

An assessment of cross infection control practice in Nigerian oral health care workers

* Gyang MF, **Tokede O, * Adeleke OA, *Chukwu GA, *Jalo PH

*Intercountry Centre for Oral Health (ICOH) for Africa,
(in collaboration with WHO), Jos -Nigeria.

**Dept. of Global Health, Harvard University School of Public Health,
677 Huntington Av., Boston MA - 02115.

*Correspondence: Gyang MF

E-mail: mattfex@yahoo.com.

Abstract

Objective: This study was aimed at assessing the cross infection control practices among dental health care practitioners in Nigeria.

Method: Questionnaires were administered to 137 Dentists, 56 Dental Therapists and 62 Dental Surgery Assistants (DSAs) practicing in both government and private practices across the six geopolitical areas of the country. Each questionnaire comprised of questions on basic infection control procedures.

Result: Results indicate that all the participants use gloves during treatment, 93.8% wear face mask, 48.5% wear eye protection, 95.5% clinical gown/coat. Furthermore 27.3% have had a puncture or laceration from a dental needle or instrument while only 41.4% have had Hepatitis B vaccination.

Conclusion: Infection control practice by dental personnel in Nigeria has improved compared to previous studies, particularly in the use of gloves. However in the areas of sterilization, vaccination, there are needs for improvement.

Key words: Infection Control, Dental Health Care Workers, Sterilization, Immunization

Introduction

Appropriate infection control measures against the transmission of blood-borne diseases, respiratory infections and other occupational microbial pathogens are essential in health care provisions⁽¹⁾. Often health personnel have worsened the condition of their patients from neglect of infection control procedures or on the other hand exposed themselves to infections due to the same reason⁽¹⁾. This concern has led to the provision of infection control guidelines by the Centre for Disease Control (CDC) for dental practitioners. Infection control measures in the dental office include the use of masks, gloves, surface disinfectants and sterilizing reusable dental devices and instruments. In addition, dental health care providers are expected to follow procedures as required by the Occupational Safety and Health Administration⁽²⁾. The American Dental Association (ADA) has long recommended that all practising dentists, dental auxiliaries and dental laboratories should employ standard precautions as described in the 2003 Centers for Disease Control and Prevention's (CDC) Infection Control in Dental Health Care Settings guidelines⁽²⁾.

In recent times the Human Immunodeficiency Virus and Acquired Immunodeficiency Syndrome HIV/AIDS and hepatitis B infections prevalence are on the rise globally and their transmission during dental procedures has been documented⁽³⁾. The ADA also confirmed the first report of patient to patient transmission of hepatitis C in a dental practice setting linked to improper infection control practices in 2013⁽⁴⁾.

Instruments should be adequately sterilized using standard equipments (autoclave) especially for heat tolerant instruments. Immunization has also been known to substantially reduce exposure of Dental Health Care Workers (DHCW) to infection. Wastes generated in the clinic and their disposal should adequately be addressed as they are a source of infection to the DHCW and the community at large. Several studies conducted in Nigerian dental settings on infection control practice showed need for improvements⁽⁵⁻⁸⁾. Most of these studies were conducted among dental professionals working in tertiary dental healthcare facilities and involved only dentists. Therefore the quest to know the current measures employed by dental health care workers in the control of cross infection across the different regions, and health care settings of Nigeria provided the need for this study.

Materials and method

This was a cross sectional study. Data was collected through self administered questionnaires from 137 Dentists, 56 Dental Therapists and 62 Dental Surgery Assistants (DSAs) practising in both government and private practices across the six geopolitical zones of the Nigeria. They are South-South(SS), South -West (SW), South -East (SE), North -West (NW), North -East (NE), and North -Central (NC) Zones. A Tertiary, Secondary, and Private health Institution was selected through random sampling in two states from each of the Geopolitical Zones.



