NIGERIAN DENTAL JOURNAL
VOLUME 34 NO.2, 2026

Knowledge, Attitude, and Practice of Infection Control among Dental Surgery Technician Students In the University of Benin Teaching Hospital: A Cross-Sectional Study

Ogordi PU[1], Obasuyi SE[2], Obasi CO[2], Nwankwo LD[2], Nton SA[2], Nwachukwu PU[2]
[1]Department of Paedodontics, University of Benin, Nigeria
[2]Department of Community Dentistry, University of Benin, Nigeria
Correspondence: Obasi CO
Email: obasicharles95@gmail.com

ABSTRACT

Background: Effective infection control protocols are imperative in dentistry to mitigate the risk of occupational and cross-infections, particularly among dental surgery technician students during their clinical rotations.
Objective: To assess the knowledge, attitude, and practice of infection control among Dental Surgery Technician students at the University of Benin Teaching Hospital.

Methods: A descriptive cross-sectional study was conducted among Dental Surgery Technician students using convenience sampling. Data were collected from February to May 2025 using a structured, self-administered questionnaire. A total of 112 questionnaires were distributed, and all were returned, giving a response rate of 100%. Information was obtained on sociodemographic characteristics and on knowledge, attitudes, and practices regarding infection control. Knowledge scores were categorized as good, fair, or poor. Associations were assessed using Chi-square tests, with statistical significance set at $p < 0.05$.

Results: The mean age was 21.00 ± 1.98 years, with most participants being female (83.9%) and in the preclinical phase of training (67.9%). Overall, 84.0% of respondents had good knowledge of infection control. Age ($p = 0.007$) and level of study ($p = 0.017$) were significantly associated with knowledge score. Attitudes toward infection control were generally positive, with clinical students demonstrating more favorable attitudes than preclinical students. Clinical students also reported significantly better practices in hand hygiene, glove use, surface disinfection, and sharps disposal ($p < 0.05$). Awareness of hepatitis B vaccination was comparatively low.

Conclusion: Although infection control knowledge, attitudes, and practices were generally satisfactory, targeted interventions—particularly early training and hepatitis B vaccination—are necessary to improve compliance, especially among preclinical students.

Keywords: Infection control; Dental surgery technician students; Knowledge; Attitude; Practice

INTRODUCTION

Infection control is a fundamental aspect of dental practice, providing a crucial framework for safeguarding dental healthcare workers and patients against the spread of infectious diseases. It underpins safe and professional dental care, ensuring a secure environment for everyone involved. Infection control encompasses strategies and techniques designed to prevent or minimize the transmission of infectious diseases, including human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and coronaviruses, to professionals in healthcare facilities.[1] Inadequate control measures can favor the spread of microorganisms that may result in healthcare-associated infections (HAIs).
In recent years, infection control in dental clinics and laboratories has become a major concern due to the perceived risks posed to dental professionals and patients while giving and receiving dental care.[2] Before the 1970s, infection control was not routinely performed in dental laboratories until it became evident that any patient could be a potential source of infection, given that microorganisms could survive on saliva and blood, and thus the transmission of diseases could occur during treatment if preventive measures were not taken.[3]

Standard precautions, according to the Centers for Disease Control and Prevention, constitute "any standard of care designed to protect health care personnel and patients from pathogens that can be spread by blood or any other bodily fluid, excretion, or secretion."[4] These precautions include respiratory hygiene with cough etiquette, hand washing, sharp safety, safe injection practices, sterile instruments and devices, clean and disinfected environmental surfaces, and the use of personal protective equipment (PPE).[5]

Dental surgery technicians are qualified professionals trained in approved health institutions. Their duties include office tasks, assisting in the surgery room, and sterilizing and disinfecting dental equipment. Therefore, adequate knowledge, a positive attitude, and a willingness to practice infection control measures are essential. Studies have shown that there is a high risk of infection transmission among dental laboratory professionals through handling dental impressions and prostheses contaminated with blood and saliva. This area of dentistry has been identified as a source of cross-infection, compounded by poor training and complacency regarding infection control.[6]

While infection control is widely recognized as essential in dental practice, evidence from Nigeria suggests persistent deficiencies in its implementation, particularly among dental laboratory and auxiliary personnel.[6] Existing studies have largely focused on dental technologists and practicing professionals, revealing inadequate compliance with infection

control protocols, the absence of standardized cross-infection policies, and limited institutional enforcement mechanisms.[5,6] Infrastructural limitations, insufficient training, and attitudinal complacency toward infection prevention measures further exacerbate these gaps.

However, there is a significant scarcity of data regarding dental surgery technician students' knowledge of infection prevention and control, despite their important role as future oral healthcare personnel and frontline contributors to maintaining infection control standards within the dental clinical environment. This group is uniquely positioned at the intersection of training and practice, where foundational knowledge, professional attitudes, and behavioral patterns toward infection control are formed. The lack of empirical data on their preparedness raises concerns about whether current training adequately equips them to mitigate infection risks in both clinical and laboratory settings.

Furthermore, to the best of the authors' knowledge, no study has comprehensively compared infection control knowledge, attitudes, and practices between preclinical and clinical dental surgery technician students in Nigeria. Such a comparison is essential to evaluate the effectiveness of clinical exposure and training progression in shaping infection control competence.

Addressing this gap is crucial, as deficiencies at the training stage may translate into long-term professional practices, thereby increasing the risk of healthcare-associated infections. Therefore, this study aimed to assess and compare infection control knowledge, attitudes, and practices among preclinical and clinical dental surgery technician students at the University of Benin Teaching Hospital.

Specifically, the study sought to:

1. Assess the level of knowledge of infection control measures among dental surgery technician students.
2. Evaluate the attitudes of dental surgery technician students toward infection control practices.
3. Determine the extent of compliance with infection-control practices among dental surgery technician students.
4. Compare the knowledge, attitudes, and practices of infection control between preclinical and clinical dental surgery technician students.

