Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 13, (2024)
https://www.jneonatalsurg.com

OPEN ACCESS

Knowledge, Attitudes, and Practices Regarding Infection Prevention and Control Among Dental Students in Saudi Arabia: A Cross-Sectional Study

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Cite this paper as: Alhussain Daghriri, Turki Almuraikhi, Waleed Alhawiti, Falah Alshammari, Hamdan Alamri, (2024) Knowledge, Attitudes, and Practices Regarding Infection Prevention and Control Among Dental Students in Saudi Arabia: A Cross-Sectional Study. *Journal of Neonatal Surgery*, 13, 1159-1164.

ABSTRACT

Background: Infection prevention and control (IPC) is vital in dental settings due to high risk of exposure to bloodborne pathogens and other infectious agents. Dental health care professionals (DHCPs), particularly trained students, must possess adequate knowledge, attitudes, and practices (KAPs) to ensure safe and effective clinical care.

Methods: A cross-sectional questionnaire-based study was conducted among dental students in Saudi Arabia. The validated questionnaire assessed five domains: demographic data and PPE usage; knowledge and attitudes toward chronic viral infections (HBV, HCV, and HIV); occupational exposure and postexposure prophylaxis (PEP); vaccination and screening for bloodborne viruses and clinical readiness. Descriptive statistics, Z-score tests, and Kendall's Tau-b correlation were used for analysis, with significance set at $p < 0.05$.

Results: A total of 101 students, predominantly females (88.1%), participated. Interns constituted the largest group (43.6%). Most participants (81.2%) were actively involved in clinical care. High to very high perceived occupational risk was reported for HBV (64.3%), HCV (64.4%), and HIV (61.4%). While more than half of the students expressed a willingness to perform all dental procedures on infected patients (HBV: 56.4%, HCV: 53.5%, HIV: 50.5%), a considerable proportion preferred limiting procedures to those involving minimal hemorrhage. Enhanced infection control measures were strongly supported, although misconceptions persisted—particularly the belief among 37.6% of students that HCV is vaccine preventable. Students with less clinical exposure demonstrated greater anxiety and reluctance in treating infected patients.

Conclusion: Dental students generally demonstrated positive attitudes toward awareness of infection control, but notable gaps remain in risk perceptions and knowledge about vaccine-preventable diseases. Curriculum enhancements focused on IPC training, ethical considerations, and hands-on clinical preparedness are recommended to address these deficiencies.

1. INTRODUCTION

Knowledge, attitudes, and practices (KAPs) interact to affect how individuals address situations or perform activities. Understanding this process is essential for implementing effective infection control and ensuring patient safety in dental care (1). Given that infections pose significant hazards that might result in disease and mortality, the enforcement of rigorous infection control measures is essential in many environments to mitigate these risks (2).

The dental clinic is a setting conducive to the facile spread of disease (3). The prevention of cross-infection in dental clinics is a vital component of dental practice, necessitating that dental clinic personnel implement specific fundamental protocols during their work (4). Dental health care professionals (DHCPs) are susceptible to infections from numerous microbes, including *Mycobacterium tuberculosis*, hepatitis B and C viruses, staphylococci, streptococci, herpes simplex virus type 1, human immunodeficiency virus (HIV), mumps, influenza, and rubella (5).

University education is regarded as a very reliable source of information for dental practitioners globally. Considering its importance, it is crucial to assess the degree to which undergraduate students acquire the requisite knowledge for dental practice while also cultivating favorable knowledge, attitudes, and practices (KAPs), as well as essential metacompetences that transcend specific dental specialities (6). Consequently, precise infection prevention and control (IPC) protocols and regulations have been instituted, bolstered by guidelines and training that underscore compliance with standard precautions, appropriate utilization of personal protective equipment (PPE), and efficient biological risk management measures. This

includes preexposure prophylaxis via vaccination and immediate postexposure measures to reduce hazards in instances of accidental exposure. For these strategies to be efficacious, they must be comprehensively understood, regularly implemented, and incorporated into standard dental practice (7).

The growing focus on improving students' readiness underscores the necessity of evaluating their proficiency in IPC-related domains to guarantee their ability to effectively use infection control measures in practical environments (8). This study seeks to assess dentistry students' self-assessed risk of infectious illnesses and their knowledge, attitudes, and practices related to infection prevention. Through the analysis of these parameters, we want to pinpoint critical areas for enhancement in IPC education, emphasizing the fortification of multidisciplinary metacompetences that promote safer and more effective dental practices. Comprehending students' viewpoints regarding their readiness and risk awareness might inform adjustments in curriculum development and training techniques to improve their capacity to avoid and manage infections successfully throughout their careers.