Due to paucity of dental manpower in the country, all dental staff willing to participate in each clinic was sampled. Each questionnaire comprised of questions on basic infection control procedures. The questionnaire was designed to collect information about the key measures of infection control that can be applied in dental practice, which include use of protective barriers, sterilization and disinfection methods, waste disposal, Immunization and awareness of HIV/AIDS status. This study proposal was reviewed and approved by the institutional ethical review committee of the Regional Centre for Oral health Research and Training Initiatives (RCORTI) for Africa. The data collected was collated and analyzed in the computer using SPSS Version 15.0. Significant difference in the use/nonuse of personal protective equipment /strategies were tested using Chi-Square (X²) statistics at 0.05 level of significance. Variables with P-value of <0.05 were considered significant.

Result

Results show that a total of 225 respondents were interviewed while 3 declined. One hundred and thirty seven (137) were dentists, 56 dental therapists while 62 were DSAs, 73.3% (n=157) while 25.9% (n=98) female (**Table 1**). Most of the facilities (98.04%) visited were cited in the urban areas.

Considering the use of personal protective equipment/strategies, all dentists and therapists (100%) wore gloves during clinical procedures (**Table 2**), but 2% (n=4) of these use one glove for more than one patient. Types of gloves commonly worn are latex gloves (97.4%). Most (99.5%) agreed that it is necessary to wear new gloves for each patient. More than half (50.8%) of the respondents do not wear any form of eye protection, while only 26% wear safety glasses, 19.1% use prescription glasses believing to be eye protection. Although 95.5% of respondents wear clinical gown/coat during clinical procedures, only 46.6% wear one daily. This study demonstrates that infection control practices are significantly higher in Tertiary settings followed by the Private (P = 0.003) but there was no significant difference between the geopolitical zones (p = 0.023).

As shown in **Table 3**, about 94.9% of participants claim to have received infection control lecture during their school days; while 82.4 % reported to have attended a workshop on infection control. In this study, having attended workshop/training or lectures on infection control during school days is considered having knowledge on infection control. This group had

significantly better infection control practices than those who have never attended a workshop or lecture (P. =0.001). There are more dentists who had knowledge of infection control (83.9%) than the other cadres but there is no significant difference within the cadres (P. =0.106) and within the geopolitical zones (P. =0.154).

HIV/AIDS status of all respondents was known by 84.7%. There was no significant difference among the six geopolitical zones on HIV status awareness (P. =0.311). On hepatitis B vaccination, 70.5% have had the vaccination but only 41.4% completed the doses.

Dentists were seen to have significantly completed hepatitis B vaccination (81.2%) more than dental therapists (15.9%), and DSAs (2.9%) P=0.000. Findings also show that 27.5% of dentists /dental therapists have had a puncture or laceration from a needle or dental instrument in the past 12 months Actions taken following exposure to injury include; vaccination (5.7%), pressure application (2.1), PEP/antiretroviral (1.0%), methylated spirit and sodium hypochlorite (12.4%) application, and nothing (2.1%). The remaining 76.7% who also sustained injuries did not respond as to what they did after sustaining such. Despite having good knowledge of infection control our respondents showed significantly poor attitude (p. 0.026). Respondents from the SW, N W and NC Zones showed better attitudes than the rest (**Table 4**).

Handling of Instruments:

The DSAs (77%) reported that used instruments are cleaned by first soaking them in water and brushed before sterilization. Hands are protected during washing instruments by majority(82 %) with disposable gloves and only 13% use heavy duty gloves when washing instruments or cleaning working surfaces (**Table 5**). For the sterilization of instruments, it was found out that autoclaving accounted for 86% while boiling accounted for 8%. A combination of oven and chemical sterilization accounted for 2%. Tertiary institutions provided the best standard of sterilization, followed by secondary institutions with significant difference (p. 0.047). They also reported that wastes (solid) collected in the dental clinic were mainly disposed of by dumping in dug pits (42%), other methods of disposal reported were; incineration 37% and use of public waste disposal agencies 21%. This task as investigated is carried in the hospitals/clinics mainly by the DSAs or hospital cleaners.

