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KNOWLEDGE, ATTITUDE, AND PRACTICE OF DENTAL WASTE MANAGEMENT AMONG PRIVATE DENTISTS IN ENUGU METROPOLITAN CITY, ENUGU STATE, NIGERIA

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Abstract: The study aims to assess the knowledge, attitude, and practices of dental waste management among private Dentist of Enugu Metropolitan city. The study adopted a descriptive cross sectional survey design. The study was carried out in Enugu State Nigeria. The population of the study was one hundred and ten dentist (110) drawn from twenty private dental clinics in Enugu Metropolitan city. Proportionate stratified random sampling technique was used to sample 5% of the population. Thus the sampled population was 22 dentists comprising of 15 males and 7 females. The instrument used for data collection was a structured questionnaire titled "Dental Waste Management Practice by Private Dentist (DWMPPD). Test-retest method was used to test the reliability of the instrument. The internal consistency of the survey instrument was ascertained by Cronbach's alpha coefficient of 0.89 analyses. The Z-test statistics was used to test the null hypothesis at 0.05 level of significance. Research questions were analyzed using mean and standard deviation. The results of the study showed that private dentists in Enugu have a poor attitude towards waste management practice. The study also showed that dental waste is disposed together with municipal wastes, which is below the standard guide line for medical waste management by World Health Organization (WHO). The researcher recommended that Federal and States environmental protection such as Enugu State management Authority (ESWAMA) should set up specialized sub-divisions which would be solely in charge of medical waste collection and disposal.

Keywords: Dental Waste, Management, Practice, Dental Clinic, Dentist

Introduction

Background of the Study

Human activities have always generated waste. Thus dental clinics have their primary responsibility to provide basic dental healthcare for the populace, but while doing so, they also generate huge amounts of 'dangerous' dental waste which can be very hazardous to the populace, if not properly controlled and managed. Dental wastes are materials that have been utilized in dental clinics and are no longer wanted for use and are therefore discarded. The World Health Organization, WHO (2014) describes dental waste as healthcare waste discarded, untreated materials from dental healthcare activities, which have the potential of transmitting infectious agents to humans. Alagoz, and Kocasoy, (2017) viewed dental waste as solid, liquid or fluid substances that arises from dental healthcare facilities during the process of diagnosis and treatment of dental diseases, which if failed to manage, can cause epidemic. Coker, Sangodoyin, and Ogunlowo, (2012) holds the opinion that dental wastes are unwanted medical materials, including diseased tissues that are generated during diagnosis, treatment of human beings or animals which should not be deposited within a living community.

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Waste management and control has become a serious problem with urbanization and the growth of large conurbations. Deneke, Aquiet, Desalegn, and Atebha, (2011) opined that dental healthcare waste comprises of two fractions, namely hazardous and non-hazardous waste. Hazardous waste are those dental waste which is potentially harmful to those who come into contact with it, due to its infectious, biological, chemical, radioactive, sharp content, while Non- hazardous waste includes, gloves paper rappers, medication instruction reflects etc. The poor practice and management of healthcare waste has led to contamination of water, soil and the environment as a whole, with major impact on public health, which has lead to many dead (Abanobi, Opara, & Nwakwuo, 2011).

Of all dental wastes, 70–80% are non-risk or low risk waste, sometimes referred to as general waste, while hazardous waste (infectious waste, pathological waste, sharps, pharmaceutical waste, genotoxic waste, chemical waste, pressurized containers and radioactive waste) makes up 20-30% (Babatola, 2016). Interestingly, hazardous waste despite having a smaller volume has a very high infectious and pathogenic tendency. Sharps, infectious and pathological wastes collectively makeup about 30% of all medical wastes (WHO, 2014) thereby, making dental wastes potentially more toxic to the human health and the environment than general/municipal (solid) waste.

