tech/BSc with 40(25%) while the least was 10(6.25%) with PhD. Place of Work of the respondents; UNTH recorded highest with 48(30%), followed by FMC, Owerri recorded highest with 48(30%) and the least was OOUTH with 9(5.6%). Years of experience; 0-5 years had 32(20%), 16(10%), 48(30%), 40(25%) and 24(15%).

Table 1: Socio-Demographic Characteristics of the Respondents

Variables	Frequency (n=160)	Percentage (%)
Sex of the respondents		
Male	68	42.50
Female	92	57.50
Age **of the respondents in years**		
18-20	07	4.40
21-25	49	30.63
26-30	21	13.13
31-35	51	31.88
36 and above	32	20.00
Marital status		
Single	67	41.88
Married	88	55.00
Divorced	05	3.13
Level of Education		
ND	25	15.62
HND	55	34.30
B.Tech/ BSc	40	25.00
MSc	30	18.70
PhD	10	6.25
Place of Work		
UNTH	67	41.9
OOUTH	9	5.60
AE-FUTHA	24	15.00
FMC, Owerri	48	30.00
FMC, Umuahia	12	7.50
Years of experience		
0-5	32	20.00
6-10	16	10.00
11-20	48	30.00
21-30	40	25.00
31 and above	24	15.00

Table 2 depicts the knowledge of workers on dental waste management; 49(30.63%) answered yes, they were aware of the WHO standard of waste management practice, 102(63.75%) said they were not aware while 9(5.63%) said they don't know. On the same table, 47(29.38%) said, they know how to sort waste by colour, 64(40%) said they don't while 49(30.63%) said they don't know. Blue code is used for disposal of medical waste by incinerate; 43(26.88%) said, they know, 56(35%) said they don't while 61(38.13%) said they don't know. Yellow code is for disposal of infectious waste; 38(23.75%) said they know, 57(35.63%) said they

don't while 65(40.63%) said they don't know. Also, 43(26.88%) said, they know orange colour is for disposal of infectious waste by treatment, 76(47%) said they don't while 41(25.63%) said they don't know. Again, 56(35%) said, they know any type of waste management practiced among dental professionals, 73(47%) said they don't while 31(19.38%) said they don't know.

Table 2: Knowledge of Workers on Dental Waste Management

Variables	Frequency (n=160)/ Percentage (%)					
	Yes		No		I don't know	
	N	%	N	%	N	%
Aware of the WHO standard of waste management practice	49	30.63	102	63.75	09	5.63
Know how to sort waste by colour	47	29.38	64	40.00	49	30.63
Blue code is used for disposal of medical waste by incinerate	43	26.88	56	35.00	61	38.13
Yellow code is for disposal of infectious waste	38	23.75	57	35.63	65	40.63
Orange colour is for disposal of infectious waste by treatment	43	26.88	76	47.00	41	25.63
Know any type of waste management practiced among dental professionals	56	35.00	73	45.63	31	19.38

Association between years of experience and knowledge on how to sort waste by colour
The data analyzed with Fisher's Exact Test showed that there is statistically significant association (*260.162*; P<0.05) between Association between years of experience and knowledge on how to sort waste by colour

Table 3: Association between years of experience and knowledge on how to sort waste by colour

			Know how to sort waste by colour			Total
			Yes	No	I don't know	
Years of experience	0-5 years	Count	32_a	0_b	0_b	32
		Expected Count	9.4	12.8	9.8	32.0
	6-10 years	Count	15_a	1_b	0_b	16
		Expected Count	4.7	6.4	4.9	16.0
	11-20 years	Count	0_a	48_b	0_a	48
		Expected Count	14.1	19.2	14.7	48.0
	21-30 years	Count	0_a	15_b	23_c	38
		Expected Count	11.2	15.2	11.6	38.0
	31 and above	Count	0_a	0_a	26_b	26
		Expected Count	7.6	10.4	8.0	26.0
Total		Count	47	64	49	160
		Expected Count	47.0	64.0	49.0	160.0

Fisher's Exact Test = 260.162; P<0.05

Table 4 presented the kilograms of dental waste generated in the hospital/laboratory on daily basis; 63(39.38%) said they generated 0-2kg of dental waste on daily basis, 59(36.88%) said they didn't while 38(23.75%) were against it. For quantity of 2-3kg of dental waste, 41(25.63%) they generated it, 58(36.25%) said they don't while 61(38.13%) said they don't know. Also, 43(26.88%) said they generated 3-4kg of dental waste, 56(35%) said they don't while 61(38.13%) said they don't know.

