Original Article

Infection control knowledge and practices related to HIV among Nigerian dentists

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Abstract

Background: Many diseases including HIV/AIDS can be transmitted in the dental setting when effective infection control procedures are ignored. The aim of this study, therefore, was to evaluate the infection control knowledge and practices of Nigerian dentists in the era of HIV/AIDS.

Methodology: Information on knowledge of transmission of HIV, occupational vulnerability, infection control practices, and opinion on adequacy of infection control facilities were gathered from dentists through a self-administered questionnaire. Knowledge was assessed on a total score of 20 questions.

Results: Only 3.6% of the dentists had poor knowledge. Younger males and dentists working in teaching hospitals had significantly better knowledge than their counterparts. While 40.8% believed HIV could be transmitted through saliva, only 43.2% knew it could be transmitted through the conjunctiva.

Most (93.2%) wore gloves routinely and the most common barrier to glove use was non-availability. Most (79.2%) used autoclaves for sterilization; however, chemical disinfectants and boiling were also used. The majority (72.4%) believed the facilities for infection control in their centres were inadequate. Close to half of the respondents (47.6%; n = 118) rated the occupational risk of becoming infected with HIV as high.

Conclusion: The results of this study have shown that while the level of knowledge of the dentists was generally acceptable, there were still some misconceptions on the transmission and occupational vulnerability of HIV. It also indicates only partial compliance with recommended infection control procedures among Nigerian dentists as a result of inadequate supplies.

Key words: HIV, infection control, dentists, Nigeria

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Introduction

Effective infection control in the dental clinic is a priority as many diseases can be transmitted in dental environs, including streptococcal and staphylococcal infections, tuberculosis, the common cold, influenza, mumps, herpes simplex, Hepatitis B virus (HBV), syphilis, and human immunodeficiency virus (HIV).

In 1987, the Centers for Disease Control and Prevention (CDC) developed universal precautions to help protect both health care workers (HCWs) and patients from infection with blood-borne pathogens in health care settings. The recommendations stress that blood is the most important source of HIV, HBV and other blood-borne pathogens, and that infection control efforts should be focused on the prevention of exposures to blood as well as the receipt of HBV immunizations [1]. In 1996, however, the CDC's Hospital Infection Control Practices Advisory Committee (HICPAC) introduced the concept of standard precautions, which states that a single set of precautions be used for the care of all patients in hospitals regardless of their presumed infection status [(2]. Standard precautions integrate and expand the elements of universal precautions into a standard of care designed to protect health care practitioners and patients from pathogens that can be spread by blood or by any other body fluid, excretion or secretion. While there are bodies such as the Occupational Safety and Health Administration (OSHA) and CDC to issue guidelines and regulate infection control in the United States, there are no guidelines or regulatory bodies in Nigeria.

Published reports have shown adherence to the precautions in developed countries [3-6] but reports from developing countries such as Nigeria are limited. While a few studies have been done on the

knowledge and practices of Nigerian dentists, they did not include dentists in private practice in their samples, and the studies were also not related to the HIV pandemic [7-9]. The objective of this study, therefore, was to assess the infection control knowledge and practices of Nigerian dentists in this era of HIV/AIDS. It also compared the compliance of dentists with previous studies from Nigeria.

Methods

This study group comprised all dentists who were currently engaged in active clinical practice either in the public or private sector in the southwest geopolitical zone. Participants were selected from three states: Osun, Oyo, and Lagos (see Figure 1). These states were chosen because they have high concentrations of practicing dentists with about 92% of the dentists in the southwest geopolitical zone located in the three states. Each of these states has a dental school in a teaching hospital complex. They also have dental centers in the state hospitals and a relatively high number of private dental clinics. The Ethical committee of the Lagos University Teaching Hospital gave permission for the study.

Figure 1. Map of Nigeria.

Data collection was done with the use of a standardized self-administered questionnaire, which covered demography, knowledge of HIV transmission, occupational vulnerability, infection control practices, concerns or fears related to HIV infected patients, and opinion on adequacy of infection control facilities in the dental clinics. Data entry and analysis were done with the Epi Info version 6.04 statistical software.