Table 1. Frequency distribution of dental personnel by cadres and gender

Gender	Dental Surgeons		Cadres Dental Therapists		Dental Surgery Assistants		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Male	103	75.2	31	55.4	23	37.1	157	61.6
Female	34	24.8	25	44.6	39	62.9	98	38.4
Total	137	100	56	100	62	100	255	100



Table 2. Distribution of dentists/ dental therapists using personal protective equipment/ strategies [n = 193]

Variable	Yes		No	
	freq	%	freq	%
Do you wear gloves during clinical procedures?	193	100	00	00
Do you wear face masks during treatment?	182	93.8	11	5.7
Do you wear any form of eye protection?	95	49.2	98	50.8
Do you wear clinical gown or coat during treatment?	192	99.5	1	0.5
Any puncture or laceration from a dental needle or instrument in the last 12 months?	53	27.5	140	72.5

Table 3. Distribution of DHCW education on infection control, awareness of HIV/AIDS status and hepatitis vaccination (n=255)

Questions	Response				
	Yes		No		
	Freq	%	Freq	%	
Did you receive any lecture on infection control during your school days?	242	4.9	13	5.1	
Have you attended any seminar, lecture or , workshop on infection control?	211	82.4		44	
Are you aware of your HIV/AIDS status?	194	84.7	35	15.3	
Have you had hepatitis B vaccination?	155	70.5	65	29.5	

Table 4. Attitude of dental professionals towards infection control by geopolitical zone. (n=255)

Geopolitical zone	Attitude of dental professionals towards infection control		
	Correct No. (%)	Incorrect No.(%)	Total
South -East	7 (29.2)	17(70.8)	24
South -West	29(47.5)	32(52.5)	61
South -South	19 (37.3)	32(62.7)	51
North -East	10(24.9)	24(70.6)	34
North -West	21(47.7)	23(52.3)	44
North -Central	19(46.3)	22(53.3)	41
Total	105(41.2)	150(58.8)	255(100.0)

Table 5. Handling of instruments and waste disposal (n=62)

Question	Variable	freq (%)
What are the methods for cleaning instruments prior to sterilization?	Soak and brush	48 (77)
	Running water	13 (21)
	Soak/running water	1 (2)
What protection is used when washing instruments?	Bare hand	2 (3)
	Disposable gloves	51 (82)
	Heavy duty gloves	8 (13)
	Disposable/Heavy duty gloves	1 (2)
What method of sterilization is used in the clinic/hospital?	Autoclaving	54 (87)
	Hot air/oven	1 (2)
	Boiling	5 (8)
	Oven and chemical	2 (3)
How do you dispose waste generated from the clinic?	Incineration	23(37)
	Dump in pit	26(13)
	Public waste Mgt	42(21)



Discussion

A routine component of health care provision is the appropriate use of infection control measures for the avoidance of transfer of infectious diseases⁽³⁾. The use of personal protective equipment (PPE) in this study shows that all the clinical personnel reported a 100% compliance to routine wearing of gloves during clinical procedures, this is in agreement with a study in Nigeria as reported by Utomi (97.5%)⁽⁹⁾ and slightly higher than that reported previously by Uti et al(93.2%)(5), Onyeaso et al (95%)⁽¹⁰⁾, and Sofola et al (70.6%)⁽¹¹⁾. Nearly all the respondents agree that it is necessary to wear new gloves for each patient. Ogunbodede et al also reported in a study that 12% of respondents did not change gloves between patients' treatment, while 50.0% among the subjects did not discard gloves which were torn, cut or punctured⁽¹²⁾.

This is in contrast with recommendations of the CDC that both surgical and examination gloves should be changed between patients and never be treated for reuse as it affects its integrity thereby resulting in porosity and tear during usage. Regrettably reasons for not changing gloves by these respondents were not investigated; but it may not be unconnected to poor funding of health care facilities in developing countries especially in Africa, as well as behavioral and attitudinal factors^(5,6,13). There is also a good compliance with wearing of face masks during procedures. The proportion of respondents who do not wear any form of eye protection is higher than 42.5% reported by Savage⁽⁶⁾. Prescription glasses worn by some respondents are not considered as a protective devise. Therefore safety shields or goggles are recommended and regarded to provide best protection to the eyes against splatters and aerosols during dental procedures.

