

Assessment of Infection Control Knowledge, Attitudes and Practices among Dentists in the Public Health Sector of Eastern Saudi Arabia

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ABSTRACT

Background: Dentists are at risk for a variety of infections. With their number and diversity increasing, updated information about current practices and knowledge is required. Data evaluating infection control knowledge and attitudes is scarce; with these two being critical indicators for future practices. This study aimed to evaluate infection control knowledge, attitudes and practices of dentists in the Eastern province.

Methodology: This is a cross sectional survey-based study. A self-administered questionnaire was distributed to 108 randomly selected dentists working in the public health sector from February to May 2015. SPSS (Version 22) was used, results were presented in frequency tables and graphs and Chi square test to assess relation between variables.

Results: Only 51.9% revealed good knowledge, 91.6% showed positive infection control attitudes and 82.4% demonstrated good practices. Infection control knowledge was significantly related to attending continuous education sessions ($p=0.029$). Participants lacked compliance for eye protection (50.5%). Although 86.1% were vaccinated from Hepatitis B yet only (54.5%) completed the three doses. Needle stick injury was reported by 46.3% and was related to increased workload.

Conclusion: Although the study revealed positive attitudes and practices, yet infection control knowledge was deficient. Continuous infection control education sessions and an in-office protocols are recommended.

Keywords

Dentists, Infection control, Knowledge, Saudi Arabia, Practices.

Introduction

Dental care providers are at high risk of exposure to a variety of infections ranging from simple ones such as common cold to life threatening such as hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV) and Mycobacterium tuberculosis [1-4]. Although recent data shows

a decline in prevalence of viral hepatitis in the Kingdom [5,6]. Yet the consequences of such diseases cannot be neglected; on the other hand, tuberculosis still remains a burden in the Kingdom with rising disease trends over the last 10 years [7].

Transmission of infections within dental office could occur either through inhalation, droplets, [4,8] directly through contact with blood and/or saliva [9] or indirectly through contact with contaminated instruments and surfaces [10].

In order to minimize cross contamination within dental settings the Center of Disease Control (CDC) recommends immunizations, training and personnel protection for all dental personnel in addition to workplace safety measures such as waterlines decontamination, equipment disinfection and instruments sterilization [2].

Compliance with these recommendations and guidelines varies between developed and developing countries especially in areas of infection control knowledge and education [11]. Many factors have been mentioned for lack of compliance with infection control, with knowledge and attitude having the most significant impact and are the strongest predictors of future practices [12,13].

Different studies were carried out in Saudi Arabia to assess knowledge level, attitudes towards infection control measures and current practices either separately or collectively [14-16] but none had investigated the individual factors behind each and the association of knowledge and attitudes with future practices. In addition to that no data is available about current infection control knowledge, attitudes and practices among dentists in Eastern Saudi Arabia. Therefore, this study aimed to 1) assess infection control knowledge, attitudes and practices among dentists in the public health sector of the Eastern Province, Saudi Arabia and 2) investigate individual factors behind each namely knowledge, attitude and practice.

Materials and Methods

This is a cross-sectional survey among dentists practicing in the public health sector of Eastern Saudi Arabia. The study was conducted during the period from February 2015 to May 2015. Ethical approval was obtained from IAU, College of Dentistry Research Board (EA2014006). Data was collected using a self-administered questionnaire developed for the study purposes. A list of public dental hospitals and facilities in the three main cities (Dammam, Dhahran and Al-Khobar) of Eastern Province was prepared. The questionnaire was distributed randomly to 119 dentists; sample size was calculated (Using Sample size calculator-World Health Organization) by considering the practices of general dentists [14] 95% confidence interval, 8% margin of error and 80% power. All dentists with the different specialties working in public hospitals were included. Interns and locum dentists were excluded from the study.

The questionnaire was pilot tested on a random sample of forty-two dentists, and Cronbach's Alpha was used to test its internal consistency (reliability). It consisted of 47 questions with 10 minutes for completion and was divided into 4 sections. Section 1 included respondents' personal profile, section 2 included eight questions that assessed dentists' knowledge, section 3 assessed dentists' attitudes using five statements on a three- point Likert scale (uncomfortable, somewhat comfortable and comfortable) and the last section evaluated current infection control practices in ten questions.