METHODS

A cross-sectional study design was carried out at the University of Benin Teaching Hospital among 112 dental surgery technician students. A formal sample size calculation was not performed for this study. Instead, a total population sampling approach was adopted, whereby all eligible dental surgery technician students at both preclinical and clinical levels at the study site were invited to participate. This approach was considered appropriate due to the relatively small and accessible study population. Hence, all enrolled DST students were eligible, but included were those who were available and gave consent between February 3 and May 20, 2025. Students absent on survey days or those who declined were excluded.

Tools for Data Collection

The tool was a structured questionnaire comprising four sections to collect data aligned with the objectives of the study. Section A covered sociodemographic characteristics of the respondents, Section B covered knowledge of infection control, Section C covered attitude toward infection control, and Section D covered practice of infection control.

Scoring System

Composite Knowledge Assessment

Knowledge refers to the extent of accurate information and understanding that dental surgery technician students possess regarding infection control principles, including disease transmission, standard precautions, sterilization, disinfection, and use of personal protective equipment. Operationally, knowledge was measured using responses to a structured questionnaire consisting of true/false items. Each correct response was assigned one point, while incorrect responses received zero points. Total scores were computed and categorized as good, fair, or poor knowledge based on predetermined cut-off values (e.g., ≥75% = good, 50–74% = fair, <50% = poor).

Attitude Toward Infection Control

Attitude refers to the beliefs, perceptions, and dispositions of dental surgery technician students toward infection control practices, including their perceived importance, willingness to comply, and sense of professional responsibility. Operationally, attitude was assessed using a Likert-scale questionnaire (e.g., strongly agree to strongly disagree). Likert responses were categorized as Agree/Strongly Agree (positive attitude) versus others where appropriate.

Practice of Infection Control

Practice refers to the extent to which dental surgery technician students consistently apply recommended infection control measures in clinical and laboratory settings, such as hand hygiene, use of personal protective equipment, instrument sterilization, and proper waste disposal. Operationally, practice was measured using self-reported frequency-based items (e.g., always, often, sometimes, rarely, and never). Responses were collapsed into: Good practice for Always + Often, and Poor practice for Sometimes + Rarely + Never.

The questionnaire used for this study was developed through a systematic multi-step process to ensure content relevance, clarity, and validity. Initially, an extensive review of existing literature on infection control in dental practice was

conducted, including previously validated instruments assessing knowledge, attitudes, and practices (KAP) among dental professionals and students. Relevant domains and items were identified and adapted to suit the context of dental surgery technician students.

The draft questionnaire was structured into four sections:

Section A: Sociodemographic characteristics (e.g., age, sex, level of study).

Section B: Knowledge of infection control (covering disease transmission, standard precautions, sterilization, disinfection, and use of personal protective equipment).

Section C: Attitude toward infection control (assessing perceptions, beliefs, and willingness to comply with recommended practices).

Section D: Practice of infection control (evaluating self-reported adherence to infection control measures).

To establish content validity, the draft instrument was reviewed by experts in dental public health, infection control, and dental technology education. Their feedback led to modifications in item wording, relevance, and coverage to ensure the questionnaire adequately reflected the study objectives.

Pretest

A pre-test (pilot study) was conducted among a small group of dental nursing students at the University of Benin Teaching Hospital to assess clarity, comprehension, and time required for completion. Based on the pilot results, ambiguous questions were revised, and necessary adjustments were made to improve reliability and ease of understanding.

The internal consistency of the attitude and practice sections was assessed using Cronbach's alpha coefficient, with values of ≥ 0.7 considered acceptable for reliability. The final version of the questionnaire was then administered to the study participants.

To reduce the risk of social desirability bias, the questionnaire was administered anonymously, with no collection of personal identifiers. Participants were assured of strict confidentiality and informed that their responses would have no impact on their academic evaluation or standing. This was intended to promote candid and unbiased reporting of their knowledge, attitudes, and practices regarding infection control.

Data Analysis

Data were entered and analyzed using appropriate statistical software (SPSS version 21). Descriptive statistics were computed for all variables, with categorical variables summarized using frequencies and percentages. Associations between categorical variables (e.g., level of study and knowledge, attitude, and practice categories) were assessed using the Chi-square (χ^2) test of independence. However, when the assumptions for the Chi-square test were violated—specifically when expected cell counts were less than 5 in more than 20% of the cells—Fisher's exact test was used as an alternative to ensure the validity of the results. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

Ethical clearance was obtained from the Ethics and Research Committee, University of Benin Teaching Hospital, University of Benin. Verbal informed consent was obtained from respondents after explaining the study purpose, and the confidentiality of the information was assured. Participants were informed that they had the right to withdraw from the interview at any time and that withdrawal would pose no loss or harm to them.

RESULTS

At the commencement of this study, a total of 130 enrollees were eligible for participation. During the data collection period, 112 students were available, consented, and enrolled in the study, and they all completed the study; their data were analyzed [Flow Diagram].

Participant Flow Diagram (STROBE)

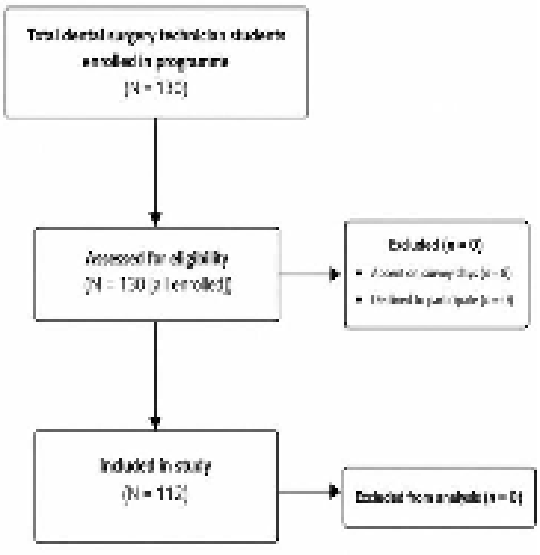

Table 1 outlines the sociodemographic characteristics of the 112 study participants. This amounts to a response rate of 86.6% out of the 130 eligible participants. Most respondents (68, 60.7%) were aged 20–22 years, followed by those aged 23–25 years (19.6%) and those older than 26 years (16.1%). The mean age of the respondents was 21.00 ± 1.98 years. The majority (94, 83.9%) were female, and males comprised 16.1%. In terms of religion, almost all respondents identified as Christian (99.1%), with only one participant (0.9%) identifying as Muslim. Regarding academic level, over two-thirds of the respondents were in the preclinical phase (100–200 level), representing 67.9% of the sample, whereas clinical students (300 level) constituted 32.1%. Concerning marital status, most participants were single (102, 91.1%), while a minority were married (9, 8.0%) or cohabiting (1, 0.9%). Overall, the study population was largely composed of young, single, female, preclinical students, with a predominantly Christian background.