Again, 40(25%) said they generated 4/5kg of dental waste, 96(60%) said they don't while 24(15%) said they don't know.

Table 4: Kilograms of Dental Waste Generated in the Hospital/Laboratory on Daily Basis

Variables	Frequency (n=160)/ Percentage (%)					
	Yes		No		I don't know	
	N	%	N	%	N	%
0-2kg of Dental waste	63	39.38	59	36.88	38	23.75
2-3kg of Dental waste	41	25.63	58	36.25	61	38.13
3-4kg of Dental waste	43	26.88	56	35.00	61	38.13
4/5kg of Dental waste	40	25.00	96	60.00	24	15.00

IV. Discussion

Waste management practice were assessed at the course of this study to determine the awareness of proper disposal of dental waste among Dental Professionals in South East Nigeria. And based on world health organization standard of waste management, 102 (63.75%) respondents out of 160 respondents of this study were not aware of the inherent danger, poor dental waste management can cause to the society, the environment and to global warning. This result is same from the work of Puri, Smriti, Pentapati, Singh, Vineetha and Tamrakar[8] on assessment of awareness about various dental waste management practices among dental students and practicing clinicians. In their study, it was found that postgraduates had a better awareness of the proper methods to dispose of Dental and healthcare waste when compared to students and interns. However, the overall level of awareness was less than adequate. As shown by the results, there are few blind spots present in the awareness regarding laws pertaining to dental healthcare waste management and the level of awareness is less than adequate which is in line with the previous reports[9]

In terms of knowledge of sorting waste 47 (29.38%) out of 160 respondents indicated that they sort their waste using code method, 64% respondents indicated they don't sort their waste while 49 (30.63%) don't have any idea about the sorting code. This result indicate poor knowledge of sorting dental waste and when the result was compared with a cross-sectional study done by Adu, Gyasi, Essumang and Otabil[10], on medical and dental Waste-Sorting and Management Practices in Five Hospitals in Ghana shown that even though there were attempts to segregate hospital waste, particularly in the high-risk areas, the lack of a uniform color coding and labeling system for the different categories of hospital waste affects the efficiency of collection and handling and the integrity of the final waste treatment processes

Furthermore, this study shows that waste were generated in different scale of kilogram and recorded per day while a study done by Adedigba, Oke and Arobieke[11] on Characterisation of Dental Waste in Tertiary Dental Hospitals: A Third World Example, discovered that most hospitals had no record of the volume of waste being generated by them while that of Adedigba, Nwhator, Afon, Abegunde and Bamise[12] on assessment of dental waste management in a Nigerian tertiary hospital, affirms the scalin and disposal of dental waste but also suggested a very high content of lead, chromium, mercury, cadmium and manganese in both soil and water samples in comparison with the Nigerian Federal Environmental Protection Agency standards. The study concludes that the use of tooth-coloured restorative materials and digital X-ray facility to serve as alternatives to the generation of these wastes is recommended and that farming activities should not be allowed in the area until an audit of the soil and water have been performed.

V. Conclusion

Dental waste from dental clinics and Laboratories has become an imperative environmental and public safety problem. As producers of hazardous waste, dental professionals have a responsibility and a duty of care for the correct management of waste with their practice. Based on the finding of this research work, this study shows that majority of the respondents don't have the knowledge and or inherent dangers associated with improper disposal of dental waste and conversely, many of them do not practice it. And this may have an adverse effect in the life of the people and the environmental condition of the area. Therefore,it's expedient to increase awareness campaign on dental waste management practice among professionals in Enugu state.

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