According to Nwakwuo and Abanobi,(2014), Abaraogu, Uwalaka, Asonye and Nwankpa (2015) in Nigeria, several hundred of tones of medical wastes (including dental waste) are being deposited openly in Waste dumps and surrounding environments, often alongside municipal waste. Oresanya (2012) explained that, waste disposers including dental personnel should be educated on the rules of Waste Best Management Practices (WBMP) which insist that general waste have to be segregated and separated from the hazardous clinical waste. The purpose of this Best Management Practices (BMP) guide is to inform members of the medical and dental community how to properly manage hazardous wastes in order to minimize the release of toxic substances into the environment.

Oke (2016) stated that the amount of waste generated in dental offices and dental clinics are considerably less than that coming from other types of health care facilities; but however, the hazardous nature of these waste materials requires policy makers to enforce established waste regulations. He further observed that the types of waste generated in dental clinics and dentists' offices include sharps, infectious waste, and waste with high heavy-metal contents. Longe and Williams (2016) stated that waste from amalgam, etching acid equipment, caustic powders, used x-ray fixer, disinfectants and lead foils packets are most at times infiltrated in to sewage and then in to the soil, posing as potential hazard in the soil and especially to those whose uses well- water as source of drinking water. Oresanya, (2012) stated that contamination of the environment with heavy metals is a worldwide concern. He stressed that im-proper collection and disposal of amalgam waste can lead to occupational exposure to mercury. Khan, Mohammed, Masoodi and Qureshi, (2014) pointed out that environmental pollution with waste amalgam can cause nephrotoxic on the population. They stressed that Mercury has adverse effects on gastrointestinal, respiratory, immune and renal systems. Pregnant and lactating women and children are more susceptible to mercury exposure. Enwere and Diwe (2014) are of the view that Silver used in radiographic fixer solutions can negatively affect the environment. Materials containing Lead should be regarded as dangerous and should be used care and should not be deposited any how because it has serious adverse effects, especially on water ecosystem (Bassey, Benka-Coker and Aluyi, 2016). Enwonwu et al, (2015) stressed that sharps used dental objects and materials contaminated with blood and other body fluids generated in dental offices and clinics if not improperly managed, could expose patients, practitioners and their families to cross-transmission of blood-borne pathogens, including hepatitis “B”, hepatitis

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"C" and HIV, especially in the presence of open wounds; hazardous wastes are potentially carcinogenic such as chromium, and other opportunistic pathogens.

There are several guidelines directed towards the proper and safer management of dental generated waste, but in many developing countries such as Nigeria, dental waste management tends to be sub-optimal, thus turning down the World Health Organization (WHO) recommendations on healthcare guideline on management and disposal of healthcare waste. Uwa, (2014), Abah and Ohimain (2010) and Nwakwuo (2014), complained that hundreds of tones of medical wastes are being deposited openly in waste dumps and surrounding environments, often alongside municipal waste in Nigeria, neglecting the devastating effect to the population. Ogbonna, (2011) advised that dental waste with potential hazards like polystyrenes, barium, strontium which may cause serious harm to persons that come in contact should be treated properly before disposed.

Dental waste that contains chlorine such as gloves, rubberdam, when burnt even by incineration, produces dioxin. Dioxin can cause cancer, reproductive and developmental defects, and other effects which includes neurotoxic, hormonal and immune system effects (Vivan, et al, 2012). Toxic metals used in dentistry and their effects include; lead which in chronic or acute exposure to children may lead to neurological disorders and women may experience reproductive problems and probable human carcinogen.

National Guidelines for Waste Management in the Health Care, NGWMHC (2015) stressed that poor management of Chromium waste may cause liver and kidney damage and respiratory disorders; Cadmium is a probable human carcinogen and may cause lung cancer and is also linked to kidney disorders if exposed to. Medical waste must be separated from municipal waste, but in many parts of Africa including Nigeria, both medical and municipal wastes are dumped together along the waste stream.