Table 1: Sociodemographic Characteristics of the Study Participants

Variable	Frequency (n=112)	Percent
Age (years)		
17-19 years	4	3.6
20-22 years	68	60.7
23-25 years	22	19.6
>26 years	18	16.1
Mean age ± SD (21.00 ± 1.98)		
Sex		
Male	18	16.1
Female	94	83.9
Religion		
Christian	111	99.1
Islam	1	0.9
Level		
100 & 200 [preclinical]	76	67.9
300 [clinical]	36	32.1
Marital Status		
Single	102	91.1
Married	9	8.0
Cohabiting	1	0.9

Table 2 summarizes the respondents' knowledge of infection control measures. Overall, the findings demonstrate a generally high level of knowledge across most domains assessed.

A large majority of participants (91.1%) reported knowledge of standard precautionary measures, while 84.8% recognized the importance of hand washing after patient contact. Similarly, 89.3% were aware of the use of alcohol-based hand rubs, and 79.5% reported adherence to recommended hand hygiene practices. Knowledge of washing hands with soap and water was particularly high, with 93.7% responding affirmatively.

Knowledge relating to personal protective equipment (PPE) was also substantial. While 65.2% demonstrated general knowledge of PPE use, almost all respondents acknowledged the importance of always wearing gloves (96.4%) and regularly changing gloves (92.9%). Awareness of the need to use surgical masks when indicated (97.3%) and to wear gowns or aprons (90.2%) was likewise high. However, knowledge regarding the removal of PPE before leaving the patient area was comparatively lower, with only 61.6% responding correctly. Most respondents recognized potential sources and routes of infection within the clinical environment. Three-quarters (75.0%) identified stationary items and telephones in wards as potential sources of infection. In addition, 89.3% knew that linen from infected patients should be placed in designated linen bags, and 85.7% were aware of the need to segregate clinical and surgical waste. Knowledge of correct disposal of used ampoules and injections was reported by 84.8% of respondents.

Regarding sharps and injury prevention, 63.4% correctly identified needle recapping as inappropriate, while 81.2% knew that puncture injuries should be reported. Furthermore, 83.9% were aware of the use of puncture-proof containers for the disposal of sharp objects.Infection prevention and control measures related to patients were also well recognized. Most respondents acknowledged the need to place a mask on coughing patients (90.2%) and to use proper disposal systems in the clinic (90.2%). Knowledge of cross-infection was reported by 75.9% of participants.

Conversely, knowledge regarding hepatitis B vaccination was relatively low, with only 39.3% reporting awareness, compared with 60.7% who were not aware. Nonetheless, most respondents correctly identified blood, sexual contact, and saliva as routes of transmission for hepatitis B and C viruses (95.5%).

In summary, respondents demonstrated good overall knowledge of infection control practices, although gaps were identified in specific areas, particularly hepatitis B vaccination and certain aspects of PPE handling and sharps safety.

Table 2: Knowledge of Infection Control

Variable	Frequency	Percent
Use of Standard Precautionary Measures		
Yes	102	91.1
No	10	8.9
Hand Washing After Contact		
Yes	95	84.8
No	17	15.2
Use of Alcohol-based Rubs		
Yes	100	89.3
No	12	10.7
Adherence to Hand Hygiene		
Yes	89	79.5
No	23	20.5
Washing Hands with Soap and Water		
Yes	105	93.7
No	7	6.3
PPE		
Yes	73	65.2
No	39	34.8
Wearing Gloves Always		
Yes	108	96.4
No	4	3.6
Regular Changing of Gloves		
Yes	104	92.9
No	8	7.1
Use of Surgical Masks When Necessary		
Yes	109	97.3
No	3	2.7
Use of Gown or Aprons		
Yes	101	90.2
No	11	9.8
Removal of PPE Before Leaving Patients		
Yes	69	61.6
No	43	38.4

Stationary/Telephones in Wards are Sources of Infection		
Yes	84	75.0
No	28	25.0
Linen from an Infected Patient Should be Put in Linen Bag		
Yes	100	89.3
No	12	10.7
Segregation of Clinical and Surgical Waste		
Yes	96	85.7
No	16	14.3
Disposal of Used Ampoules and Injection Materials		
Yes	95	84.8
No	17	15.2
Recapping of Needles is Inappropriate		
Yes	71	63.4
No	41	36.6
Puncture Injury Should be Reported		
Yes	91	81.2
No	21	18.8
Disposal of Sharp Objects with Puncture-Proof Containers		
Yes	94	83.9
No	18	16.1
Placement of Mask on Coughing Patient		
Yes	101	90.2
No	11	9.8
Vaccination for Hepatitis B		
Yes	44	39.3
No	68	60.7
Use of Proper Disposal System in Clinic		
Yes	101	90.2
No	11	9.8
Knowledge of Cross Infection		
Yes	85	75.9
No	27	24.1
Wearing of Clinical Scrub Every Time		
Yes	106	94.6
No	6	5.4
Aware that HBV and HCV Can Be Transmitted via Blood, Sexual Contact, and Saliva		
Yes	107	95.5
No	5	4.5

Figure 1 shows the summary of knowledge of infection control among the participants; ninety-four (84.0%) had good knowledge, and thirteen (12%) had fair knowledge of infection control, respectively.

