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# Cross-infection and infection control in dentistry: Knowledge, attitude and practice of patients attended dental clinics in King Abdulaziz University Hospital, Jeddah, Saudi Arabia



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## KEYWORDS

Patient safety;  
Cross infection;  
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KAP

**Abstract** The objective of the study was to determine the level of Knowledge, Attitude and Practice (KAP) of patients attended dental clinics at King Abdulaziz University Hospital (KAUH) regarding cross infections and infection control in dentistry. A cross-sectional study was conducted among 225 patients who attended the dental clinics of KAUH, Jeddah, Saudi Arabia, 2014. A standardized, confidential, anonymous, interviewing questionnaire was used. Knowledge about dental infections was assessed by 12 MCQs. The attitudes were assessed through answering seven statements on a three- point Likert scale. Patients' self reported practices were also evaluated. Descriptive and inferential statistics were done.

Results of the study revealed that 39.5%, 38.7% and 21.8% of the participants obtained poor, fair and satisfactory level of knowledge about infections and infection control in dentistry, respectively. Social media was the commonest source of information about dental infection. Participant's educational level was significantly associated with the level of knowledge about dental infection. Patients had positive

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attitudes towards infection control in dentistry. Regarding self-reported practice, only few participants would ask dentists about sterilization of dental instruments (9.3%), wearing face mask (13.3%) and gloves (16.4%) if they don't do so. In conclusion, our participants had good attitudes towards infection control in dentistry. However, their knowledge and practice need improvements. Conduction of educational programs is needed through social media, mass media, schools and public places. These programs involve both patients and providers.

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## Background

Patient safety is an important medical discipline which aims at improving quality of patient care, minimizing treatment mistakes and improving safety [1]. Infectious diseases represent an important public health problem facing health care systems in many countries [2].

Provision of dental care is not free from risk [3]. Cross-infection during clinical practice can occur with transmission of infectious agents between patients and health workers in a clinical environment. Transmission of dental infection can occur through infected air droplets, blood, saliva, and instruments contaminated with secretions [4]. Persons who seek dental care could be in the prodromal phase or being carriers of certain infectious diseases, without knowing about their physical conditions. In addition, some infectious diseases have prolonged incubation periods or post-infection "window period" during which antibodies can't be detected [4,5].

Cross-infection in dentistry can occur through many pathogenic organisms found in oral cavity and respiratory tract. Example of these organisms are cytomegalovirus (CMV), Hepatitis C Virus (HCV), Hepatitis B Virus (HBV), herpes simplex virus (HSV types 1 and 2), HIV/AIDS, Mycobacterium tuberculosis, staphylococci, streptococci and other viruses and bacteria [4]. Furthermore, nowadays we are living in an era of eco-epidemiology, with global emergence and re-emergence of many communicable diseases [6,7]. Emerging agents as Ebola, Middle East Respiratory Syndrome-Corona Virus (MERS-CoV), H1N1 and H5N1 and others [8] can be also transmitted during dental practice.

Blood borne infections as HIV/AIDS, HCV, HBV, and other emerging blood borne organisms represent the main risks for the transmission of infections in dental practice. Exposure to blood and body fluids need great concerns from both dental care providers and the patients [5]. A study done in

Riyadh, KSA, showed that 3.2% of female patients attended the dental clinics of King Saud University had seropositive HBV and HCV. Meanwhile, they didn't know about their infection and had no clinical manifestations. The study concluded that taking medical history without screening for HBV and HCV might lead to treating infected patients as non infected and this can increase the risk of cross infection unless strict adherence to standard precautions is applied [9]. Another study conducted by reviewing literature done on occupational risks of viral infections in the operating room over the last 5 decades. Results revealed that the risks of viral infections remained the same as a decade ago [10]. Furthermore, a house-hold survey done in Damietta, Egypt, 2014, found that 1.1% of the participants were infected with HBV, 9.3% with HCV, and both infections co-existed in 0.4%. One of the main risk factors for both infections was exposure to dental procedures [11]. In addition, the continuous increase in the number of patients seeking dental clinics should give alarming signs to dentists and Dental Health Care Programs (DHCPs) for better awareness of extra-precautions required while treating the dental patients. These measures are needed for protecting both patients and staff members [12].

Although many guidelines and recommendations are issued by medical and dental societies as well as governmental organizations, studies illustrated that infection is not well controlled in some dental practices and hospitals [2].

Identifying KAP of patients towards infection control methods in dentistry is an important issue. A study done in Riyadh, Saudi Arabia, 2013, showed that most of their patients agreed that dentist should wear gloves, face mask and spectacles while providing dental treatment. However, smaller percentage knew that HIV/AIDS and HBV can be transmitted through dental practices [4]. Most of the studies done about infection control in dentistry were conducted among dentists or dental students [13]. Limited number of studies was done among

patients attending dental clinics in Jeddah. So, such study is needed.

**The objective of the study** was to determine the level of Knowledge, Attitude and Practice (KAP) of patients attending dental clinics about the cross infections and infection control measures in dentistry, King Abdulaziz University Hospital (KAUH), Jeddah.

