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Assess the Degree of Infection Control Knowledge and Practices among Dentists and Dental Nurses

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Abstract

Background
There is limited information on adherence to infection control measures in dental settings within the Middle East.

Objective
This study aims to assess infection control knowledge and practices among dental staff and dental nurses at a university-based dental teaching center.

Methods
A confidential, self-administered questionnaire covering various aspects of infection control knowledge and practice was distributed to 48 dental staff members and 28 dental nurses

Results
Completed questionnaires were returned by 37 (77%) dental staff members and 23 (82%) dental nurses. Among dental staff, 95% had received the hepatitis B vaccine, compared to 87% of dental nurses. Dental nurses were statistically more likely to experience percutaneous injuries ($P < .05$). All participants reported routine use of gloves; however, 46% of dental staff reported frequent handwashing before gloving, while 100% of dental nurses reported frequent handwashing after glove removal. Additionally, dental staff reported a higher rate of mask use (43%) compared to dental nurses (30%).

Conclusion
Adherence to infection control guidelines showed variability between dental staff and dental nurses. Both groups demonstrate a need for improved infection control practices.

Keywords: *questionnaires, infection, Adherence, percutaneous*

Introduction

Delivering dental care inherently involves certain risks. A primary concern for both dental professionals and patients is potential exposure to bloodborne pathogens, such as hepatitis B and C viruses and HIV (1). Infection within a dental clinic can occur through direct contact with bodily fluids or blood, airborne droplets carrying pathogens, or contaminated instruments or sharps that haven't been adequately sterilized (2).

While many exposure incidents are accidental, they can often be prevented by following safe work practices and adhering to infection control protocols. However, for instances where exposure is unavoidable, immunization and effective post-exposure management serve as essential protective measures (1).

Continuous research into occupational injuries and infection control practices among dental healthcare providers (DHCP) is crucial. Such studies help assess the effectiveness of infection control training and education, ultimately supporting the development of programs that enhance adherence to protocols and minimize injury risks (1).

Currently, there is limited data on compliance with universal infection control protocols in dental settings in the Middle East. This study therefore aimed to assess infection control knowledge and practices among dental staff and nurses at a dental teaching center , as well as to identify any notable differences between these two groups.

Methods

A self-administered and confidential questionnaire assessing infection control knowledge and practices was distributed to 48 dental staff and 28 dental nurses .Participation was voluntary for both groups. The questionnaire contained 20 items categorized into five key sections: (1) demographic information, including age, gender, year of graduation, and dental specialty (if applicable); (2) vaccination status and post-vaccination testing for hepatitis B virus (HBV); (3) incidence and follow-up of percutaneous injuries (both needlestick and non-needlestick); (4) hand hygiene practices, such as handwashing before and after gloving, between patients, and any use of hand or finger jewelry; and (5) use of protective barriers, specifically face masks and protective eyewear.

At the time of this study, JUST's dental center did not have specific infection control protocols. Instead, universal precaution guidelines established by the American Dental Association and the Office Safety and Asepsis Procedures were implemented, serving as the standard for evaluating infection control practices.

Data were inputted and organized using the Statistical Package for Social Sciences (SPSS for Windows, SPSS Inc., Chicago, IL). Analysis included descriptive statistics, the chi-square test, and the Wilcoxon signed-rank test, with statistical significance set at a probability value of $\leq .05$.

Results

Responses were received from 37 dental staff members (77%) and 23 dental nurses (82%) working at the dental teaching center. Among the 37 dental staff participants, 21 (57%) were male and 16 (43%) female, while among the 23 dental nurse participants, 13 (56.5%) were female and 10 (43.5%) male. The difference in gender distribution was not statistically significant ($P = .43$).

Table 1 presents data on hepatitis B immunization and post-immunization testing. Immunization coverage was high, with 95% of dental staff and 87% of dental nurses vaccinated, although this difference was not statistically significant. However, post-immunization testing was significantly higher among dental staff (57%) compared to dental nurses (4%) ($P < .0001$).

Table 2 outlines hand hygiene and glove-wearing practices. All participants reported routinely wearing gloves. Differences emerged in handwashing practices, where 46% of dental staff routinely washed hands before gloving, compared to only 4% of dental nurses. However, 100% of dental nurses reported washing hands after removing gloves, compared to 87% of dental staff. Compliance with glove changing between patients was suboptimal, reported by 70% of dental staff and 61% of dental nurses. Dental staff were significantly more likely to dispose of contaminated gloves before handling nonclinical items (73%) compared to dental nurses (35%) ($P = .006$). Dental nurses were also more likely to wear hand, wrist, and finger jewelry, though this was not statistically significant ($P = .763$).

Table 3 illustrates the use of protective barriers, showing that dental staff reported a significantly higher frequency of routine mask use (43%) compared to dental nurses (30%) (P = .025). Additionally, 48% of dental nurses never wore protective eyewear, in contrast to 14% of dental staff, although this difference was not statistically significant.

Table 4 displays the incidence of percutaneous injuries, with dental nurses experiencing more such injuries than dental staff. This difference was statistically significant (P < .011). Dental staff reported a higher incidence of blood splashes to the eyes, nose, or mouth within the previous 12 months (49%) compared to dental nurses (39%) (P < .003).