Figure 1: Knowledge Score for Infection Control (n=112)

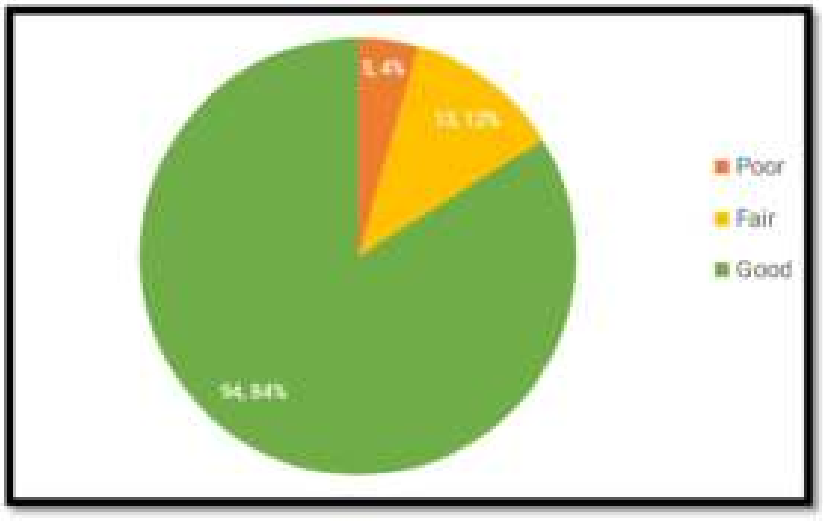

Figure 2 shows the practice of infection control, with sixty-three (83%) of respondents in the preclinical class having good practices of infection control, while thirty-one (86%) of respondents in the clinical class had good practices of infection control.

Figure 2: Practice of Infection Control by Level of Study

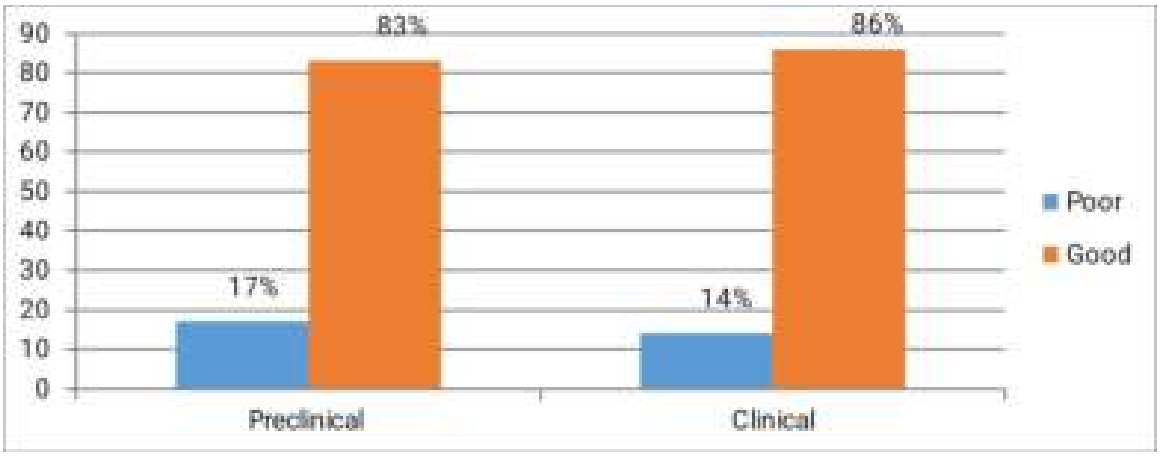

Table 3 presents the cross-tabulation of respondents' sociodemographic characteristics with their knowledge scores, categorized as good, fair, and poor. Knowledge of infection control was generally high among respondents. There was a statistically significant association between age and knowledge level ($\chi^2 = 11.997$, $p = 0.007$), with the proportion of good knowledge increasing across age groups—from 75.0% (95% CI: 30.1–95.4) among those aged 17–19 years to 88.9% (95% CI: 67.2–96.9) among those older than 26 years.

Although a higher proportion of females (75.5%; 95% CI: 65.8–83.2) had good knowledge compared to males (55.6%; 95% CI: 33.7–75.4), this difference was not statistically significant ($\chi^2 = 1.862$, $p = 0.290$). There was no significant association between religion and knowledge level (Fisher's exact $p = 1.000$). Most respondents were Christians, among whom 78.4% (95% CI: 69.9–85.0) demonstrated good knowledge.

Level of study was significantly associated with knowledge ($\chi^2 = 8.588$, $p = 0.017$), with a higher proportion of good knowledge among clinical students (91.7%; 95% CI: 78.2–97.1) compared to preclinical students (84.2%; 95% CI: 74.5–90.7). Although all married respondents demonstrated good knowledge (100.0%; 95% CI: 70.1–100.0), the association between marital status and knowledge was not statistically significant (Fisher's exact $p = 0.051$).

Confidence intervals were notably wide in subgroups with small sample sizes, indicating limited precision of these estimates.

Table 3: Knowledge Score by Sociodemographic Characteristics with 95% CI

Sociodemographics	Good N (%) [95% CI]	Fair N (%) [95% CI]	Poor N (%) [95% CI]	Test used	Test statistic	p-Value
Age of respondents				Chi-square	11.997	0.007*
17–19 years (n=4)	3 (75.0%) [30.1–95.4]	1 (25.0%) [4.6–69.9]	0 (0.0%) [0.0–49.0]			
20–22 years (n=68)	55 (80.9%) [70.0–88.6]	8 (11.8%) [6.1–21.5]	5 (7.4%) [3.2–16.1]			
23–25 years (n=22)	19 (86.4%) [67.4–95.5]	2 (9.1%) [2.5–27.8]	1 (4.5%) [0.8–21.8]			
>26 years (n=18)	16 (88.9%) [67.2–96.9]	1 (5.6%) [1.0–25.8]	1 (5.6%) [1.0–25.8]			
Sex				Chi-square	1.862	0.290
Male (n=18)	10 (55.6%) [33.7–75.4]	4 (22.2%) [9.0–45.2]	4 (22.2%) [9.0–45.2]			
Female (n=94)	71 (75.5%) [65.8–83.2]	20 (21.3%) [14.2–30.8]	3 (3.2%) [1.1–8.9]			
Religion				Fisher's exact	–	1.000