Level of knowledge of dentists was assessed on a total score of 20 questions. Knowledge was adjudged good if 15 to 20 questions were answered correctly; fair if 10 to 14 questions were correct; and poor if less than 10 were correct.

Means, standard deviation, and other measures of central tendency and dispersion were determined for quantitative variables, while frequency distributions were generated for qualitative variables. The chi square test of association was used where appropriate. Difference was taken as significant at the level of $P < 0.05$.

Results

Demography

A total of 250 Nigerian dentists took part in the study. The study population consisted of 132 (52.8%) males and 118 (47.2%) females. The ages of the dentists ranged between 22 and 50 years, with a mean of 33.76 years $\pm$ 5.93. Respondents' years of practice ranged between one and 24 years. The majority of the dentists (n = 171, 68.4 %) had been in practice for one to 10 years. The majority of the respondents (n = 128, 51.26%) were from teaching hospitals.

Level of knowledge of respondents

While 64.4 % of the respondents had good knowledge, 32% had fair knowledge and only 3.6% had poor knowledge of HIV transmission and oral manifestations.

There was a statistically significant association between knowledge and age ($\chi^2 = 10.63$, $p = 0.031$). Younger dentists below age 40 years had better knowledge compared to their counterparts above 40 years of age. A statistically significant association was also noted between knowledge of respondents and gender ($\chi^2 = 6.07$, $p = 0.048$). The male respondents had a slightly better knowledge than the female respondents. The level of knowledge was significantly associated with type of practice. The teaching hospitals had the highest proportion (n = 112, 85.5%) of dentists who had good knowledge, while the private clinics had the highest proportion of dentists with poor knowledge (n = 6, 16.2%).

This was statistically significant; however, there was no significant association between level of knowledge and years of practice ($\chi^2 = 6.04$, p =

Table 1. Level of Knowledge of Dentists

Characteristics	Poor knowledge	Fair knowledge	Good knowledge	Total	P value
AGE					
20 - 30	3 (3.6%)	29 (35.0%)	51 (61.4%)	83 (100%)	
31 - 40	3 (2.3%)	34 (26.0%)	94 (71.7%)	131 (100%)	
41 - 50	3 (8.3%)	17 (47.2%)	16 (44.5%)	36 (100%)	0.031*
GENDER					
Female	7 (5.9%)	31 (26.3%)	80 (67.8%)	118 (100%)	
Male	2 (15.0%)	49 (37.1%)	81 (61.4%)	132 (100%)	0.048*
TYPE OF PRACTICE					
Teaching hospital	0 (0.0%)	19 (14.5%)	112 (85.5)	131 (100%)	
General hospital	2 (2.9%)	37 (53.6%)	30 (43.5%)	69 (100%)	
Military hospital	1 (7.7%)	8 (61.5%)	4 (30.8%)	13 (100%)	0.000*
Private hospital	6 (16.2%)	16 (43.2%)	15 (40.5%)	37 (100%)	
YEARS OF PRACTICE					
1 - 10	3 (1.8%)	55 (32.2%)	113 (66.0%)	171 (100%)	
11 - 20	5 (7.1%)	23 (32.9%)	42 (60.0%)	70 (100%)	
21 - 30	1 (11.1%)	2 (22.2%)	6 (66.7%)	9 (100%)	0.195

* Significant p values

0.195). The younger dentists who had practiced for 10 years and less had the highest proportion of dentists with fair to good knowledge (98.2%), while those who had been in practice for 21 to 30 years had the lowest proportion (88.9%) of dentists with fair to good knowledge. Table 1 shows the relationship between various characteristics and knowledge of the dentists.

While 42.8% of the dentists knew that transmission of HIV was not possible through uncontaminated **s**aliva, 40.8% believed that it could be transmitted. Transmission through the conjunctiva was identified only by 43.2% of the dentists.

About half of the respondents (n = 118, 47.6%) rated the occupational risk of becoming infected with HIV high. Although more male than female respondents rated the risk high, there was no significant difference between gender and rating of occupational risk of HIV ($\chi^2 = 1.17$, p = 0.55).