The questionnaire was distributed to the randomly selected 119 dentists during working hours; study purpose was explained, and a

verbal consent was achieved.

Data collected was entered into a computer and analyzed by statistical software Statistical Package for Social Sciences (SPSS) (Version 22; SPSS Inc., Chicago, USA). Descriptive analyses for knowledge, attitude, and practice, with the use of percentages and frequencies were carried out and results were presented in form of tables and figures. Chi-square test and likelihood ratio test were used to check statistical significance between the variables. To analyze the relation between infection control practices and other variables logistic regression models were used. The dependent variable was infection control practices and the independent variables were individual's characteristics (demographics), knowledge and attitudes.

Results

The study questionnaire was found to be valid and reliable. Reliability of the questionnaire was 0.858. Of the one hundred and nineteen distributed questionnaires, one-hundred and eight was returned, fully completed and considered for analysis with a response rate of 90.7%. Among the 108 participants, 78 (72.2%) were males, 30 (27.8%) were females. Of the study sample 53.7% were married and almost 67 percent (n=73) among the study group were general dentists. There were 89 (79.8%) Saudi and only 18 (20.2%) non-Saudis.

Participants were asked about their years of experience and responses were dichotomously categorized into 3 groups (1= less than 5 years; 2 = 5-10 years and 3 = more than 10 years). More than half of the respondents 65 (60.2%), had less than 5 years of experience, 30 (27.8%) their working experience was 5 to 10 years and only 11 dentists (10.2%) had more than 10 years of experience.

Most of the dentists were right handed (n=97, 89.9%) and only 10 (9.3%) were using their left hand. Work load among participants was as follows: 34 (31.8%) had less than 5 patients per day, almost half of the participants (50.5%) reported having 5-10 patients daily, and the rest (17.8%) were having more than 10 patients a day.

Infection Control Knowledge

When assessing infection control knowledge, 62 (57.4%) out 108 dentists believed that they have good knowledge while 44 (40.7%) rated their knowledge as fair; contradicting their actual knowledge score as almost half (48.1%) of the participants demonstrated poor knowledge (Table 1).

The majority of the participants had an opportunity to attend infection control continuous education programs; almost 72 percent (n=78) had attended up to five continuous education programs in infection control.

Infection control knowledge was not significantly associated with gender (p=0.69), years of experience (p=0.79), nor with the dominant hand (p=0.69) (Table 2). Having adequate infection control was significantly related to attending continuous education sessions (p=0.029).

Infection Control Knowledge	Number (%)	Overall Knowledge % 56 (51.8)
HIV has the highest risk of transmission in dental settings	42 (43.5)	
There is a vaccine for Hepatitis B and C	43 (39.8)	
What immediate action should be taken in case of direct blood contact with HIV patient	24 (22.2)	
Do you know for how long Hepatitis B virus remains viable on dry surface	35 (32.4)	
Of the various hepatitis viruses, what is the one of major concern in dentistry?	42 (38.9)	
Standard precautions should be applied to all patients regardless of their infection status	88 (81.5)	
Patients with tuberculosis infection can be treated in the dental setting with appropriate precautions	17 (15.7)	
Wearing of gloves can replace hand hygiene	81 (75)	

Table 1: Infection Control Knowledge among Study Participants.

From the study participants 64.5% were aware about their workplace post exposure policy, 11.2% said they don't have such a policy while 24.3% didn't know if such a policy existed in their workplace.

Variable		Knowledge		Total	P-vale
		Poor	Good		
Gender	Male	39	39	78	0.69
	Female	13	17	30	
Experience (years)	<5	30	35	65	0.79
	5-10	16	14	30	
	>10	5	6	11	
Dominant Hand	Right	47	50	97	0.69
	Left	4	6	10	
speciality	General Dentist	36	37	73	0.83
	Other	15	19	34	
Marital Status	Married	29	29	58	0.073
	Not Married	23	27	50	

Table 2: Relation between Demographic variables and Dentists' Knowledge.

Infection Control attitudes

Most of the participants 71.3 % (n=77) showed positive attitudes towards infection control guidelines and measures (Table 3). They were comfortable with wearing of personal protective equipment for all patients, changing them between patients and did not consider that as a waste of time or extra burden.

