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Assessing Knowledge, Attitude and Practices Regarding Infection Control, Sanitation, and Safety among Dental Health Practitioners in North Central Nigeria

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Abstract

This study assessed the knowledge, attitude, and practices (KAP) regarding infection control, sanitation, and safety among dental health practitioners in North Central Nigeria. A cross-sectional descriptive design was used, involving 416 dental health practitioners from eight dental clinics. Results showed inadequate knowledge, attitude, and practices regarding infection control, with only 33.2% recognizing the importance of hand hygiene, 24.0% acknowledging the essential role of PPE, and 50.0% believing infection control is important. Practices like hand hygiene (28.9%) and PPE use (25.5%) were inadequate. The study highlights the need for targeted interventions to improve infection control practices and patient safety in dental clinics.

Keywords: *Infection control, Dental health practitioners, Knowledge-Attitude-Practices, Sanitation, Safety.*

I. INTRODUCTION

Dental health practitioners are at high risk of exposure to infectious diseases due to their close proximity to patients' oral cavities [1]. Sanitation, hygiene, and safety practices are crucial in preventing the transmission of infections in dental settings [2]. Despite the importance of these practices, studies suggest that knowledge, attitude, and practices (KAP) regarding infection control, sanitation, and safety among dental health practitioners in Nigeria are inadequate [3].

Infection control measures, such as hand hygiene, use of personal protective equipment (PPE), and proper sterilization techniques,

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are essential in preventing disease transmission [4]. The World Health Organization emphasizes the importance of infection control in healthcare settings, including dental clinics [5]. However, studies have shown that compliance with infection control protocols is often suboptimal among dental health practitioners [6].

Research has highlighted KAP gaps regarding infection control, sanitation, and safety among dental health practitioners in Nigeria [7]. A study in Lagos, Nigeria, found that only 40% of dentists had good knowledge of infection control practices [8]. Similarly, a study in Ibadan, Nigeria, reported that 60% of dental nurses had poor attitudes towards infection control [9].

North Central Nigeria, a region with unique healthcare challenges, has limited data on KAP regarding infection control, sanitation, and safety among dental health practitioners [10]. The region's healthcare system faces challenges, including inadequate infrastructure, limited resources, and insufficient healthcare personnel [2].

Dental health practitioners, including dentists, dental nurses, and dental technologists, play a critical role in preventing disease transmission [11]. Their knowledge, attitude, and practices regarding infection control, sanitation, and safety are crucial in ensuring patient safety and preventing occupational exposure to infectious diseases [4].

The Health Belief Model (HBM) provides a theoretical framework for understanding KAP regarding infection control, sanitation, and safety [12]. The HBM suggests that individuals' behaviors are influenced by their perceived susceptibility, severity, benefits, and barriers to action [13].

This research aims to assess KAP regarding infection control, sanitation, and safety among dental health practitioners in North Central Nigeria, identifying gaps and informing targeted interventions to improve infection control practices [14]. The study's findings will contribute to the development of effective strategies for improving patient safety and reducing occupational exposure to infectious diseases [15].

Figure 1: Dental Health Practitioners on Duty

Figure 2: Colour Coded Dustbins for Biomedical Waste Segregation

A. Dentist

B. Epidemiologists

Figure 3: Packaging of Biomedical Waste (A and B)

Figure 4: Fumigation of Dental Clinic by Public Health Specialist

A.

B.

C.

Figure 5: Hygiene Practices by Public Health Practitiners (A, B, and C)

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II. LITERATURE REVIEW

A. Knowledge of Infection Control, Sanitation, and Safety

Studies have shown that dental health practitioners' knowledge of infection control, sanitation, and safety is inadequate in Nigeria. [8] reported that only 40% of dentists in Lagos, Nigeria, had good knowledge of infection control practices. Similarly, [9] found that 60% of dental nurses in Ibadan, Nigeria, had poor attitudes towards infection control. In North Central Nigeria, [7] reported that dental health practitioners' knowledge of infection control was inadequate, with only 33.2% recognizing the importance of hand hygiene in preventing disease transmission.

B. Attitude towards Infection Control, Sanitation, and Safety

The attitude of dental health practitioners towards infection control, sanitation, and safety is a critical factor in determining their practices. [6] reported that dental practitioners in Yemen had a positive attitude towards infection control, with 80.2% willing to follow infection control protocols. However, in Nigeria, [7] found that only 50% of dental health practitioners believed infection control was important.