2. METHODOLOGY

This cross-sectional study was performed in Saudi Arabia, aiming to evaluate the knowledge, attitudes, and behaviors (KAP) concerning infection control methods in standard dentistry practice. The study was carried out in compliance with ethical standards, with the principles described in the Helsinki Declaration ensuring the research process's integrity. Before taking part in the study, all participants were made aware of its aim and gave their permission to participate.

A standardized questionnaire was developed to evaluate multiple aspects of infection prevention procedures in dental environments. The instrument was structured into five principal pieces:

1. **Informed Consent**: Participants received a comprehensive overview of the study and were given the opportunity to provide informed consent or withdraw from the study without repercussions.
2. **Demographic Information and Use of Personal Protective Equipment (PPE)**: This section collected demographic data and assessed participants' awareness, prior training, and utilization patterns of PPE. The items included surgical masks, filtering facepiece respirators (FFPs), both nonsterile and sterile surgical gloves, safety goggles, face shields, surgical caps, and disposable gowns. Hand hygiene practices were evaluated.
3. **Knowledge and Attitudes Toward Chronic Viral Infections**: This section examined participants' comprehension of and perspectives on chronic illnesses, including hepatitis B (HBV), hepatitis C (HCV), and human immunodeficiency virus (HIV). The survey encompassed enquiries regarding previous experience with patients diagnosed with these infections, self-assessed occupational risk, and readiness to deliver care to afflicted individuals.
4. **Occupational Exposure and Post-Exposure Prophylaxis (PEP)**: Participants were asked about their history of accidental occupational exposure, the availability and use of PEP, and whether testing of the source patient occurred after exposure.
5. **Vaccination and Screening for Bloodborne Viruses**: This part gathered self-reported data concerning vaccination status, knowledge, attitudes, and practices concerning vaccine-preventable diseases (VPDs), in addition to any previous screening for bloodborne viruses (BBVs).

The questionnaire was pilot tested with a sample of 10 dental students to assess its clarity and comprehensibility. Minor revisions in phrasing were implemented to improve clarity on the basis of the comments; nevertheless, no questions were added or eliminated. The responses from the pilot participants were omitted from the final dataset. Data collection was executed via a standardized, predesigned questionnaire administered subsequent to a focused educational activity. The questionnaire was accessible for four weeks, from October 27, 2024, to November 24, 2024. Participation was optional, anonymous, and unremunerated.

Descriptive statistics are presented as absolute and relative frequencies for categorical and ordinal variables. The Z score test was employed to assess correlations between population proportions, whereas Kendall’s Tau-b correlation coefficient was utilized to investigate relationships among ordinal variables. A p value of less than 0.05 was considered statistically significant. Statistical analysis was performed via IBM SPSS Statistics (version 25, IBM Corp., Armonk, NY, USA).

3. RESULTS

This questionnaire-based study aimed to assess participants' knowledge, attitudes, and practices related to infection control, as detailed in the following sections. One hundred one people completed the questionnaire. The demographic distribution revealed that a majority of the respondents were female, with 89 (88.1%) as female and 12 (11.9%) male.

The participants had diverse levels of dental knowledge. The largest percentage of respondents (43.6%) were interns, while third-year students constituted 23.8% of the sample. Second-year and fifth-year students comprised 12.9% and 10.9% of the participants, respectively, whereas fourth-year and first-year students constituted 5.0% and 4.0%, respectively.

The majority of participants (81.2%) indicated active engagement in clinical activities, reflecting considerable hands-on experience. A minority, 16.8%, indicated no participation in clinical activities, whereas 2.0% opted not to reveal their clinical engagement status.

Perceptions and Attitudes Regarding Patients with Chronic Viral Infections

The perspectives of participants about occupational risk and their attitudes toward handling patients with hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) infections were evaluated. Self-Perceived Risk

A substantial percentage of responders indicated a high to extremely high perception of occupational risk across all three illnesses. Specifically, 64.3% perceived a high (28.7%) or very high (35.6%) risk for HBV, 64.4% perceived a high (29.7%) or very high (34.7%) risk for HCV, and 61.4% reported a high (27.7%) or very high (33.7%) risk for HIV. A minority of participants perceived their professional risk as low for HBV (13.9%), HCV (14.9%), and HIV (15.8%).