Christian (n=111)	87 (78.4%) [69.9–85.0]	8 (7.2%) [3.7–13.6]	16 (14.4%) [9.1–22.1]			
Muslim (n=1)	0 (0.0%) [0.0–79.3]	1 (100.0%) [20.7–100.0]	0 (0.0%) [0.0–79.3]			
Level				Chi-square	8.588	0.017*
100 & 200 (n=76)	64 (84.2%) [74.5–90.7]	7 (9.2%) [4.5–17.8]	5 (6.6%) [2.9–14.5]			
300 (n=36)	33 (91.7%) [78.2–97.1]	2 (5.6%) [1.5–18.1]	1 (2.8%) [0.5–14.2]			
Marital Status				Fisher's exact	–	0.051
Single (n=102)	80 (78.4%) [69.5–85.3]	17 (16.7%) [10.7–25.0]	5 (4.9%) [2.1–11.0]			
Married (n=9)	9 (100.0%) [70.1–100.0]	0 (0.0%) [0.0–29.9]	0 (0.0%) [0.0–29.9]			
Cohabiting (n=1)	0 (0.0%) [0.0–79.3]	0 (0.0%) [0.0–79.3]	1 (100.0%) [20.7–100.0]			

Table 4 shows that the attitude of dental surgery technician students toward infection control was assessed by comparing preclinical and clinical students across three domains: perceived susceptibility to blood-borne infections, willingness to treat infected patients, and attitudes toward infection control measures.

Students demonstrated a consistently high perceived susceptibility to HBV and HCV across both preclinical and clinical groups, with no statistically significant differences observed (HBV: $p = 0.98$; HCV: $p = 0.72$). In both cohorts, over 80–90% of respondents reported high or moderate susceptibility, indicating a strong baseline awareness of blood-borne infection risks. In contrast, perceived susceptibility to HIV differed significantly between groups ($p < 0.001$), with preclinical students more likely to report higher perceived risk, while clinical students more frequently indicated lower perceived susceptibility. This pattern suggests that clinical exposure may reduce perceived vulnerability, potentially reflecting increased confidence in infection control measures or a degree of risk desensitization.

Willingness to treat infected patients varied by disease type. A significant difference was observed for HBV ($p = 0.033$), with clinical students more likely to refuse care, reflecting heightened fear or perceived occupational risk despite adequate knowledge. No significant differences were found for HCV ($p = 0.127$) and HIV ($p = 0.852$), with both groups demonstrating generally high willingness to treat HIV-infected patients (>80%). Overall, HBV emerged as the most feared infection, exerting the greatest influence on clinical decision-making compared with HIV and HCV.

Across infection control attitudes, clinical students generally demonstrated stronger alignment with recommended practices, with significant differences observed in glove use ($p < 0.001$), hand hygiene ($p < 0.001$), use of new gloves per patient ($p = 0.040$), HBV vaccination before clinical posting ($p = 0.040$), new anesthetic needle use ($p < 0.001$), and new mask use per patient ($p < 0.001$). In these domains, clinical students tended to show more measured or neutral response patterns compared with stronger categorical agreement among preclinical students, suggesting a transition from theoretical certainty to context-informed practice. However, no significant differences were observed for routine mask use ($p = 0.571$) and anesthetic cartridge replacement ($p = 0.913$), indicating uniform adherence and strong institutional standardization in these practices.

Table 4: Perception, Willingness, and Attitude toward Infection Control by Level of Study (with 95% CI)

Perceived Susceptibility (Risk Awareness)

Questions	Options	Preclinical (n=76) n (%) [95% CI]	Clinical (n=36) n (%) [95% CI]	p- value
Susceptibility to HBV	Highly expected	65 (85.5%) [75.7–91.9]	30 (83.3%) [67.2–92.7]	0.98
	Expected	10 (13.2%) [7.3–22.6]	5 (13.9%) [6.1–28.7]	
	Not very much expected	1 (1.3%) [0.2–7.1]	1 (2.8%) [0.5–14.2]	
	Never expected	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	
Susceptibility to HCV	Highly expected	8 (10.5%) [5.3–19.4]	3 (8.3%) [2.9–21.8]	0.72
	Expected	68 (89.5%) [80.6–94.7]	33 (91.7%) [78.2–97.1]	
	Not very much expected	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	
	Never expected	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	

Susceptibility to HIV	Highly expected	21 (27.6%) [18.9–38.5]	3 (8.3%) [2.9–21.8]	<0.001
	Expected	15 (19.7%) [12.1–30.2]	2 (5.6%) [1.5–18.1]	
	Not very much expected	32 (42.1%) [31.6–53.4]	30 (83.3%) [67.2–92.7]	
	Never expected	6 (7.9%) [3.7–16.2]	1 (2.8%) [0.5–14.2]	

Willingness to Treat Infected Patients (Behavioral Intention)

Questions	Options	Preclinical (n=76) n (%) [95% CI]]	Clinical (n=36) n (%) [95% CI]]	p- value
Attend to HBV patient	Yes	10 (13.6%) [7.6–23.3]	1 (2.8%) [0.5–14.2]	0.033*
	Some concern	6 (7.9%) [3.7–16.2]	0 (0.0%) [0.0–9.7]	
	A lot of concern	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	
	No	60 (78.9%) [67.7–86.9]	35 (97.2%) [85.8–99.5]	
Attend to HCV patient	Yes	60 (78.9%) [67.7–86.9]	35 (97.2%) [85.8–99.5]	0.127
	Some concern	10 (13.2%) [7.3–22.6]	1 (2.8%) [0.5–14.2]	
	A lot of concern	6 (7.9%) [3.7–16.2]	0 (0.0%) [0.0–9.7]	
	No	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	
Attend to HIV patient	Yes	65 (85.5%) [75.7–91.9]	30 (83.3%) [67.2–92.7]	0.852
	Some concern	10 (13.2%) [7.3–22.6]	5 (13.9%) [6.1–28.7]	
	A lot of concern	1 (1.3%) [0.2–7.1]	1 (2.8%) [0.5–14.2]	
	No	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	