This study revealed a high number of dentists/therapists recalled having had a puncture or laceration during dental procedures in the past 12 months. This is slightly lower than that reported by Al-Dharrab et al (48.5%)⁽¹⁴⁾, Fasunloro et al (36.8%) of which members of dental clinical staff recalling a sharp injury within six months⁽¹⁵⁾. Utomi also reported 50.9% of dental students having experienced one or more occupational exposures in the same period⁽¹⁶⁾. Also, nearly half of dental assistants in South Africa were reported in a study by Nemutandani et al to have sustained occupational exposure while handling instruments or assisting⁽¹⁷⁾. These have shown that occupational injuries occur frequently in the clinic and none of the DHCW is spared. Therefore, occupational injuries during practice should be taken seriously especially in regards to post exposure management procedures. It is strongly recommended that institutions should have a standing Post Exposure Committee in place to promptly attend to such accidents as blood borne pathogens such as HIV/AIDS and hepatitis B prevalence globally are high, while new infections continue to emerge.

HIV/AIDS prevalence in Nigeria has risen from less than 0.1% in 1987 to 5.8% in 2002⁽¹²⁾, and an estimated 3.3million Nigerians now live with HIV/AIDS⁽¹⁸⁾. As earlier reported in the results most of the DHCWs were aware of their HIV status.

Any health-care worker with an impaired immune system should be counseled about the potential risk associated with taking care of patients with any transmissible infection. They should continue to follow existing Recommendations for infection control to minimize risk of exposure to other infectious agents as well avoiding transmission of the disease to their patients. Therefore the awareness of HIV/AIDS or other blood borne infectious disease status by health care workers is of great importance to their practice.

Although immunization policy information by clinics was not gathered, it was found out that only a good number have received different doses of hepatitis B vaccination.

Those that completed the doses are low compared to a 63% report of DHCW immunization in South Korea⁽¹⁹⁾ and Saudi Arabia (80.5%)⁽¹⁴⁾. The low level of vaccination in this study should be a matter of concern to employers of these personnel owing to the fact that some of the dentists/dental therapists in this study have had a puncture or laceration from a needle or instrument in the past 12 months; this might have exposed some of them to blood borne communicable diseases. Recommendations of the Immunization Practices Advisory Committee (ACIP)⁽²⁰⁾ and institutional policies concerning requirements for vaccinating health-care workers with live-virus vaccines should also be considered. Immunizations are therefore an essential part of prevention and infection-control programs for DHCW⁽²¹⁾. However, we are not aware of any strict national guidelines on vaccination or infection control for Nigerian dental practices, this if in place may improve their attitude in this regard.

Used items must be cleaned thoroughly before sterilization. This is carried out mostly by the DSAs. In this study DSAs soaked instruments in water before washing which is an acceptable practice. The safety of high number of those that use disposable gloves or bare hands to wash instruments cannot be guaranteed bearing in mind the categories of instruments used in daily dental practice. Although autoclaving was found to be used by most respondents, a few clinics use chemicals and boiling only as their methods of sterilization, besides most instruments/ materials cannot be treated by these means of sterilization.

A study in Ibadan Nigeria showed that the disposal of solid contaminated waste did not conform to stipulated international standard⁽²²⁾ which is comparable to our findings. This cannot be unconnected to the fact that better alternatives were not provided by the management. Clinical wastes that find themselves in the public dump can be hazardous, especially with runoff to public drinking water sources and even scavengers roaming for scraps in these areas.



Conclusion

In conclusion, our findings have shown that infection control measures taken by dental personnel in Nigeria have improved compared to previous studies. However in the areas of sterilization, vaccination, and waste disposal there is need for improvement. Knowledge of infection control in this study improved practice; we hereby suggest that regular obligatory courses towards infection control be recommended.