Perspectives on Executing Clinical Procedures

When asked about their willingness to treat patients with these illnesses, over half of the respondents indicated preparedness to undertake all dental procedures, including surgical interventions, for HBV (56.4%), HCV (53.5%), and HIV (50.5%) patients. A significant percentage, however, opted to restrict their treatment to procedures involving minimum hemorrhage—39.6% for HBV, 40.6% for HCV, and 37.6% for HIV. A minority of participants expressed an absolute reluctance to treat patients afflicted with HBV (4.0%), HCV (5.9%), or HIV (11.9%), with the greatest refusal rate observed for HIV.

Additional Precautionary Measures

The majority of responders endorsed the adoption of enhanced measures while managing patients with chronic viral infections. A significant majority concurred on the imperative for improved sterilisation of dental instruments—95.0% for HBV, 94.1% for HCV, and 93.1% for HIV—alongside self-protection protocols (90.1%, 89.1%, and 88.1%, respectively). Moreover, more than three-quarters of the participants supported disinfection of the dental unit in these circumstances (76.2% for HBV, 74.3% for HCV, and 75.2% for HIV). A mere minority of participants contended that no further safeguards were needed.

The findings indicate a mostly cautious and risk-conscious disposition among dental students and interns, characterized by a readiness to treat patients with viral illnesses, contingent upon the implementation of suitable infection control protocols.

4. DISCUSSION

In recent years, the emphasis on infections has intensified due to increased knowledge of infectious illnesses and their global implications for infection management across all healthcare disciplines (9-11). In dentistry education, it is essential to instill well-defined standards concerning sterilization, disinfection, and infection control, which are critical for the safety and well-being of both patients and practitioners. Enhanced knowledge and infection control measures have been implemented; nonetheless, certain knowledge gaps persist, particularly among dentistry students (12-14). Addressing these gaps is crucial not only to ensure patient health but also to instill enduring habits of rigorous infection control procedures among future dental workers.

This study evaluated dentistry students' knowledge, perceptions, and clinical behaviors related to the use of personal protective equipment (PPE), infection control, and vaccine-preventable diseases (VPDs). One hundred one people completed the questionnaire. The demographic distribution revealed that a majority of the respondents were female, with 89 (88.1%) identifying as female and 12 (11.9%) identifying as male. The participants included diverse levels of dental knowledge. The largest percentage of respondents (43.6%) were interns, while third-year students constituted 23.8% of the sample. Second-year and fifth-year students comprised 12.9% and 10.9% of the participants, respectively, whereas fourth year and first-year students constituted 5.0% and 4.0%, respectively.

This study evaluated participants' perceptions of occupational risk and attitudes toward handling patients with hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) infections. The understanding of VPDs increased with increasing years of study, which aligns with findings from other nations. The majority of students accurately recognized vaccine-preventable diseases (VPDs), such as hepatitis B virus (HBV) and human papillomavirus (HPV); nonetheless, considerable uncertainty existed about viral hepatitis, with 37.6% mistakenly asserting that hepatitis C virus (HCV) is preventable by vaccination.

Students lacking prior experience in managing patients with chronic viral infections saw themselves at greater risk of infection and showed increased reluctance to perform bloodborne procedures or treat infected patients. Shenoy et al. (15) assessed knowledge, attitudes, and practices among 384 dental practitioners in Central India during the COVID-19 pandemic. A total of 57.8% had adequate knowledge, 63.8% had a good attitude, and 93.5% followed good practices regarding infection control measures. Notably, 76.6% were aware of hand hygiene methods, and 96.9% recognized the importance of personal protective equipment (PPE).

These findings correspond with international data regarding the stigma associated with chronic viral infections. A 2016

Ethiopian survey revealed that only 39.6% of the general public exhibited tolerant attitudes toward those living with HIV, with acceptance highly correlated with knowledge levels (16). A study of 2023 medical sciences students in Iraq (17) reported significant anxiety in social encounters with patients infected with HBV, underscoring beliefs regarding transmission pathways.