Infection Control Attitudes	Number (%)	Overall Attitude % 99 (91.7)
Infection control measures are waste of time and money	96 (88.9)	
Wearing of gowns during all patients' treatment?	81 (75)	
Wearing of gloves during all patients' treatment contact?	96 (88.9)	
Wearing of masks during all contact with patients?	96 (86.1)	
Wearing of eyewear during patients' treatment?	69 (63.9)	
Rank the importance of Gowns, Gloves, Masks and Eyewear in a scale from 1-5	85 (78.7)	

Table 3: Infection Control Attitudes among Study Participants.

Dentists' attitudes were not significantly related to any of the demographic factors (Table 4).

Variable		Knowledge		Total	P-vale
		Poor	Good		
Gender	Male	7	2	6	0.52
	Female	2	28	30	
Experience (years)	<5	6	59	65	0.303
	5-10	1	29	30	
	>10	2	9	11	
Dominant Hand	Right	9	88	97	0.39
	Left	0	10	10	
speciality	General Dentist	4	69	73	0.146
	Other	5	30	35	
Marital Status	Married	6	52	58	0.5
	Not Married	3	47	50	

Table 4: Relation between Demographic variables and Dentists' Attitude.

Infection Control Practices

Most of the study participants (85.9%) stated that they were satisfied with their infection control practices (Table 5). Almost (92%) of the participants take medical history regularly before treating patients.

Infection Control Practices	Number (%)	Overall Practices % 89 (82.4)
Do you have a post exposure policy in your institution	69 (63.9)	
When do you perform hand washing/hygiene	106 (98.1)	
Wear gowns during patient contact	78 (72.2)	
Wear gloves during patient contact	97 (89.8)	
Wear masks during patient contact	92 (85.2)	
Wear eyewear during patient contact	54 (50)	
Wear gloves when receiving clinical items from dental clinics	71 (65.7)	
Apply antibacterial mouthwash before treatment	27 (25)	
Wear protective face shields during laboratory work	52 (48.1)	

Table 5: Infection Control Practices among Study Participants.

When participants were asked about personal protective equipment (PPE), 72.2% said they always wear gowns, 90.7% always wear gloves, 86% always wear masks and only 50.5% wear eye protection.

From the participants 86.1% (n=93) mentioned that they were vaccinated from Hepatitis B but only half (n=51) 54.5% had completed all the recommended three doses.

Regarding needle stick injuries 73.5% said they would report if any occurred. When asked about previous exposure injuries 46.3% had needle stick injury and only 56.8% of the exposed performed screening after these injuries. Frequency of needle stick injuries

was not significantly associated with taking medical history ($p=0.633$).

The study also tried to investigate if there was an association between the dominant hand (Figure 1) and years of experience with the frequency of needle stick injury. Dominant hand had no association with needle stick injuries and there was insignificant correlation between experience and needle stick injury (0.18 with p -value 0.064).

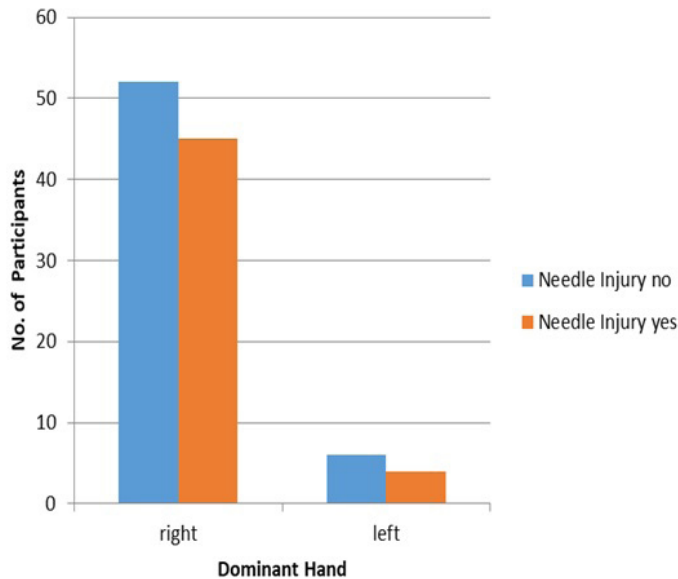


Figure 1: Dominant hand and prevalence of needle stick injuries.

Daily load of patients was related to frequency of needle stick injuries; it was found that dentists who have more than 15 patients per day reported more needle stick injuries, a finding that was statistically significant (p -value 0.015).