Infection Control Attitudes

Questions	Options	Preclinical (n=76) n (%) [95% CI]]	Clinical (n=36) n (%) [95% CI]]	p-value
Use gloves when treating patient	Strongly agree	21 (27.6%) [18.9–38.5]	3 (8.3%) [2.9–21.8]	<0.001*
	Agree	15 (19.7%) [12.1–30.2]	2 (5.6%) [1.5–18.1]	
	Neutral	32 (42.1%) [31.6–53.4]	30 (83.3%) [67.2–92.7]	
	Disagree	6 (7.9%) [3.7–16.2]	1 (2.8%) [0.5–14.2]	
	Strongly disagree	2 (2.6%) [0.7–9.0]	0 (0.0%) [0.0–9.7]	
Use new gloves for each patient	Strongly agree	60 (78.9%) [67.7–86.9]	35 (97.2%) [85.8–99.5]	0.040*
	Agree	10 (13.2%) [7.3–22.6]	1 (2.8%) [0.5–14.2]	
	Neutral	6 (7.9%) [3.7–16.2]	0 (0.0%) [0.0–9.7]	
	Disagree	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	
	Strongly disagree	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	
Use hand sanitizer after each patient	Strongly agree	32 (42.1%) [31.6–53.4]	30 (83.3%) [67.2–92.7]	<0.001*
	Agree	21 (27.6%) [18.9–38.5]	3 (8.3%) [2.9–21.8]	
	Neutral	15 (19.7%) [12.1–30.2]	2 (5.6%) [1.5–18.1]	
	Disagree	6 (7.9%) [3.7–16.2]	1 (2.8%) [0.5–14.2]	
	Strongly disagree	2 (2.6%) [0.7–9.0]	0 (0.0%) [0.0–9.7]	
Use a mask when treating patient	Strongly agree	57 (75.0%) [64.1–83.5]	30 (83.3%) [67.2–92.7]	0.571
	Agree	16 (21.1%) [13.1–32.3]	6 (16.7%) [7.8–32.8]	
	Neutral	2 (2.6%) [0.7–9.0]	0 (0.0%) [0.0–9.7]	
	Disagree	1 (1.3%) [0.2–7.1]	0 (0.0%) [0.0–9.7]	
	Strongly disagree	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	
Use a new mask for each patient	Strongly agree	21 (27.6%) [18.9–38.5]	3 (8.3%) [2.9–21.8]	<0.001*
	Agree	15 (19.7%) [12.1–30.2]	2 (5.6%) [1.5–18.1]	
	Neutral	32 (42.1%) [31.6–53.4]	30 (83.3%) [67.2–92.7]	

	Disagree	6 (7.9%) [3.7–16.2]	1 (2.8%) [0.5–14.2]	
	Strongly disagree	2 (2.6%) [0.7–9.0]	0 (0.0%) [0.0–9.7]	
HBV vaccination before clinical posting	Strongly agree	60 (78.9%) [67.7–86.9]	35 (97.2%) [85.8–99.5]	0.040*
	Agree	10 (13.2%) [7.3–22.6]	1 (2.8%) [0.5–14.2]	
	Neutral	6 (7.9%) [3.7–16.2]	0 (0.0%) [0.0–9.7]	
	Disagree	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	
	Strongly disagree	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	
Use a new anesthetic needle for each patient	Strongly agree	21 (27.6%) [18.9–38.5]	3 (8.3%) [2.9–21.8]	<0.001*
	Agree	15 (19.7%) [12.1–30.2]	2 (5.6%) [1.5–18.1]	
	Neutral	32 (42.1%) [31.6–53.4]	30 (83.3%) [67.2–92.7]	
	Disagree	6 (7.9%) [3.7–16.2]	1 (2.8%) [0.5–14.2]	
	Strongly disagree	2 (2.6%) [0.7–9.0]	0 (0.0%) [0.0–9.7]	
Use a new anesthetic cartridge for each patient	Strongly agree	65 (85.5%) [75.7–91.9]	30 (83.3%) [67.2–92.7]	0.913
	Agree	10 (13.2%) [7.3–22.6]	5 (13.9%) [6.1–28.7]	
	Neutral	1 (1.3%) [0.2–7.1]	1 (2.8%) [0.5–14.2]	
	Disagree	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	
	Strongly disagree	0 (0.0%) [0.0–4.8]	0 (0.0%) [0.0–9.7]	

The practice of infection control among dental surgery technician students is summarized in Table 5, comparing preclinical and clinical students across domains of self-protection, instrument sterilization, local anesthesia practice, and waste disposal.

Self-protection practices: Clinical students demonstrated significantly better compliance with handwashing using soap and water, with 91.6% reporting good practice compared with 69.7% of preclinical students ($\chi^2 = 4.45$, $p = 0.035$). A similarly high level of compliance was observed for alcohol-based hand sanitizer use, although the difference between groups was not statistically significant ($p = 0.251$).

Use of new gloves showed a statistically significant difference between groups, with clinical students demonstrating lower but more appropriate classification in the "good practice" category compared with preclinical students (47.3% vs. 13.9%; $\chi^2 = 12.45$, $p = 0.002$). Although higher proportions of clinical students reported consistent use of new masks (91.6% vs. 69.7%), this difference was not statistically significant ($p = 0.235$). Similarly, use of eye protection and special gowns/aprons was higher among clinical students but did not reach statistical significance ($p = 0.069$ and $p = 0.099$, respectively).