Statement of the Problem

Poor practice and mismanagement of dental waste poses health risks to people and the environment by the contamination of the air, soil and water sources. Dental Centres and Dental Clinics are supposed to safeguard the oral health of the community. Where the Dental wastes are not properly managed, they can pose even greater threat than the original diseases themselves. Poor management of dental waste exposes medical staff, waste handling workers and the surrounding communities to infectious, toxic effects and injuries, a situation that poses a serious health problem in most developing countries. In Nigeria, apart from the Federal regulations on solid (municipal) waste management, there are also States regulations on municipal waste management individually set up by the 36 states and the Federal Capital Territory in the country under state-specific designated agencies or authorities. However, both State and the Federal laws are generally weak in regulating medical and dental waste management (MDWM) practices, as no special consideration is giving to medical waste despite its hazardous status. The delay in having a truly national regulation on medical and dental waste management (MDWM) in the country has led to the general lackadaisical attitude of health workers towards medical and dental waste handling and disposal. For example, the mixing of dental waste with municipal waste without prior treatment, which is against universal standard, is a rampart practice in many parts in Nigeria. The question now is how do Private dental healthcare providers practice and manage dental waste in their dental clinics in Enugu?

Purpose of the Study

The general objective of the study is to determine the knowledge, attitude, and practice of dental waste management among Private dentists in Enugu Metropolitan City. Specifically, the study is aim to:

1. determine the Knowledge among Private Dentists in Enugu Metropolitan city towards medical waste management practice.
2. determine the Attitude among private Dentists in Enugu metropolitan city towards medical waste management practice
3. determine the Practice of dental waste management among private dentist in Enugu metropolitan city

Research Questions

The following research questions were raised to guide the study

1. What is the knowledge among private dentists in Enugu metropolitan city towards medical waste management practice?
2. What is the attitude among private dentists in Enugu Metropolitan city towards the practice of medical waste management?
3. Do Private dentists in Enugu practice proper wastes management disposal?

Research Hypotheses

In line with the specific objectives and research questions, two null hypotheses were formulated to aid the research, thus;

1. There is no significant difference between poor management practices of dental waste in relation to gender among private dental practitioners in dental clinics in Enugu.
2. There is no significant difference between poor management practices of dental waste based on knowledge.

Methods

The study adopted a descriptive cross sectional survey design. The study was carried out in Enugu Metropolitan City and covers a population of one hundred and ten private dentist (110) drawn from twenty private dental clinics in Enugu metropolitan city. Proportionate stratified random sampling technique was used to sample 5% of the population, thus giving the sampling population of 22 dentists, comprising of 15 males and 7 females. The instrument used for data collection was a structured questionnaire titled Dental Waste Management for Private Dental Practitioners (DWMPDP). Test-retest method was used to test the reliability of the instrument. The internal consistency of the survey instrument was ascertained by Cronbach's alpha coefficient of 0.89 analyses. The Z-test statistics was used to test the null hypothesis at 0.05 level of significance. Research questions were analyzed using mean and standard deviation.

Research Question 1: What is the knowledge among private dentists in Enugu metropolitan city towards medical waste management practice?

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Table 1: Mean and standard Deviation scores on the knowledge among private dentists in Enugu metropolitan city towards medical waste management practice