## Methods

**Ethics statement:** The study was approved by the Institutional Review Board (IRB) of the Faculty of Dentistry, KAUH. Administrative approvals were taken and a written consent was taken from each accepted participant.

**A cross-sectional design** was conducted at the dental clinics of KAUH, during 2014. The study enrolled adult patients aged 18–60 years of both genders, who attended the dental clinics at the day of the interview and accepted to participate. The exclusion criteria included patients with severe illnesses and patients with mental diseases.

**A non-probability convenience** sample method was used. The sample size was calculated according the established formula for calculation from a cross-sectional study [14]. The minimum calculated sample size was 267 participants.

**A validated, confidential interviewing questionnaire** was used. The face and content validity of the questionnaire was assessed by 2 experts. The internal consistency reliability was assessed using Cronbach's  $\alpha$  and was found to be 0.84.

**The questionnaire contained 50 questions asked about:**

*Personal and socio-demographic data:* as age, sex, education, etc.

*Source of knowledge:* about infection and infection control in dentistry.

*Knowledge about dental cross-infection and infection control in dentistry:* Knowledge was assessed by asking twelve Multiple Choice Questions (MCQs); as an easy method for assessing patients' factual knowledge, understanding and interpretation [15]. The questions asked about infections that can be transmitted through dental practice; as HIV/AIDS, HBV, HCV, TB, MERS-CoV (modes of transmission, availability of vaccine if any, and infection control measures to prevent transmission in dentistry, etc.).

**Patients' attitudes** towards the required measures for prevention of cross-infection during dental care: attitudes were determined through patient's response to seven statements on a three-point Likert scale. These statements inquired about

participants' opinions regarding the importance of dentists wearing gloves, face mask and eye goggles (glasses) during dental practice. In addition, they were asked about their perceptions regarding the importance of replacing gloves after treating each patient, and after receiving phone calls, etc. Participants were inquired also about their opinions regarding protective measures and cross-infection during dental practice

**Patients' self reported practices:** participants were asked nine questions about their self-reported practices in some suggested situations. These situations as accepting receiving dental care from a dentist who is not immunized against HBV, or from dentist who treated other infected patients with HIV, HBV or HCV, or treated by a dentist who has HIV. In addition, they were inquired about their self-reported practice supposing that they catch infection(s) after visiting dental care.

**Participants were also asked about dentist's practice** regarding asking them about having any infectious disease.

**Statistical methods:** Data were analyzed using Statistical Package of Social Sciences (SPSS) Version 21 (SPSS Inc., Chicago, IL). For each knowledge question, a score of "1" was given for the correct answer and "0" for the incorrect or unknown answers. A total knowledge score was calculated and it ranged from 0 to 12. It was then classified into three tertiles:

- **Poor score:** <50% of the correct answers (<6/12 questions)
- **Fair score:** 50% – two-thirds of the correct answers (6–8/12 questions)
- **Satisfactory score:** >two-thirds of the correct answers (>8/12 questions).
- Descriptive and inferential statistics were done. Chi-square test was conducted to determine the associations between the categorical variables. All  $p$ -values <0.05 were considered statistically significant.

## Results

The response rate was 85%, and a total of 225 patients participated in the study, this occurred because those patients who attended the outpatient clinics were usually in hurry and apologized to complete the questionnaire. The mean age was  $31.6 \pm 13.3$  years. Concerning their source of information, 49.8% reported that they obtained their information about dental infection control from social media, followed by television (16.4%), books (10.7%) and friends (6.7%). Relatives, newspaper,

**Table 1** Relationship between the levels of knowledge about dental infection and the studied variables among dental patients attended King Abdulaziz University Hospital.

Knowledge level	Poor		Fair		Satisfactory		$\chi^2$	<i>p</i>
	No.	%	No.	%	No.	%		
Variables								
Gender								
Male	21	42.9	21	42.9	7	14.2	2.07	0.36
Female	68	38.6	66	37.5	42	23.9		
Age (in years)								
≤ 20	26	48.1	21	38.9	7	13	6.06	0.2
20–30	26	31.7	36	43.9	20	24.4		
>30	37	41.6	30	33.7	22	24.7		
Occupation								
Professional	8	25.8	15	48.4	8	25.8	2.87	0.34
Non-professional	81	41.8	72	37.1	41	21.1		
Income								
Less than Enough	11	44.0	4	16	10	40	9.06	0.06
Enough	74	39.6	76	40.6	37	19.8		
Enough and exceed	4	30.8	7	53.8	2	15.4		
Level of education								
≥ University	19	27.5	33	47.8	17	24.6	15.43	0.004
< University	44	50.6	21	24.1	22	25.3		
Student	26	37.7	33	47.8	10	14.5		

magazines and other sources represented 5.3%, 4.9%, 1.3% and 4.9%, respectively.

Regarding knowledge about dental infection and infection control in dentistry, 39.5%, 38.7% and 21.8% of the participants obtained poor, fair and satisfactory knowledge scores, respectively.