Table 1. Hepatitis B Immunization and Post-immunization Testing Status

Status	Dental Staff n (%)	Dental Nurses n (%)	Wilcoxon Signed Rank Test
Hepatitis B Immunization	35 (95%)	20 (87%)	.65
Hepatitis B Post-immunization Testing	21 (57%)	1 (4%)	.000*

* Statistically significant

Table 2. Hand Care and Glove-Wearing Practices Between the Two Groups

Practice	Frequency	Dental Staff n (%)	Dental Nurses n (%)	Wilcoxon Signed Rank Test
Routine Use of Gloves	Always	37 (100%)	23 (100%)	1.00
Routine Handwashing Before Gloving	Always	17 (46%)	1 (4%)	.001*
	Never	2 (5%)	9 (39%)	
Routine Handwashing After Removing Gloves	Always	32 (87%)	23 (100%)	.025*
	Never	0 (0%)	0 (0%)	
Changing Gloves Between Patients	Always	26 (70%)	14 (61%)	.157
	Never	1 (3%)	1 (4%)	
Disposing Contaminated Gloves Before Handling Nonclinical Items	Always	27 (73%)	8 (35%)	.006*
	Never	1 (3%)	2 (9%)	
Routine Hand, Wrist, and Finger Jewelry Wearing	Always	4 (11%)	5 (22%)	.763
	Never	25 (68%)	6 (26%)	
Routine Watch Wearing	Always	22 (60%)	18 (78%)	.006*
	Never	2 (5%)	1 (4%)	

* Statistically significant

Table 3. Use of Protective Barriers Among Participants

Practice	Frequency	Dental Staff n (%)	Dental Nurses n (%)	Wilcoxon Signed Rank Test
Routine Wearing of a Mask	Always	16 (43%)	7 (30%)	.025*
	Never	1 (3%)	6 (26%)	
Routine Wearing of Protective Eyewear	Always	12 (32%)	1 (4%)	.317
	Never	5 (14%)	11 (48%)	

* Statistically significant

Table 4. Incidence of Percutaneous Injuries and Blood Splashes Among DHCP

Incidence	Frequency	Dental Staff (%)	Dental Nurses (%)	Wilcoxon Signed Rank Test
Needlestick Injuries	Once or More	10 (27%)	8 (35%)	.007*
Non-needlestick Injuries	Once or More	6 (16%)	7 (30%)	.011*
Blood Splashes to Eyes, Nose, or Mouth	Once or More	18 (49%)	14 (39%)	.003*

* Statistically significant

Discussion

Hepatitis B virus (HBV) infection poses a significant public health challenge in the Middle East, with studies indicating that the prevalence of hepatitis B surface antigen (HBsAg) carriers is approximately 9.9%, showing no age-related trends. However, the overall prevalence of HBV infection is estimated to be as high as 36%, with an increasing rate associated with advancing age (3). The most efficient and effective use of vaccines in healthcare settings is to immunize dental healthcare personnel (DHCP) before they are exposed to the risk of infection (4). While there is no legislative mandate for HBV vaccination among DHCP, such vaccination is strongly recommended.

In the present study, the vaccination rates were 95% for dental staff and 87% for dental nurses, consistent with previous research that reported vaccination rates among dentists ranging from 93% to 100% (5, 6) and significantly higher than the 66% vaccination rate noted for dental assistants (5). Despite the high vaccination rates among dental personnel, there remains concern about the vulnerability of some staff and nurses to HBV infection. Although DHCP have a responsibility to be aware of their serostatus, the necessity of postvaccination testing for antibodies to hepatitis B surface antigen (anti-HBs) has been a matter of debate. Some argue that the high seroconversion rates observed in most recipients, along with a reduction in occupational HBV exposure, render such testing unnecessary (7). Others suggest that postexposure testing and administration of hepatitis B immunoglobulin (HBIG) to negative responders may be more cost-effective than routine postimmunization testing (8).

In a survey involving Canadian dentists, 72% reported knowledge of their serostatus following immunization (9). In this study, 57% of dental staff and only 4% of dental nurses had undergone HBV postimmunization testing ($P < .0001$). This disparity may arise from the fact that dental staff required this test while participating in residency programs abroad, where such testing is often mandated before providing treatment to dental patients. Conversely, many dental nurses completed their education, where no legislation necessitates such testing.

It is well established that HBV is transmitted via percutaneous or mucosal exposure to the blood or body fluids of individuals infected with either acute or chronic HBV (4). Approximately 30% of healthcare workers infected with HBV recall having treated patients who were HBsAg positive (10). In another study, the likelihood of developing clinical hepatitis from a needle contaminated with HBsAg-positive, HBeAg-negative blood was estimated at 1% to 6%, with the risk of developing serological evidence of HBV infection ranging from 23% to 37% (11). It has also been estimated that 8% of general dentists and 21% of oral surgeons have serological markers indicative of HBV infection (12).