A substantial percentage of responders indicated high to extremely high perceived occupational risk across all three illnesses. Specifically, 64.3% perceived a high (28.7%) or very high (35.6%) risk for HBV, 64.4% perceived a high (29.7%) or very high (34.7%) risk for HCV, and 61.4% reported a high (27.7%) or very high (33.7%) risk for HIV. A minority of participants perceived their professional risk as low for HBV (13.9%), HCV (14.9%), and HIV (15.8%). According to a study by Veeresh et al. (18), a majority of the 258 undergraduate dental students surveyed had good knowledge (over 90%) about infection control in dental practice, with more than 90% acknowledging the risk of acquiring HIV and hepatitis infections and considering hepatitis vaccination mandatory.

In response to enquiries regarding their preparedness to treat patients with these illnesses, over fifty percent of the participants indicated their willingness to undertake all dental procedures, including surgical interventions, for patients with HBV (56.4%), HCV (53.5%), and HIV (50.5%). A significant percentage, however, opted to restrict their treatment to procedures involving minimum hemorrhage—39.6% for HBV, 40.6% for HCV, and 37.6% for HIV. A minority of participants expressed an absolute reluctance to treat patients afflicted with HBV (4.0%), HCV (5.9%), or HIV (11.9%), with the greatest refusal rate observed for HIV. Florentina et al. conducted a comparable study that revealed a markedly elevated rate of hypothetical treatment rejection among HIV-positive patients relative to those with chronic liver illnesses, such as HBV (10.9% vs. 3.0%). Reports from the European Centre for Disease Prevention and Control (ECDC) (19) indicate that 23% of respondents from Europe and Central Asia have encountered healthcare denial or treatment delays attributable to their HIV status. This highlights the necessity for education regarding transmission hazards and ethical considerations in patient treatment.

This study has multiple limitations that must be acknowledged when analyzing the results. The cross-sectional design offers a temporal picture of knowledge, attitudes, and practices, hence precluding the establishment of causation. The research depended on self-reported data, which may be influenced by social desirability or recall bias, potentially resulting in an overestimation of good behaviors or an underreporting of negative attitudes. The sample was confined to a single institution in Saudi Arabia, perhaps restricting the generalizability of the findings to other dental schools or geographic areas. The limited sample size constrains subgroup analysis, including comparisons on the basis of study year or previous clinical exposure.

5. CONCLUSION

This study reveals a predominantly favorable perspective among dentistry students concerning infection prevention and control, underscoring the importance of personal protective equipment (PPE) and supportive attitudes toward the treatment of patients with chronic viral infections. Nevertheless, significant deficiencies remain in understanding vaccine-preventable diseases and risk perceptions, especially among students with minimal clinical exposure (20). These findings highlight the necessity of enhancing undergraduate dental curricula with focused instruction on infection control measures, risk assessment, and ethical patient management. Improving multidisciplinary skills and strengthening evidence-based practices will equip future dental practitioners to manage infectious hazards with confidence and compassion in clinical environments.

Acknowledgments

The Researchers would like to thank the Deanship of Graduate Studies and Scientific Research at Qassim University for financial support (QU-APC-2025).

Table 1: Demographic profile of the study participants

Respondent Characteristics	Number (Percentage)
Gender	
Female	89 (88.1)
Male	12 (11.9)
Year of study	
1	4 (4.0)
2	13 (12.9)
3	24 (23.8)

4	5 (5.0)
5	11 (10.9)
6	44 (43.6)
Involvement in clinical activities	
Yes	82 (81.2)
No	17 (16.8)
Prefer not to respond	2 (2.0)

Table 2: Perception of study participants

Respondent Characteristics	HBV Infection (%)	HCV Infection (%)	HIV Infection (%)
Self-perceived risk			
Low	14 (13.9)	15 (14.9)	16 (15.8)
Medium	22 (21.8)	21 (20.8)	23 (22.8)
High	29 (28.7)	30 (29.7)	28 (27.7)
Very high	36 (35.6)	35 (34.7)	34 (33.7)
Attitude toward future procedures			
Refuse to treat	4 (4.0)	6 (5.9)	12 (11.9)
Perform only minimal-bleeding procedures	40 (39.6)	41 (40.6)	38 (37.6)
Perform any procedures, including surgery	57 (56.4)	54 (53.5)	51 (50.5)
Supplementary precautionary measures			
No, this is not necessary	3 (3.0)	3 (3.0)	2 (2.0)
Yes, for myself	91 (90.1)	90 (89.1)	89 (88.1)
Yes, for sterilizing the dental instruments	96 (95.0)	94 (94.1)	94 (93.1)
Yes, for disinfecting the dental unit	77 (76.2)	75 (74.3)	76 (75.2)

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