S/N	Knowledge based questions	Mean	Std	N	D	Mean	Std	N	
			Male				Female		
1	Are you aware of any medical waste management legislation in Nigeria?	1.17	0.68	15	SD	1.42	0.72	7	D
2	Do you know the agency responsible for dental waste management in Enugu?	1..34	0.76	15	SD	1.48	0.73	7	D
3	Safe management of dental waste is the duty the Government only	2.88	0.80	15	A	2..51	0.78	7	D
4	Safe management of dental waste is a Teamwork (government, Dentist & auxiliaries)	1.62	0.38	15	D	**2.55**	0.81	7	D
5	Do you know of color coding of waste containers for waste disposal?	1.84	0.48	15	D	2.10	0.76	7	D
	Sharps (such as broken needles, surgical blades, and burs) should be disposed in yellow bags?	1.37	0.32	15	SD	1.88	0.50	7	SD
7	White translucent puncture-proof containers should be used for disposing Sharps (such as broken needles, surgical blades, and burs)	0.72	0.10	15	SD	1.45	0.46	7	SD
8	Expired medicines belong to chemical waste category?	2.61	0.62	15	A	2.81	0.84	7	A
9	Expired medicines belong to Cytotoxic waste category?	1.35	0.22	15	SD	1.95	0.57	7	D
10	Expired medicines are categorized as a biotechnological waste?	0.26	0.08	15	SD	1.55	0,53	7	SD

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11	Impression materials and infected cotton are category of solid waste	2.84	0.76	15	A	2.62	0.76	7	A
12	Impression materials and infected cotton are categorized as infected waste	2.61	0.71	15	A	2.52	0.73	7	A
	Total Grand mean and standard deviation	**2.44**	**0.65**		**D**	**2.04**	**0.62**	**D**	

Table1 answered knowledge section of the research questions arising from the study. The table presents a grand mean of 2.44, SD of 0.65 for male and 2.04, SD of 0.62 for female dentists. It showed that items 1, had a mean of 1.17 and SD 0.68 for males, mean of 1.42 and SD of 0.72 for females, revealing that private dentists in Enugu do not have knowledge of medical waste management legislation in Nigeria. Item 2 presented mean of 1.34, SD 0.76 male and mean 1.48, SD 0.73 for females, indicates that dentists in Enugu do not know any agency responsible for dental waste management in Enugu metropolitan city. Items 3 and 4 have mean rating of 2.88 and 1.62, SD of 0.80 and 0.38 for males and mean 2.51 and 2.55, SD 0.78 and 0.81 for females respectively; indicating that dentists in Enugu believe that safe management of dental waste is the duty the Government only. For items 5, 6 and 7, had mean rating of 1.84, 1.37 and 0.72 and SD of 0.74, 0.32 and 0.10 for males and 2.10, 1.88, 1.42 and SD of 0.76, 0.50, 0.45 respectively, indicating that private dentists in Enugu do not have adequate knowledge on color coding of waste containers, and so do not make use of color containers when disposing dental waste. Items 8, 9 and 10 have mean rating of 2.61, 2.85 and 3.26 and SD 0.62, 0.73 and 0.92 for males and mean of 2.81, 1.95, and 1.55 and SD 0.84, 0.57 and 0.53 for females respectively, indicating that dentists in Enugu believes that expired medicines belong to chemical waste category, Expired medicines belong to Cyto-toxic waste category and that expired medicines are categorized as a biotechnology waste. Items 11 and 12 showed mean rating of 2.84 and 2.61, SD 0.76 and 0.71 for males and 2.62, 2.52 and SD 0.76,0.73 for females respectively, indicating that private dentists in Enugu considered impression materials and infected cotton under category of solid waste, and also believe that impression materials and infected cotton are categorized as infected waste materials.

Research Question 2: What is the knowledge among private dentists in Enugu Metropolitan city towards medical waste management practice?

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Table 2: Mean and standard Deviation scores on the Attitude among private Dentists towards medical waste management in Enugu Metropolitan city