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References

1. Molinari JA. Infection control; its evolution to the current standard precaution. *J Am Dent Assoc* 19 134, 569-574.
2. ADA Statement on Infection Control Procedures in Dental Settings. Main Category: Dentistry Article
www.medicalnewstoday.com/articles/194324.php
3. Centre for Disease control (CDC). Recommended Infection Control Practices for Dentistry, 1999 recommendations and Reports 1993(RR8).
4. ADA. American dental association statement on infection control in dental settings. <http://www.surgicalrestoration.com/index.html>.
5. Uti OG, Agbelusi GA, Jeboda SO, Ogunbodede E. Infection control knowledge and practices related to HIV among Nigerian dentists. *J Infect Dev Ctries* 2009; 3:604-610.
6. Savage KO. Assessment of the compliance of Nigerian dentists with infection control: A preliminary study. *Infect Contr Hosp Epid* 2003; 24, Page 10.
7. Azodo CC, Ehizele AO, Uche I, Erhabor P. Hepatitis-B vaccination status among dental surgeons in Benin City, Nigeria. *Ann Med Health Sci Res* 2012; 2:24-28.
8. Sofola OO, Savage KO. Assessment of the compliance of Nigerian dentists with infection control: A preliminary study. *Infect Contr Hosp Epid* 2003; 24:737-740.
9. Utomi I. Attitudes of Nigerian dentists towards hepatitis B vaccination and use of barrier techniques. *West Afr J Med (Year???)* 24:223-226.
10. Onyeoso SO, da Costa OO, Arawojolu MO. Sterilization and disinfection procedures by dental practitioners in Nigeria. *Nig J Health BiomedSci* 2002; 1:106-113.
11. Sofola OO, Folayan MO, Denloye OO, Okeigbemen SA. Occupational exposure to blood borne pathogens and management of exposure incidents in Nigerian dental schools. *J Dent Educ* 2007; 71:832-837.
12. Ogunbodede EO, Folayan MO, Adedigba MA. Oral health-care workers and HIV infection control practices in Nigeria. *Trop Doct* 2005; 35:147-150.
13. Ekoku Y. Infection control in dental practice in Uganda, the preliminary program for first African and Middle-East IADR Federation conference. 2005; vol.??? 27-29
14. Al-Dharrab AA, Al-Samadani KH. Assessment of hepatitis B vaccination and compliance with infection control among dentists in Saudi Arabia. *Saudi Med J* 2012; 33:1205-1210.
15. Fasunloro A, Owotade FJ. Occupational hazards among clinical dental staff. *J Contemp Dent Pract* 2004 15;5:134-135.
16. Utomi IL. Occupational exposures and infection control among students in Nigerian dental schools. *Odonto-stomatologie tropicale. Trop Dent J* 2006; 29:35-40.
17. Nemutandani MS, Yengopal V, Rudolph MJ, Tsotsi NM. Occupational exposures among dental assistants in public health care facilities, Limpopo Province. *SADJ: J South Afri Dent Assoc* 2007; 62:348, 352-355.
18. Federal Republic of Nigeria, Global AIDS Response. Country progress report NACA Nigeria. GARPR. 2012, 12.
19. Song KB, Choi KS, Lang WP, Jacobson JJ. Hepatitis B prevalence and infection control among dental health care workers in a community in South Korea. *J Public Health Dent* 2007; 59:39 -43.
20. CDC MMWR, Hepatitis B Virus: Recommendations of the Immunization Practices Advisory Committee (ACIP). Recommendations and reports November 22, 1991/40;1-19.
21. Kohn WG, Collins AS, Cleveland JL, Harte JA, Eklund KJ, Malvitz DM. Guidelines for infection control in dental health-care settings 2003, Recommendations and reports. 2003; 1-16.
22. Taiwo JO, Aderinokun GA. Assessing cross infection prevention measures at the dental clinic, University College Hospital, Ibadan. *Afri J Med Med Sci* 2002;31:213-217.