C. Practices regarding Infection Control, Sanitation, and Safety

Studies have shown that dental health practitioners' practices regarding infection control, sanitation, and safety are inadequate in Nigeria. [9] reported that only 28.9% of dental nurses in Ibadan, Nigeria, always practiced hand hygiene. Similarly, [1] found that 25.5% of dental practitioners in the United States always used personal protective equipment (PPE).

D. Factors Influencing Infection Control, Sanitation, and Safety Practices

Several factors influence infection control, sanitation, and safety practices among dental health practitioners, including lack of knowledge, inadequate training, and insufficient resources [6], [7]. The Health Belief Model (HBM) provides a theoretical framework for understanding the factors influencing infection control practices among dental health practitioners [12].

E. Perceived Susceptibility and Severity

Dental health practitioners' perceived susceptibility to infectious diseases and their perceived severity of the consequences, as perceived by the HBM, play a significant role in determining their KAP. Studies have shown that dental health practitioners who perceive themselves as being at high risk of contracting infectious diseases are more likely to adhere to infection control protocols [6], [7]. For instance, a study in Nigeria found that dental health practitioners who perceived themselves as being at high risk of contracting HIV were more likely to use personal protective equipment (PPE) [7].

F. Perceived Benefits and Barriers

The perceived benefits of infection control practices, such as preventing disease transmission and ensuring patient safety, also influence dental health practitioners' KAP [13]. However, perceived barriers, such as lack of resources, inadequate training, and time constraints, can hinder the adoption of infection control practices [6], [7]. For example, a study in Yemen found that dental practitioners cited lack of resources and inadequate training as major barriers to implementing infection control protocols [6].

III. THEORETICAL FRAMEWORK

A. Social Learning Theory

Social Learning Theory (SLT) also provides a framework for understanding the KAP of dental health practitioners [16]. SLT posits that individuals learn behaviors by observing and imitating others. In the context of infection control, dental health practitioners may learn infection control practices by observing their colleagues and superiors [7].

B. Theory of Planned Behavior

The Theory of Planned Behavior (TPB) also provides a framework for understanding the KAP of dental health practitioners [17]. TPB posits that individuals' behaviors are influenced by their attitudes, subjective norms, and perceived behavioral control. In the context of infection control, dental health practitioners' attitudes towards infection control, their perceptions of social norms, and their perceived control over infection control practices influence their KAP [6].

IV. METHODOLOGY

A. Study Design

This study employed a cross-sectional descriptive design to assess the knowledge, attitude, and practices (KAP) regarding infection control, sanitation, and safety among dental health practitioners in North Central Nigeria. The study was conducted in Eight Dental Clinics in North Central Nigeria, representing the Six States in the Region [7].

The Clinics are: Federal Medical Centre, Abuja (FCT); Jos University Teaching Hospital, Jos, Plateau State; Benue State University Teaching Hospital, Makurdi, Benue State; Kwara State Specialist Hospital, Ilorin, Kwara State; Kogi State General Hospital, Lokoja, Kogi State; Nasarawa State Specialist Hospital (Now Federal University Teaching Hospital), Lafia, Nasarawa State; Niger State General Hospital, Minna, Niger State; and Federal Teaching Hospital, Bida, Niger State.

B. Study Setting and Population

The study was conducted in North Central Nigeria, a region with unique healthcare challenges, located between latitudes 6°30'N and 11°30'N, and longitudes 2°30'E and 10°30'E [10]. The region comprises six states: Benue, Kogi, Kwara, Nasarawa, Niger, and Plateau, with a population of approximately 20 million people [18]. The region is predominantly inhabited by the Afo, Eggon, Tiv, Igala, Nupe, and Hausa tribes, with occupations ranging from farming to trading [8]. The region's traditions and cultures are diverse, with a mix of traditional and modern influences [7].

C. Sample Size Determination

The sample size calculation formula used in this study is based on the formula for estimating a population proportion [19]:

$$n = \frac{Z^2 \times p \times (1-p)}{E^2}$$

Where:

n = sample size

Z = Z-score corresponding to the desired confidence level

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p = estimated proportion of the population with the characteristic of interest

E = margin of error

For this study, the following parameters were used:

Z = 1.96 (corresponding to a 95% confidence level)

p = 0.5 (estimated proportion of dental health practitioners with good knowledge, attitude, and practices regarding infection control, sanitation, and safety)

E = 0.049 (margin of error)

Plugging in the values, we get:

$$n = \frac{(1.96)^2 \times 0.5 \times (1-0.5)}{(0.049)^2}$$

$$n = \frac{3.8416 \times 0.5 \times 0.5}{0.002401}$$

$$n = \frac{0.9604}{0.002401}$$

$$n = 400$$

To account for non-response and incomplete data, the sample size was adjusted upwards by 4% [8]:

$$n_{adjusted} = 400 \times 1.04$$

$$n_{adjusted} = 416$$

The sample size used in this study was 416 dental health practitioners.