This study found a statistically significant difference between the two tested groups regarding percutaneous injuries ($P < .007$). Specifically, 35% of dental nurses experienced needlestick injuries in the past year, compared to only 27% of dental staff, which is lower than the 56% incidence reported among 600 general dental practitioners in a separate study (13). Moreover, the rate of non-needle percutaneous injuries was significantly higher among dental nurses (30%) than dental staff (16%) ($P < .01$). One possible explanation for the higher incidence of percutaneous injuries among dental nurses at a dental teaching center could be their increased involvement in patient treatment and direct assistance to undergraduate students, as the responsibilities of the dental teaching staff are more divided among teaching, research, and treatment sessions.

The dental staff in this study reported a statistically greater frequency of handwashing prior to gloving (46%) compared to dental nurses (4%). This aligns with findings from earlier studies, where 38% to 40% of dentists washed their hands before donning gloves, while no dental assistants demonstrated this practice (14). Some researchers have identified factors contributing to poor handwashing compliance, including the sex of the healthcare worker (15), glove usage (16), sink availability (17), handwashing effects on skin conditions (18), and the number of daily patient interactions (18); however, these factors were not explored in the current study.

There is substantial evidence indicating that a significantly higher number of bacteria can be isolated from under rings and watches worn by oral surgeons compared to a control group (19). In another study, it was demonstrated that health care workers could achieve a greater reduction in bacterial colonies after handwashing when not wearing rings (20), which supports the recommendation that jewelry should be removed before operative dental procedures. Among the dental staff surveyed in this study, 68% reported never wearing jewelry during work, whereas the proportion for dental nurses, although not statistically significant, was considerably lower at 26%. These findings are consistent with earlier studies, which indicated that 66% of practitioners remove jewelry before washing their hands (13).

DHCP are advised to wear gloves to prevent hand contamination when contacting mucous membranes, blood, saliva, or other potentially infectious materials, as well as to reduce the risk of transmitting microorganisms from DHCP hands to patients during surgical or other patient care activities (4). The reported 100% routine glove usage among dental staff and assistants indicates a commendable adherence to basic infection control practices within the dental profession. This compliance rate is favorable compared to other studies that report glove-wearing rates for dentists between 29% and 96% (5, 13, 14, 21, 22) and 30% to 69% for dental nurses (5, 14, 22).

Prior research has indicated that dental assistants working with dentists who consistently wear gloves are more likely to wear gloves routinely than those working with dentists who only use gloves for certain patients (21). This trend may account for the findings of this study. Inappropriate glove usage, such as neglecting to change gloves, can facilitate the spread of organisms and heighten caregiver risk, as some gloves may leak (23). The current study observed that 70% of dentists and 60% of dental nurses changed gloves between patients, surpassing the rates found in other studies where only 12% to 54% of dentists changed gloves between patients (13, 14, 21). The reported poor compliance with glove-changing among dental assistants (7%) may stem from the increased supervisory role of dental staff over undergraduate students rather than direct patient treatment, potentially leading to misconceptions about the sufficiency of washing gloved hands for cross-contamination control.

In dental clinics, various infectious agents can be transmitted to both dental staff and patients through airborne routes (24). Increased levels of oral microorganisms are often produced during specific dental procedures, particularly during mechanical scaling and cavity preparation (25). The infection control guidelines from the American Dental Association recommend that dentists and dental assistants should always wear masks and

protective eyewear (26). In this study, routine mask usage was reported as low among both dental staff (43%) and dental nurses (30%) (P < .025). These figures align with previous reports indicating regular mask usage among dentists (20%-60%) (5, 13, 14) but are lower than findings from studies where 75% to 100% of dentists routinely wore masks (9, 27).

Earlier studies found that 35% to 62% of dentists and 7% to 25% of dental assistants used eye protection (5, 14). In the current study, 33% of dental staff consistently wore protective eyewear, while 14% never did; surprisingly, only one dental nurse (4%) reported always using protective eyewear, and 48% never wore them. However, the differences in eyewear usage between dental staff and nurses were not statistically significant (P > .317).

Lastly, the results of this study should be interpreted with caution due to the small sample sizes of both dental staff and nurses. Including dental practitioners and nurses from the private sector and other governmental institutions could yield more robust evidence regarding infection control knowledge and practices among dentists and dental nurses

Conclusion

Overall, adherence to international infection control precautions at dental teaching center was inadequate. Both dental staff and nurses reported a 100% routine use of gloves. Immunization against hepatitis B was confirmed by 95% of dental staff and 87% of dental nurses. However, dental nurses experienced a higher frequency of percutaneous injuries, and the consistent use of masks and protective eyewear was notably low among both groups.

There is a clear nee to establish infection control guidelines specifically for dental healthcare personnel (DHCP). Implementing such guidelines would help reduce the risk of cross-infection within dental practices, ultimately lowering the morbidity and mortality rates associated with these infections for both DHCP and their patients. The lack of national guidelines for cross-infection control in highlights the necessity for a structured and comprehensive approach to educating dental students about infection control practices within the curriculum. It is essential that the responsibility for preventing cross-infection be shared by the dentist and all members of the dental team.

Involve patients in infection control efforts by educating them about their role in preventing the spread of infections.

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