On the infectivity of HBV and HIV, 78.0% correctly stated that HBV was more infectious than HIV and 76.4% agreed that infection control procedures for HBV are adequate for the control of HIV.

Infection control practices

Table 2 shows the use of recommended infection control measures by dentists.

While 218 (87.2%) of the respondents always took the medical history of new patients, only 92 (36.8%) updated the medical history of patients who had been seen previously.

Most dentists (n = 233, 93.2 %,) wore gloves routinely while treating patients and only 34 (13.6%) routinely asked about their patients' HIV status. There was no significant association between use of gloves and age ($\chi^2 = 2.4$, p = 0.66), type of practice ($\chi^2 = 3.05$, p = 0.931) and years of practice ($\chi^2 = 7.13$, p = 0.523). There was a significant association between use of gloves and willingness to treat HIV-infected patients. Dentists who wore gloves routinely were more willing to treat HIV-infected patients (p = 0.031).

The majority of the dentists (56.8%) reported various barriers to glove use.

Non-availability of gloves was the most commonly reported barrier to glove use (52.11%). Others were allergy (28.17%); loss of tactile sensation (26.7%); discomfort and difficulty in

Table 2. Percentage compliance with infection control measures by dentists

INFECTION CONTROL MEASURES	ALWAYS (%)	SOMETIMES (%)	NEVER (%)
Medical history of new patients	87.2	12.8	0.0
Routinely asked about HIV status	13.6	58.4	28.0
Update of medical history	36.8	46.4	16.8
Use of gloves	93.2	6.4	0.4
Change gloves between patients	97.2	1.6	1.2
Reuse of gloves	2.4	2.8	94.8
Hand washing after glove removal	78.0	20.4	1.6
Change face mask between patients	39.6	55.6	4.8
Wearing of face shields	12.0	40.0	48.0
Use of eye goggles	11.6	51.6	36.6
Use of coats	64.0	29.2	6.8
Use of extra precautions	91.5	3.5	5.0

n = 250

manipulation of instruments (21.13%); and cost (20.4%).

Non-availability of gloves was significantly associated with type of practice. The teaching hospitals and general hospital had the highest proportions of dentists who reported non-availability of gloves, while the federal dental centre, private hospitals and military hospital had the highest proportions of dentists who had gloves available to them.

Use of extra precautions

Only 5% of the respondents reported never taking extra precautions, such as double gloving and wiping down surfaces, when treating HIV-infected patients.

Sterilization of instruments

Most dentists (79.2%) made use of the autoclave for sterilizing instruments. Sodium hypochlorite (household bleach) was the most frequently used solution (chemical disinfection) for cold sterilization (70.1%). Methylated spirit was used by 21.6%, Hibitane in spirit was used by 20.0%, glutaraldehyde by 11.9%, and Hibitane by 8.0%.

Infection control policy and post-exposure protocol

An infection control policy was reported to be available to 92 (36.8%) dentists, while 32.0% claimed their hospitals did not have any. About thirty percent (31.2%) of the dentists did not know if their hospitals had any.

Less than half of dentists (n = 118, 47.2%) did not know if their hospitals had a post-exposure protocol, while 34.8% claimed their institutions did not have any. Only 45 (18.0%) claimed their hospitals had a post-exposure protocol. Most dentists 240 (96.0%) were willing to accept post-exposure prophylaxis for accidental exposures while 4.0% would refuse.

Waste disposal and opinion of dentists on infection control in the clinics

Most respondents (72.4%) disposed of wastes in the normal refuse bin.

There was a significant difference between waste disposal in a normal refuse bin and type of practice (χ^2 = 13.5, p = 0.009). The teaching hospitals (76.6%) and general hospitals (78.3%) tended to use normal refuse bins more than the private clinics (59.5%) and the military hospitals (69.2%).

On the adequacy of facilities to ensure proper infection control in their clinics, 184 (73.6%) claimed they were inadequate, while 66 (26.4%) claimed they were adequate.