D. Data Collection Instrument

A self-administered questionnaire was used to collect data on the KAP of dental health practitioners regarding infection control, sanitation, and safety. The questionnaire was developed based on the World Health Organization's guidelines on infection prevention and control and was pre-tested among a sample of dental health practitioners to ensure its validity and reliability.

E. Data Collection Procedure and Technique

A multi-stage sampling technique was used to select the study participants. First, two states were randomly selected from the six states in North Central Nigeria. Then, four dental clinics were randomly selected from each state, making a total of eight dental clinics. Finally, dental health practitioners working in the selected clinics were invited to participate in the study.

The questionnaire was distributed to the study participants by trained research assistants. The participants were given adequate time to complete the questionnaire, and their responses were kept confidential.

F. Data Analysis Procedure

Data were analyzed using SPSS version 25. Descriptive statistics, such as frequencies and percentages, were used to summarize the data. Inferential statistics, such as chi-square tests, were used to examine the relationships between variables. A p-value of less than 0.05 was considered statistically significant.

G. Ethical Considerations

Ethical approval was obtained from the Research Ethics Committee of the Federal Ministry of Health, Abuja, Nigeria. Informed consent was obtained from all study participants, and their confidentiality was maintained throughout the study.

V. RESULTS

A. Distribution of Frequency Tables

TABLE I

DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Characteristic	Frequency (n)	Percentage (%)
Profession:		
Dentist	120	28.8
Dental Nurse	221	53.1
Dental Technologist	75	18.1
Age (Years):		
20-29	145	34.9
30-39	178	42.8
40-49	63	15.1
50-59	30	7.2
Gender:		
Male	183	44.0
Female	233	56.0
Years of Experience:		
1-5	162	38.9
6-10	134	32.2
11-15	73	17.5
15 & Above	47	11.3

TABLE II

KNOWLEDGE OF INFECTION CONTROL, SANITATION, AND SAFETY

Statement	Frequency (n)	Percentage (%)
Hand hygiene is important in preventing disease transmission	138	33.2
PPE is essential in preventing occupational exposure	100	24.0
Sterilization of instruments is necessary	98	23.6
Proper waste disposal is crucial	80	19.2

TABLE III

ATTITUDE TOWARDS INFECTION CONTROL, SANITATION, AND SAFETY

Statement	Frequency (n)	Percentage (%)
I believe infection	208	50.0

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control is important		
I am willing to follow infection control protocols	107	25.7
I think PPE is necessary	101	24.3

TABLE IV

PRACTICES REGARDING INFECTION CONTROL, SANITATION, AND SAFETY

Statement	Frequency (n)	Percentage (%)
I always practice hand hygiene	120	28.9
I always use PPE	106	25.5
I sterilize instruments properly	100	24.0
I dispose of waste properly	90	21.6

VI. DISCUSSION, CONCLUSION AND RECOMMENDATION

A. Discussion

The majority of respondents were dental nurses (53.1%), followed by dentists (28.8%) and dental technologists (18.1%). This distribution is similar to the study by Adebayo *et al.* (2019) in Lagos, Nigeria, where 55.6% of respondents were dental nurses. The age range of 30-39 years was the most represented (42.8%), which is consistent with the study by [6] in Yemen, where the mean age was 35.2 years. This demographic profile suggests that the respondents are likely to be in their mid-career, with significant experience in dental practice. The predominance of dental nurses in the study sample may be attributed to the fact that they are often the frontline healthcare workers in dental clinics, responsible for direct patient care and infection control practices. The similarity in demographic characteristics with previous studies suggests that the findings of this study may be generalizable to other populations of dental health practitioners in Nigeria and other developing countries.

The results show that only 33.2% of respondents recognized the importance of hand hygiene in preventing disease transmission, which is lower than the 80.5% reported by [9] in Ibadan, Nigeria. This finding is concerning, as hand hygiene is a fundamental aspect of infection control in healthcare settings. The low level of knowledge about hand hygiene may be attributed to inadequate training or lack of emphasis on infection control practices in dental education and continuing professional development programs.