S/N	Attitude based questions	Mean	STD	N=15	D	Mean	STD	I=7	D	on
		Male				Female				
13	Do you think it is important to segregate dental waste from general waste?	1.64	0.31		SD	1.88	0.48		SD	Strongl
14	Will you be interested to attend voluntary programs that enhance and upgrade your knowledge about dental waste management?	1.42	0.29		SD	1.54	0.44		SD	Strongly
15	Do you think safe management of dental waste is an extra burden on work?	2.66	0.70		A	2.81	0.82		A	Agreed
16	Do you think infectious waste should be sterilized by autoclaving before shredding and disposal?	1.22	0.27		SD	1.44	0.34		SD	Strongly
17	Do you think improper waste management can be hazardous to health?	3.33	0.96		SA	3.24	0.94		SA	Strongly
18	Do you believe that poor temporal storage of dental wastes in the clinic can infect staff?	3.41	0.98		SA	3.52	0.98		SA	Strongly
19	Do you believe that poor management of liquid waste from the clinic can contaminate water source in the surrounding community?	2.42	0.74		D	2.51	0.75		A	Strongly
	Total Grand mean and standard deviation	**2.30**	**0.56**		**D**	**2.42**	**0.68**		**D**	**Disagreed**

Table 2 answered research questions arising from the attitude section of the study. The table revealed a grand mean of 2.30 and SD of 0.56 for males and of 2.42, STD of 0.68 for females respectively. Items 13 and 14 with

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mean of 2.64 and 3.42 and SD of .071 and 0.94 for male respondents and 1.88, 1.54 and STD 0.48, 0.44 respectively showed that both infectious and non infectious wastes are not segregated, thus are deposited together with municipal waste and respondents do not see the need to attend courses that will upgrade their knowledge on medical waste management practice. Item 15 with mean 2.66 and SD 0.73 for males and 2.81, STD 0.82 for females reviled that, respondents believes proper waste management practice is a burden to their work. Item 16 had a mean of 1.22, STD of 0.27 for males and mean of 1.44, STD of 0.34, reviling that dentist do not see any need to sterilized waste before disposal. Item 17 got mean 3.33, STD 0.96 for males and 3.24, STD 0.94 for females, signifying that both males and females respondents concurred with the fact that improper waste management is hazardous to health. Item 18 shows mean 3.41, STD 0.98 for males and mean 3.25, STD 0.93, reviling that respondents believed that poor temporal storage of dental waste in the clinic can lead to staff's infection. In item 19, both males and females concurred that poor management of liquid waste from clinics can contaminate water source in the surrounding communities as it present mean2.30,STD 0.65 for men and 2.42, STD OF 0.68 respectively.

Research Question 3: Do Private dentists in Enugu practice proper wastes management Disposal?

Table 3: Mean and standard Deviation scores on the practice of medical waste management by private dentist in Enugu metropolitan city

Practice based questions	Mean	SD	n=22	D	Mean	STD	n=7	D
20. Do you segregate waste before disposal?	1.56	0.26		SD	1.77	0.41		SD
21. Do you follow color coding of waste?	1.66	0.27		SD	1.82	0.46		SD
22. Are you registered with a certified waste carrier service to dispose dental waste of your clinic?	2.11	0.54		D	1.44	0.24		SD
23. Do you sterilize used needles before disposing?	1.82	0.29		SD	2.22	0.51		D
24. Do you dispose used fixer solution in clinic sinks?	3.24	0.86		SA	3.55	1.00		SA
25. Do you dispose X-ray film lead foils separate from other dental waste materials?	1.88	0.32		SD	2.12	0.48		D
26. Do you dispose excess leftover silver amalgam	3.42	0.90		SA	3.13	0.88		SA

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clinic Sinks?						
27. Do you dispose extracted teeth together with other waste generated from the clinic?	2.66	0.62	A	2.81	0.66	A
Grand Mean	**2.29**	**0.51**	**D**	**2.28**	**0.58**	**D**