There was a significant association between the rating of facilities as adequate and type of practice. More dentists in private practice rated their clinics as adequate, while those in teaching hospitals and general hospitals claimed they were inadequate. There was no statistically significant association between rating the clinic as adequate and age (χ^2 = 0.34, p = 0.843), gender (χ^2 = 3.11, p = 0.077) and years of practice (χ^2 = 0.51, p = 0.972).

More than half (56.6%) of the dentists had at least one concern related to the treatment of patients with HIV, and the majority of them (83.45%) had concerns regarding contracting HIV from the patients.

Discussion

The risk of transmission of HIV in the dental care setting has been reported to be low [10,11]; however, this does not indicate a zero risk as dentists can be accidentally exposed to the virus and other blood-borne pathogens in the course of treating patients.

In this study, level of knowledge of HIV transmission and oral manifestations of this virus was fairly good. It was, however, found to be significantly better among younger dentists, most of whom were undergoing postgraduate training in teaching hospitals. Furthermore, dentists with less than 10 years' experience exhibited better knowledge, and this could be attributed to better training in infection control in their curriculum, especially with the onset of the HIV pandemic. It may also be that the younger practitioners are more receptive to new thinking than the older practitioners.

Possible routes of HIV transmission were not fully understood by the dentists. While most respondents could identify blood, direct contact through cuts and abrasions, and percutaneous injury as modes of transmission, 40.8% of the respondents believed that HIV could be transmitted through saliva. The level of misconception is higher than 21.9% as reported in a study of Nigerian dentists in government hospitals [12]. This discrepancy could be due to the exclusion of dentists from private clinics in the previous study. The misconception is lower than the rate of 51.9% reported in a 1992 study of Nigerian dentists [8]. The currently available data suggests that while there may be virus in human saliva, the risk of HIV transmission is low, although blood contamination of the saliva may increase this risk [13].

Although there has been improvement in the knowledge that infection control procedures for HBV are adequate for HIV prevention in the clinic, nearly half of the dentists perceived the risk of occupationally contracting HIV to be high. This and other misconceptions are likely to affect the willingness of dentists to treat HIV-infected patients and should be addressed by continuing dental education.

Universal precautions include taking a medical history for all patients and updating it periodically at subsequent visits. In this study, while most dentists always took a patient's history, only a few always updated it. This is in contrast with an earlier study in which about 92% claimed that they always took medical history [7]. It is important that patients' HIV status is specifically asked. If dentists can ask patients about their history of other debilitating diseases, then they should ask about HIV status. This practice will enable the dentist to examine the patients more closely for oral manifestations and this will also ensure prompt treatment.

Routine use of disposable gloves has been recommended for all patient contacts. Gloves ideally should be removed after seeing a patient and the hands washed thoroughly before re-gloving to see a new patient. The findings in this study are similar to Sofola's, where 92.5% claimed that they always wear gloves [7]. The proportion of dentists claiming that they washed and re-used gloves has also reduced (2.4%) compared to results obtained by Sofola and Savage, where 4.8% of the dentists re-used gloves on consecutive patients [7]. It is also an improvement on the results obtained by Adegboye *et al.* [9], where a non-compliance rate of 44% in the dental clinics was recorded. The main barriers to the use of gloves in this study were non-availability, allergy, and loss of tactile sensation. It is important that materials such as gloves are made available to dentists so that proper infection control procedures can be performed.

Hand washing is an important and very basic aspect of infection control because the hand is a principal vector for transfer of pathogens in the health care setting. The results of this study showed that there is again an improvement over a previous study of Nigerian dentists [7] which reported that 34.9% of the dentists always washed and 61.6% sometimes washed. However, there is still room for more improvement in the hand washing practices of Nigerian dentists.

Facemasks and protective eyewear are recommended for use when spatter and splash of body fluids are anticipated. The results in this study are lower than those of previous studies in Nigeria [7,8] and some other parts of the world which reported 74% to 94% (14-16). The use of eye goggles and face shields is even more uncommon than use of facemasks. Only 11.6% always wore eye goggles and 12.0% always wore face shields. These proportions are higher than those reported in the previous Nigerian study [7]; however, they are still low when compared with studies from the Caribbean, which reported that 58% of dentists always wore protective eyewear [15] and from Kenya, where 58% also reported wearing protective eyewear [17].