When investigating the relation between demographic factors with practices only the total years of experiences was significantly related to infection control practices ($p=0.029$) (Table 6).

Participants' attitudes and practices had statistically significant correlation ($r=0.43$, p -value 0.000). On the other hand, participants' attitudes and knowledge had weak but significant correlation ($r=0.21$, p -value 0.031); while their knowledge and practices had weak and statistically insignificant correlation ($r=0.13$, $p=0.19$).

Variable		Practice			Total	P-value
		Poor	Moderate	Good		
Gender	Male	29	7	42	78	0.17
	Female	6	2	22	30	
Experience (years)	<5	26	3	36	65	0.029*
	5-10	7	2	21	30	
	>10	2	4	5	11	
Dominant Hand	Right	33	8	56	97	0.64
	Left	2	1	7	10	

Table 6: Relation between Demographic variables and dentists' Practice.

*statistically significant at 0.05 level of significance.

Discussion

Adherence to infection control policies and guidelines is crucial to prevent the spread of infectious and transmissible diseases [17]. For this purpose, it is important that dental health care professionals are aware of the occupational risks, methods of prevention and updated infection control guidelines. This survey was conducted to assess the level of knowledge, attitudes, and practices of dentists regarding infection control procedures in the public sector; and to investigate the individual's factors behind each.

Health-care in Saudi Arabia is provided through three agencies; the Ministry of Health, other governmental agencies, and the private sector [18] with the majority of dental task force working in the regions of Riyadh, Makkah, and Eastern province [19]. Currently there are eight-hundred and forty-eight (848) dentists, Saudis and Non-Saudis working in the Public Sector in the Eastern Province [19]. The cities of Dammam, Dhahran and Al-Khobar are the largest in the Eastern Province and, therefore, we believe that our results can be generalized to public dentists practicing in Eastern Province of Saudi Arabia.

Adequate knowledge is the major reason for compliance with correct infection control measures [11]. Surprisingly the majority (82.4%) of the study participants demonstrated good infection control practices despite the finding of this study that only 51.9% demonstrated good knowledge. The discrepancy between knowledge and practice can be explained by the impact of experience among this study group (p -value 0.029). This finding was in line with those reported from Iran and Turkey [20,21]. A weak but a statistically significant ($r=0.21$, p -value 0.031) correlation was found between participants' attitudes and knowledge in coherence with a study conducted among dental professionals in Iran. Knowledge would definitely affect attitudes [13] and the weak correlation is most probably due to the small number of participants.

The Theory of Planned Behavior, as presented by Ajzen since the beginning of 90s [13], justifies our finding that despite the low knowledge level 91.6% of the respondents yet they had positive attitudes towards infection control measures. The theory states that intentions predict behavior and intentions to perform a given behavior are determined by attitudes [13]. Infection control practices had a positive and statistically significant correlation ($r=0.43$, p -value 0.000) with participants' attitudes but no correlation could be established between knowledge and practices ($r=0.13$, p -value 0.19). Many studies in the same context reported similar finding [11,12,14-18,20-22].

With the emergence of bloodborne diseases the CDC adopted the concept of standard precautions, this mandates the wearing of full personal protective equipment (PPE) for all patients regardless of the procedure [2,9]. In our study, compliance with PPE varied among the participants with gloves and masks being used by the majority (90.7% and 86% respectively); in agreement with a

similar local study carried in the private sector in Riyadh [15]. The concern about bloodborne diseases transmission [9,16] and the outbreak of respiratory diseases such as Middle East Respiratory Syndrome (MERS) is the most logical explanation for high compliance with these practices.

Also, of the best practices that the participants revealed was the regular history taking (92%) a similar finding was obtained from a Jordanian study carried among private dentists [22]. Medical history is important in health practice for patient safety, better treatment and identification of infectious diseases. Tada et al, in their investigation of Japanese dentists' compliance with infection control, found that compliance increased if the patient had a transmissible disease [12]. The authors assumed that being aware of the medical history of the patient would affect the rate of needle stick injuries, i.e. may lead to more carefulness but no statistical significance was found ($p=0.633$).

The study identified another gap, that is lack of compliance with eye protection. Eye protection was the least practiced (50.5%) in agreement with similar studies carried in the same context [11,12,14,17,20]. Dentists are exposed to splashes from patient's oral cavity, containing saliva and blood, as well as tooth particles or dental materials [23]. Wearing eye protectors during patient-care procedures is a part of standard precautions [3,10]; these devices provide a mechanical barrier from both physical and biological insult [23].