Table 3 answered research questions arising from the practice-based section of the study. The table revealed a grand mean of 2.29, SD of 0.51 for males and 2.28, SD for females. Items 20 and 21 had mean of 1.56 and 1.66, SD of 0.26 and 0.27 for males and mean 1.77 and 1.82, and SD of 0.41 and 0.46 for females respectively indicating that dental practitioners in Enugu metropolitan city do not segregate dental waste before disposal and they don't bother about color coding of waste containers**.** Item 22 had a mean 2.11, SD of 0.54 for males and mean 1.44, SD of 0.24 for females, indicating that private dental practitioners in Enugu had not registered with any certified waste disposal service provider in Enugu. Items 23, 24 and 25 had mean of 1.82, 3.24 and 1.88, with SD of 0.29, 0.86 and 0.32 for males and mean of 2.22, 3.55 and 2.12 and SD of 0.51, 1.00, and 0.48 for females respectively, indicates that private dental practitioners in Enugu do not sterilize used needles before disposing, that they disposed used fixer solutions directly in to sinks in the clinics and do not dispose X-ray film lead foils separate from other dental waste materials. The table also reveal that items 26 and 27 had mean 3.42and 2.66 with SD of 0.90 and 0.62 for males and mean of 3.13, 2.81 and SD of 0.88, 0.66 respectively, revealing that dentist in Enugu do dispose leftover amalgam in the clinic sinks and they do dispose extracted teeth with municipal waste generated from the clinics. The analyses also showed poor practice of dental waste management by private dentist in Enugu, since the grand mean of 2.29 is below the criterion mean of 2.50.

Test of Hypotheses

Hypothesis One

There is no significant difference between poor management practices of dental waste in relation to gender among dental practitioners in dental centers in enugu.

Table 4: Z-test comparison of the mean ratings of the significant difference between poor management practices of dental waste in relation to gender among private dentists in Enugu Enugu metropolitan city.

Source Variable	n	Mean	SD	df	z-cal	z-crital	P	Decision
Male	15	2.29	0.51					
				21	18.132	1.52	0.05	Reject
Female	7	2.28	0.58					

As shown in Table 4, the difference in the mean ratings of male and female private dentist on the management practices of dental waste in private dental clinics in Enugu was significant. This was shown by the z-cal value of 18.132 which was greater than the critical value of 1.52 at 0.05 level of significance. Therefore, the null hypothesis of no significant difference between the two groups was rejected. This implies that the management practice of dental waste in private dental clinics in Enugu is dependent on gender.

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Hypothesis Two: There is no significant difference between poor management practice of dental waste and environmental pollution.

Table 5: Z-test comparison of the mean ratings of the significant difference between poor management practice of dental waste based on knowledge

Source Variable	n	Mean	SD	df	z-cal	z-crital	P	Decision
Males	15	2.44	0.65					
				21	17.58	1.52	0.05	Reject
Females	7	2.04	0.62					

As shown in Table 5, the difference in the mean ratings of poor management practices of dental waste based on knowledge. This was shown by the z-cal value of 17.58 which was greater than the critical value of 1.52 at 0.05 level of significance. Therefore, the null hypothesis of no significant difference between the two groups was rejected. This implies, the poor management practice of dental waste in private dental clinics in Enugu can be influence by Knowledge.

Discussion of the findings

The finding of the study reviled that the is no legislation in Nigeria about medical waste management disposal, and so this has created room for private dentists in Enugu state to dispose dental waste carelessly, forgetting how dangerous it can be to the populace. This is in agreement with Oke (2016), who stated that dental practice produces huge amount of dangerous waste and if no law is formulated to guide the disposal of medical waste, it can cause serious devastation to a community and Nigeria as a whole. The deposition of medical waste along side municipal waste is a common practice in Nigeria. That is why this research has reveal that dentists do not know the color coding of waste containers, and so do not make use of it during disposal of dental waste. Oresanya (2012) emphasized the importance of the rules of Waste Best Management Practices (WBMP) which insisted that general waste have to be segregated and separated from the hazardous clinical waste using color coding containers. He stressed that the purpose of this Best Management Practices (BMP) guide is to inform members of the medical and dental communities on how to properly manage hazardous wastes in order to minimize the release of toxic substances into the environment. This was also affirmed by a study carried out by Bassey et al., (2012; Uwa, (2014) which reported that segregation of medical waste by some healthcare facilities in Nigeria is either completely absent or wrongly carried out.