Instrument sterilization practices: Both groups demonstrated generally good compliance with sterilization practices. Disinfection of impressions was low in both groups (14.5% vs. 16.7%), with no significant difference observed ($p = 0.834$). However, disinfection of treatment surfaces was significantly higher among clinical students (91.6%) compared with preclinical students (69.7%) ($\chi^2 = 9.78$, $p = 0.002$). Sterilization of burs and endodontic files showed higher compliance among clinical students, although these differences were not statistically significant ($p > 0.05$).

Local anesthesia practices: Clinical students demonstrated significantly better practice regarding the use of new anesthetic agents (97.2% vs. 63.2%; $\chi^2 = 6.84$, $p = 0.009$) and new anesthetic needles (91.6% vs. 69.7%; $\chi^2 = 4.12$, $p = 0.042$). Use of new anesthetic cartridges was lower in clinical students compared with preclinical students, but this difference was not statistically significant ($p = 0.734$).

Waste disposal practices: Waste management practices were generally high in both groups. Disposal of saliva ejectors was significantly better among clinical students (100.0% vs. 96.1%; $\chi^2 = 8.31$, $p = 0.004$). Similarly, sharps disposal showed a statistically significant difference in favor of clinical students (100.0% vs. 98.7%; $\chi^2 = 4.56$, $p = 0.033$). No significant difference was observed in biological waste disposal, with both groups demonstrating near-universal compliance ($p = 0.694$).

Overall, clinical students demonstrated significantly better infection control practices in key areas including hand hygiene, glove use, surface disinfection, local anesthesia safety practices, and waste disposal. However, both groups showed generally high levels of compliance, indicating satisfactory adherence to infection prevention protocols with progressive improvement as clinical exposure increases.

Table 5: Practice of Infection Control

Domain	Variable (Good practice)	Preclinical n (%)	Clinical n (%)	Test (χ^2)	p- value
Self-protection	Handwashing with soap (Always/Often)	53 (69.7)	33 (91.6)	4.45	0.035*
	Alcohol-based hand sanitizer	73 (96.1)	36 (100.0)	1.32	0.251
	Use of new gloves	36 (47.3)	5 (13.9)	12.45	0.002*
	Use of new mask	53 (69.7)	33 (91.6)	1.42	0.235
	Eye protection	73 (96.1)	36 (100.0)	3.31	0.069
	Special gown/apron	36 (47.3)	5 (13.9)	2.72	0.099
Instrument sterilization	Disinfection of impressions	11 (14.5)	6 (16.7)	0.07	0.834
	Disinfection of surfaces	53 (69.7)	33 (91.6)	9.78	0.002*
	Sterilized burs use	53 (69.7)	33 (91.6)	3.06	0.080
	Sterilized endodontic files	73 (96.1)	36 (100.0)	1.42	0.235
Local anesthesia practice	New anesthetic use	48 (63.2)	35 (97.2)	6.84	0.009*
	New anesthetic needle	53 (69.7)	33 (91.6)	4.12	0.042*
	New anesthetic cartridge	36 (47.3)	5 (13.9)	0.11	0.734
Waste disposal	Disposal of saliva ejector	73 (96.1)	36 (100.0)	8.31	0.004*
	Sharps disposal	75 (98.7)	36 (100.0)	4.56	0.033*
	Biological waste disposal	75 (98.7)	36 (100.0)	0.15	0.694

DISCUSSION

Findings: Healthcare professionals are susceptible to infectious diseases in the workplace. However, there is a paucity of data on the knowledge, attitudes, and practices related to infection control among dental surgery technician students. This study aimed to address this gap. The sociodemographic profile showed that the majority were young adult females in preclinical years, a pattern consistent with other healthcare student populations, in which young adults predominate and female representation is often higher in allied health programs.[8,9] As frontline implementers of sterilization, instrument handling, and patient support, their knowledge and practices directly influence patient and staff safety.

This study revealed that overall knowledge of infection control was high (84.0% good knowledge), with significant associations between knowledge and both age and level of study. Similar patterns of adequate knowledge among dental students have been reported in previous studies, suggesting a generally strong foundational understanding of infection prevention in dental education settings.[10,11] Despite this, notable gaps were identified in specific areas such as hepatitis B vaccination awareness, proper PPE removal, and sharps safety practices.

Infection control attitudes showed multiple significant differences. Clinical students demonstrated stronger adherence to key practices such as the use of new gloves, hand sanitization after each patient, and HBV vaccination before clinical exposure. However, some infection control measures, such as mask use and use of new anesthetic cartridges, did not differ significantly between the groups. Notably, preclinical students exhibited higher levels of neutrality across several items, suggesting uncertainty or limited practical exposure. These patterns are consistent with previous studies reporting improved infection control compliance with increasing clinical exposure.[9,10]

With respect to practice, clinical students demonstrated superior infection control practices compared with preclinical students, particularly in areas such as hand hygiene, surface disinfection, safe administration of local anesthesia, and waste disposal, with several of these differences attaining statistical significance.

This trend is consistent with previous studies showing that clinical exposure improves adherence to standard infection control precautions.[10,12] However, preclinical students reported higher use of new gloves, an unexpected finding that may reflect reporting bias or limited clinical experience. Similar inconsistencies between reported and actual practice have been documented in self-reported infection control studies.[13] Overall, while compliance was high for certain practices, such as the use of hand sanitizer and waste disposal, in both groups, clinical training appeared to improve consistency and adherence to key infection control measures, in line with established infection prevention guidelines.[14,15]

The high level of knowledge observed among respondents may reflect adequate theoretical exposure to infection control principles within the training curriculum. Nevertheless, the continued deficiencies observed in critical areas such as hepatitis B vaccination uptake and safe sharps handling indicate that the level of knowledge remains inconsistent and insufficiently comprehensive. While knowledge of the risk of infection appears adequate across both groups, inconsistencies in perceived susceptibility, particularly for HIV, indicate that increased training may alter risk perception, sometimes leading to reduced perceived vulnerability.[16]

The reluctance to treat HBV-infected patients, especially among clinical students, highlights a gap between knowledge and clinical behavior, suggesting that fear of infection and possible stigma persist despite formal education. Similar trends have been reported in studies among dental students and practitioners in developing settings.[17]