Dentists' knowledge and attitude were not related to most of the demographics variables such as gender, experience and the dominant hand (Tables 2 and 3).

Nevertheless, it was observed that the practice of infection control for a dentist became significantly mature as he/she increases in experience (Table 4). Similar result was documented by a systematic review that compared infection control practices among dentists and dental students in Iran where the former demonstrated better practices [20]. This shows that experience is a key factor to good infection control practices as a result of more exposure to the working environment.

One of the positive findings and similar to a systematic review that evaluated infection control compliance on a global prospective [11] that the majority of the respondents (86.1%) were vaccinated against Hepatitis B. This is a mandatory practice guideline in most health care facilities, in addition there has been an increased awareness about the great risk of HBV transmission in dental settings [5,6]. Nevertheless, compliance with the recommended three doses was not the same (only 54.5% completed the three doses), the time gap between the doses, workload, and lack of enforcement policy may all be possible reasons for this low compliance.

The most common occupational risk that dentists may encounter is sharp injury, where exposure to blood-borne pathogens, in particular HBV, HCV and HIV is likely to occur [11]. Almost

half of the participants (46.3%) had a needle stick injury and the more alarming, is that only 56.8% of the injured performed post-exposure screening. Reporting exposure injuries enables better counseling, prevention of secondary transmission, and proper medical evaluation [9,11,17]. Antiretroviral therapy or vaccines are highly effective if administered within 24 to 36 hours after the exposure [11,24,25]. This finding highlights the importance of staff awareness about post exposure management and comes in line with a wealth of studies investigating infection control in the dental practice [11,12,17]. Another gap in this area is that one third of the participants were either unaware of the existence of such a policy or did not have any policy within their practice. Health facilities with both its public and private sectors should adapt a post exposure policy and orient their staff on regular basis.

Needle stick injuries were evaluated for possible relation with dominant hand but no significant difference was observed (Figure 1), and although our study had very few left-handed dentists yet this was similarly reported from a study in a dental institution by Smith et al [24]. Tada et al, compared infection control practices among Japanese dentists over three years; there was a great improvement in their participants' practices [12]. The authors of the current study assumed that years of practice would be the reason in betterment of practices; as such needle stick injuries would be lower among experienced participants. To our surprise it was not the case, no significant relation was found between them ($r=0.18$ with p -value 0.064). We believe it is probably due to that more than half of our sample were recent graduates (67%). However, when daily work load of patients was compared with needle injuries it was observed that number of injuries increased as the number of patients increased and the result was statistically significant with p -value 0.019; similar to the study in Najran, Saudi Arabia where practitioners with more clinical load had more needle stick injuries [25], most probably due to tiredness, stress or negligence.

One of the limitations of this study is that data collected relied on participants' subjective self-assessment. Another limitation the study included dentists from the public sector only, including dentists from the private sector and from other regions of the Kingdom would have allowed better comparison of the study variables and further investigations of factors behind lack of compliance with infection control guidelines.

Lastly some important issues in infection control such as sterilization and disinfection were not included in the questionnaire due to the fear of exhausting the participants.

Conclusion

Although the study revealed positive attitudes, yet infection control knowledge was deficient with some gaps in current practices. Knowledge was directly related to continuous infection control education. The more the experience the better the practice was. No relation was found between any of the demographics and knowledge, attitudes or practices. More work load increases the risk of needle stick injuries. Positive infection control attitude was found to be related to sound future practices.

Infection control continuous education programs should be mandatory for all practicing dental personnel, expressed in pre-set credit hours by Saudi Medical Commission to ensure quality of such sessions. Health facilities should develop a hiring policy where passing an infection control evaluation exam is a selection criterion. Reinforce the use of personal protective equipment within clinical premises for all patients. Clear regulations should be made to ensure that all practicing dentists receive the three doses of HBV vaccine. All staff should be made aware about post exposure policy within their workplaces.

Future studies are recommended to provide updated information about infection control practices and identify any deficiencies. It would also be beneficial to evaluate the practices of infection control in both public and private sectors.

Areas of sterilization, disinfection and waste management should also be investigated when assessing infection control practices.

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