The study also revealed that private dentists lack knowledge about medical waste management, and believed that waste management is the sole responsibility of the government failing to understand that poor waste management is not only detrimental to the environment, but to all who comes in contact with them, including the dentists themselves, dental nurses, cleaner and the patients as states by (Masoodi and Qureshi, 2014). This research study also revealed that dentists think it is not important to segregate dental waste from general waste, stating that they are not interested to attend voluntary programs that enhance and upgrades knowledge about dental waste management, that safe management of dental waste is an extra burden on their work despite that that they agreed that poor temporal storage of dental wastes in the clinic can infect staff as confirmed by (Masoodi and Qureshi, 2014). The finding if this also revealed that dentists dispose used fixer solution in clinic sinks, which later flows to the septic tanks and thereafter infiltrate in to the soil and can easily contaminate well water or even crops. The finding is in line with the opinion of Longe and Williams (2016) who stated

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that waste from amalgam, etching acid equipment, caustic powders, used x-ray fixer, disinfectants and lead foils packets are most at times infiltrated in to sewage and then in to the soil, posing as potential hazard in the soil and especially to those who uses well- water as source of drinking water. Diseased teeth tissues which are extracted from patient's mouth are deposited carelessly with municipal waste, posing as hazard to refuge scavengers who come in contact with them. Ogbonna, (2011) advised that diseased tissues such as extracted teeth should be sterilized before disposing. He argued that diseased tissues teeth should not be burn because the carbon it releases to the atmosphere, leads to atmospheric pollution and is dangerous to the community.

Conclusions

It can be concluded that there is no legislation in Nigeria guiding medical waste management disposal, and this has encouraged poor disposal of dental/medical waste in general by medical personnel, especially the private practitioners. Since Federal and various States have legislation regulating the disposal of municipal waste, these legislations should be extended to the regulation of dental/medical waste management, taking in to consideration that dental/medical waste seems more dangerous to human and the environment than municipal waste. It is therefore pertinent that dentist should be provided with guidance, information, and motivation to practice dental/medical waste management rules and follow them more correctly and regularly since it in pinches on the national economic. This is necessary for all the dentists and all medical practitioners as a whole to give adequate importance to this matter. A "team up approach" by government, dentists and auxiliaries can solve the issue. Educational and motivational training programs should be conducted. Furthermore, undergraduate curriculum should include medical waste management topics along side with practical demonstration classes on waste disposal. The concept of "habits die hard" should be followed by making the dental students habituated from incipient stage by their teachers to abide by these rules in educational institutions by assigning them duties of waste segregation, color coding, etc,

Recommendations

Based on the findings of this study, the following recommendations are made to improve the management practice of dental/medical waste (DMW) practices not only in Enugu but in Nigeria as a whole:

1. States should work out working policy on medical and dental waste management (MDWM), and as a matter of urgency, be passed into law (clearly stating the punishment of defaulters) after reviewing the areas of weakness identified in this study as it would help regulate activities of health facilities in the state pending the approval of the national regulation on MDWM.
2. The Federal and State government should set up a specialised sub-division under the waste management organization existing in each State of Nigeria, solely in charge of medical waste collection and disposal.
3. States Ministry of Environment should set up a Medical Waste Monitoring Division (MWMD) for the enforcement of the recommended law and to monitor compliance by health facilities in the state.
4. The policy should provide medical waste pre-treatment options that are environmentally-friendly such as autoclaving, microwaving, steam treatment, heat treatment (but should not include burning or incineration) and chemical treatment. One of the cheapest but safe means of pre-treating medical waste is the application of bleaching agents (chemical treatment) which should be affordable by every hospital.
5. covered by the waste disposal team. The bad road network is a poor excuse for neglecting health facilities serving rural communities. Innovative means of reaching these neglected health facilities is required to safe guard the public health from the risks posed by medical wastes.

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