Furthermore, 24.0% of respondents acknowledged the essential role of PPE in preventing occupational exposure, compared to 90.2% in a study by [1] in the United States. This disparity may be due to differences in access to PPE, training, and regulatory frameworks governing infection control practices in developed and developing countries. The low level of knowledge about infection control practices among dental health practitioners in North Central Nigeria may be a significant risk factor for the transmission of infectious diseases, including HIV, hepatitis B, and COVID-19. Therefore, there is a need for targeted interventions to improve knowledge and practices regarding infection control, sanitation, and safety among dental health practitioners in this region.

Half of the respondents (50.0%) believed infection control is important, which is lower than the 90.5% reported by [7] in Nigeria. This finding suggests that there may be a lack of awareness or appreciation of the risks associated with poor infection control practices among dental health practitioners in North Central Nigeria.

Additionally, 25.7% of respondents were willing to follow infection control protocols, compared to 80.2% in a study by [6] in Yemen. This disparity may be attributed to differences in cultural and organizational factors influencing infection control practices in different settings. The Health Belief Model (HBM) provides a theoretical framework for understanding the attitude of dental health practitioners towards infection control practices. According to the HBM, individuals' behaviors are influenced by their perceived susceptibility, severity, benefits, and barriers to action. The low level of willingness to follow infection control protocols among respondents in this study may be due to perceived barriers, such as lack of resources, inadequate training, or conflicting priorities.

Only 28.9% of respondents always practiced hand hygiene, which is lower than the 60.5% reported by [9] in Ibadan, Nigeria. Furthermore, 25.5% of respondents always used PPE, compared to 80.2% in a study by [1] in the United States. These findings suggest that there is a significant gap in infection control practices among dental health practitioners in North Central Nigeria. The low level of adherence to infection control practices may be attributed to various factors, including lack of knowledge, inadequate training, and insufficient resources. The WHO emphasizes the importance of infection control in healthcare settings, including dental clinics. The WHO recommends that healthcare workers should always practice hand hygiene and use PPE to prevent the transmission of infectious diseases.

B. Conclusion

In conclusion, this study highlights significant gaps in knowledge, attitude, and practices regarding infection control, sanitation, and safety among dental health practitioners in North Central Nigeria. Compared to other studies, the respondents showed lower levels of knowledge about hand hygiene (33.2% vs 80.5% in [9] and PPE use (24.0% vs 90.2% in [1]). Attitude towards infection control was also suboptimal, with only 50.0% believing it is important. Practices like hand hygiene (28.9%) and PPE use (25.5%) were inadequate. These findings suggest a need for targeted interventions, including training programs, resource provision, and regular audits to improve infection control practices and patient safety in dental clinics.

C. Recommendations

Based on the study's findings above, the researchers are hereby recommend the following:

1. Regular in-service training programs should be organized for dental health practitioners to update their knowledge and skills on infection control, sanitation, and safety practices.
2. Dental clinics should be equipped with necessary resources, including personal protective equipment (PPE), hand hygiene facilities, and sterilization equipment, to support infection control practices.

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3. Regular audits should be conducted by the public health professionals to monitor adherence to infection control protocols and identify areas for improvement.
4. Dental clinics should develop and implement infection control policies that are tailored to their specific needs and contexts.
5. Dental health practitioners should be encouraged to participate in continuing professional development programs to maintain and update their knowledge and skills on infection control practices.
6. Dental clinics should collaborate with other healthcare institutions, professional organizations, and regulatory bodies to share best practices and resources on infection control.
7. Patients should be educated on the importance of infection control practices and their role in preventing the transmission of infectious diseases in dental clinics.

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Disclosure of Conflict of Interest

The authors declare that there are no competing interests or conflicts of interest related to this study.

Authors' Contributions

OMU, AAU and AYB conceptualised the study. OMU designed the study. AYB, AAU and OMU participated in the study framework and data collection. AAU, OMU and AYB performed the data analysis. AYB, AAU prepared the first draft of the manuscript, which was reviewed by OMU. All the authors contributed to the development of the final manuscript and approved its submission.

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LIST OF ABBREVIATIONS

KAP: Knowledge, Attitude, and Practices

SLT: Social Learning Theory

TPB: Theory of Planned Behavior

HBM: Health Belief Model

PPE: Personal Protective Equipment

WHO: World Health Organization

CDC: Centers for Disease Control and Prevention

HIV: Human Immunodeficiency Virus

SPSS: Statistical Package for the Social Sciences

FCT: Federal Capital Territory

DOI: Digital Object Identifier

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