Implications: Clinical exposure appears to significantly enhance adherence to infection control practices, particularly in critical areas such as hand hygiene, surface disinfection, and safe anesthetic procedures, a trend widely reported in dental education literature.[10],[11] The inconsistencies observed, especially the unexpectedly higher glove use reported by preclinical students, suggest gaps between theoretical knowledge and actual clinical practice, as well as the possibility of reporting bias, which is a recognized limitation in self-reported infection control studies.[15] Overall, while institutional protocols for waste disposal appear effective across both groups, the findings highlight the need to better integrate practical training with early theoretical instruction to ensure consistent and accurate infection control practices, in line with established infection prevention guidelines.[14],[15]

Trade-Offs (Limitations): Although the study provides valuable insights, certain limitations must be considered. The relatively smaller number of clinical students compared to preclinical students may affect the balance of comparisons and reduce statistical power. Additionally, the use of self-reported measures introduces the possibility of social desirability bias, where respondents may overstate positive attitudes toward infection control. There is also a trade-off between breadth and depth, as the structured questionnaire captures general trends but may not fully explore underlying reasons for attitudes such as fear or reluctance.

Take-Home (Conclusion): Overall, participants demonstrate strong knowledge and generally positive infection control practices. However, clinical exposure appears to refine attitudes, sometimes improving adherence to protocols while simultaneously influencing risk perception and willingness to treat specific infections, particularly HBV. The findings indicate that while awareness of infection risks is high, attitudes and behavioral intentions are not entirely consistent across training levels or infection types. Clinical training improves adherence to infection control practices but does not fully eliminate fear-related reluctance, particularly toward HBV patients. Bridging the gap between knowledge and practice requires not only technical training but also addressing psychological and attitudinal factors influencing clinical decision-making, as highlighted in infection control literature.[14] Clinical training appears to play a crucial role in improving practical adherence to infection control measures, particularly in high-risk procedures such as local anesthesia and surface disinfection. However, inconsistencies between knowledge and reported practice, especially among preclinical students, highlight the need for early practical exposure and clearer instruction. Ensuring consistency across all aspects of infection control is essential for patient and practitioner safety.

Expectations for Future Research: Future studies should include larger multi-center populations and longitudinal designs to better evaluate changes in infection control knowledge, attitudes, and practices over time. Observational studies assessing actual compliance with infection control measures are also recommended, alongside research exploring barriers to hepatitis B vaccination uptake and adherence to sharps safety protocols among dental auxiliary personnel.

Recommendations

Mandatory Vaccination: The school should make HBV vaccination a prerequisite for entering the clinical phase (300 Level).

Sharps Protocol: Given that 36.6% still think needle recapping is appropriate, a hands-on "Sharps Safety" workshop should be implemented before students begin clinical rotations.

Funding: Nil
Conflicts of interest: None declared

REFERENCES

1. Araujo MW, Andreana S. Risk and prevention of transmission of infectious diseases in dentistry. Quintessence Int. 2002; 33(5):376-382.

2. Kilimo CS, Simiyu NB. Infection Control Mechanisms Employed by Dental Laboratories to Prevent Infection of their Dental Technicians/Technologists. J Oral Health Craniofac Sci. 2016; 1: 001-011

3. Centers for Disease Control and Prevention. Guidelines for infection control in dental health-care settings—2003. MMWR Recomm Rep. 2003;52(RR-17):1–61.

4. Boyce R, Mull J. Complying with the occupational safety and health administration: Guidelines for the dental office. Dent Clin North Am. 2008; 52:653–68.

5. Ajantha H, Kumar B. Infection control in the dental office-A review. Indian Journal of Dental Advancements. 2011;3(03):577–82

6. Azodo, CC, Odai CD, Akinboboye, B. Infection control in Dental laboratories: A survey of Nigerian dental technology students. Egyptian Medical Journal.2012; 11(1&2): 37-42

7. Osoba M, Olulaja O, Oyadiran O. Knowledge, Attitude and Practice of Standard Precautions amongst Allied Oral Healthcare Personnel in Lagos State. J Oral Health. 2021; 2(1) : 20-28

8. Olubiyi AO, Oladipo OO, Adegboye OA. Sociodemographic characteristics of healthcare students in Nigeria: Implications for training. Niger J Clin Pract. 2019; 22(5):678–84.

9. Chrcanovic BR, Albrektsson T, Wennerberg A. Gender and age distribution in dental students: Trends and implications. Int J Dent. 2015; 2015:123–31.

10. Askarian M, Mirzaei K, Assadian O. Knowledge, attitude and practice of standard isolation precautions among Iranian healthcare workers: A cross-sectional study. Archives of Iranian Medicine. 2004; 7(3), 174–177.

11. Singh A, Purohit BM, Bhambal A, Saxena S, Singh A, Gupta A. Knowledge, attitudes, and practice regarding infection control measures among dental students in Central India. J Dent Educ. 2011; 75(3):421–427.

12. ALOsaimi MM, Almeslet AS, Wisali QMAL. Knowledge, Attitude, and Practice of Infection Control among Dental Healthcare Personnel: The Updated Guidelines for COVID-19 in Dental Settings. J Contemp Dent Pract 2022;23(11):1150–1156.

13. Al-Omari MA, Al-Dwairi ZN. Compliance with infection control programmes in dental clinics. J Dent Educ. 2005;69(6):693–698

14. Centers for Disease Control and Prevention (CDC). Guidelines for infection control in dental health-care settings—2003. MMWR Recomm Rep. 2003; 52(RR-17):1–61.

15. World Health Organization (WHO). Guidelines on core components of infection prevention and control programmes. Geneva: WHO; 2016.

16. Champion VL, Skinner CS. The Health Belief Model. In: Glanz K, Rimer BK, Viswanath K, editors. Health Behavior and Health Education. 4th ed. San Francisco: Jossey-Bass; 2008. p. 45–65

17. Sadeghi M, Hakimi H. Iranian dental students' knowledge of and attitudes towards HIV/AIDS patients. J Dent Educ. 2009; 73(6):740–745.