The use of protective coats has been recommended to sheild skin and clothing from splashes and spatter. In this study, 64.0% of dentists claimed they always wore coats, while 29.2% only wear coats sometimes. While there is an improvement in the use of protective coats compared to the results seen in two previous studies in Nigeria, (44.3% [8] and 52.7% [7]), it is much lower than in other places. In Kenya, 82.5% reported use of protective coats during clinical practice [17].

An overwhelming majority of dentists (91.5%) claimed they adopted extra precautions while treating HIV patients. This suggests that they would improve their infection control with only some of their patients, which contravenes the policy of "universal precautions". The erroneous perception that use of extra precautions can protect the dentist from cross-infection can lead to a false sense of security. This selective approach also does not account for those patients who are unaware of their infection status or who have chosen to attend the dental clinic without disclosure of their status. It is, however, likely that the high level of concern about treatment of patients with HIV and the dentists' fear of contracting the virus from the patients result in the use of additional precautions that may allay the dentists' anxieties and enable them to be more comfortable with the treatment of HIV-infected patients. However, this practice is not limited to Nigeria, as more than one-third of Mexican dentists said they would increase their fees as they would increase their infection control if they treated HIV patients [16]. Dentists and all health care workers need to be aware that all patients should be treated using recommended infection control measures as if they were infected with HIV or any blood-borne pathogens, and that any lowering of the standards may result in cross-infection.

The CDC recommends that all surgical and other instruments that penetrate soft tissues and bone must be sterilized after use or discarded. In this study, the majority of the dentists (79.2%) reported using a steam autoclave, but cold sterilization and boiling are still used to sterilize instruments by many respondents. The proportion of dentists who reported using a steam autoclave in this study is lower than that reported in previous studies (Sofola and Savage, 84.1% [7] and Sote, 92.4% [8]). This could be a result of the difference in the sample of dentists. Dentists in private practice, who were included in this study, may not have autoclaves, unlike the dentists in the public sector who were the focus of the earlier studies.

Boiling and cold sterilization are not acceptable methods of sterilization and need to be discouraged as their effectiveness cannot be verified. Use of boiling was significantly associated with type of practice, as 62.5% of dentists who used boiling as a method of instrument sterilization were from the general hospitals.

The lack of post-exposure protocol reported in this study is worrisome because creating a zero risk environment in the occupational setting is not realistic and procedures which provide medical and psychological care to those who are accidentally exposed should be a priority. A post-exposure protocol would enable dentists to handle occupational exposures in their clinics effectively. This current study has shown that dentists are willing to accept post-exposure prophylaxis if it were made available in their clinics.

The majority of the dentists in this study believed that the infection control facilities in their clinics were inadequate. It is important that dental caregivers be provided adequate infection control facilities to enable them deliver oral health care services with confidence and professionalism. Where practitioners are not confident in their cross-infection control, there must be worries about the treatment of not only

the HIV patients or other high-risk patients, but also the treatment of non-HIV patients.

In conclusion, the results of this study have shown that while the level of knowledge of the dentists was generally acceptable, there were still some misconceptions about the transmission and occupational vulnerability of HIV and also the use of extra precautions. While there have been some areas of improvement when compared with earlier investigations, the study indicates only partial compliance with recommended infection control procedures among Nigerian dentists as a result of inadequate supplies. It therefore seems that lack of resources rather than lack of knowledge may be responsible for the partial compliance. There is need for a regulatory body such as the OSHA to enforce standards, and the Nigerian Dental Association must issue guidelines on infection control measures for Nigerian dentists. Such guidelines should include

- Enforcement and monitoring of infection control practices in the dental clinics
- Development of written comprehensive policy on immunization of dental health care workers
- Development of a written program for dental health care workers that includes policies, procedures and guidelines on education and training, exposure prevention, and post-exposure management

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