It is apparent from [Table 1](#) that females obtained a slightly higher percentage of satisfactory knowledge score compared to males. However, there is no statistical significant difference ( $p > 0.05$ ). On the other hand, students had the lowest level of knowledge compared to others ( $\chi^2 = 15.43$ ,  $p < 0.001$ ). Patients with a professional job had better level of knowledge compared to non-professional participants, but without statistical significant difference ( $p > 0.05$ ).

The majority of the participants had positive attitudes towards infection control measures required during dental practice. Most of the participants (71.2%) agreed that dentists should be vaccinated against HBV. Only 47.1% agreed on the importance of using prophylactic antibiotic prior to certain dental procedures among some infected patients. The majority of participants agreed that dentists should wear gloves while treating their patients (98.2%), and they need to replace gloves after receiving a phone call (80%). Similarly, 96.9% of the participants agreed that dentists need to wear face mask. Furthermore, 89.8% disagreed on that dentists can treat more than one patient with the same pair of gloves ([Table 2](#)).

Results found that the commonest known methods of disinfection of dental instruments were by autoclaving (51.6%), followed by the using of disinfectant agents (28.9%), boiling (15.6%) and washing (1.3%). On the other hand, 2.6% of patients did not know any method.

Regarding participants' self-reported practices, [Table 3](#) shows that only 9.3%, 13.3% and 16.4% of the participants would ask the dentists about sterilization of the dental instruments, wearing facemask and gloves (supposing not wearing), respectively.

Concerning patients' self reported practice supposing occasion of catching infection after visiting a dental clinic, 41.3% said that they would inform the dentists themselves, 27.6% inform hospital administrators and 17.8% inform the Ministry of Health. On the other hand, 13.3% will have nothing to do.

The majority of participants perceived that wearing gloves and face masks will protect both patients and dentists. Similarly, about three-fourths of the participants perceived that dental infection can be transmitted to both dentists and patients ([Fig. 1](#)).

Concerning patients' self-reported practice, supposing a situation in which a dentist not-immunized against HBV will treat them, 24% of patients said that they would not mind to receive the treatment, 19.1% said that they will reject it, while 56.9% would not bother themselves by asking about this.

**Table 2** Attitudes of patients attended dental clinics of King Abdulaziz University Hospital about the infection control measures.

Degree of agreement	Agree		Neutral		Disagree	
	No.	%	No.	%	No.	%
Dentists should be vaccinated against HBV	160	71.2	37	16.4	28	12.4
Dentists need to give prophylactic antibiotics to some patients prior to some procedures	106	47.1	40	17.8	79	35.1
Dentists should always wear gloves while treating patients	221	98.2	1	0.4	3	1.3
Dentists should replace gloves after receiving phone calls	180	80	8	3.6	37	16.4
Dentists can treat more than one patient with the same gloves	15	6.7	8	3.6	202	89.8
Dentists should always wear face mask when treating patients	218	96.9	2	0.9	5	2.2
Dentists should wear eye goggles when treating patients	123	54.7	25	11.1	77	34.2

## Discussion

To the best of our knowledge, this is the first study done in Jeddah for assessing the KAP of dental patients regarding cross-infection and infection control in dentistry.

Following infection control guidelines and applying the required protection can prevent most of the unintentional exposure in dental care. Standard practices, and use of proper precautions, pre-exposure immunization and post-exposure prophylaxis are also vital for preventing transmission of blood borne infections and other dentally acquired cross-infections [16,17].

In the current study about two-fifths of the participants obtained poor knowledge score about dental infections and infection control in dentistry. Similarly, another study from Sudan revealed that dental patients had low knowledge about HIV/AIDS [18].

The level of the patients' education about health is rising as their concern for protection during receiving treatment increasing [19]. In the current study, the educational level of the participants was significantly associated with their level of knowledge about infection control in dentistry. Furthermore, females obtained a slightly better knowledge score compared to males (but without significant difference). These results agree with the results of Bârlean, et al. from Romania [19].

In the present the most of our participants had positive attitudes towards dentist using of barrier methods (gloves, facemask, and eye glasses) to prevent spread of infection during dental practice. It was found that 96.9% and 54.7% of the participants perceived necessity of dentist using facemask and protective eye glasses during providing dental care, respectively. Our results agree with the results of other recent study from Riyadh, KSA [4]. On the other hand, our results are much better

**Table 3** Self-reported practices towards infection control measures in dental clinics among dental patients attended King Abdulaziz University Hospital.

Response	Yes		No, I do not mind		No, I am afraid		No, I am shy		No such occasion	
	No.	%	No.	%	No.	%	No.	%	No.	%
Ask the dentist about the way they sterilize instruments	21	9.3	20	8.9	6	2.7	11	4.9	167	74.2
Ask the dentist to wear a face mask if not wearing it/them	30	13.3	25	11.1	4	1.8	42	18.7	124	55.1
Ask the dentist to wear gloves if he isn't wearing it/them	37	16.4	10	4.4	2	.9	22	9.8	154	68.4



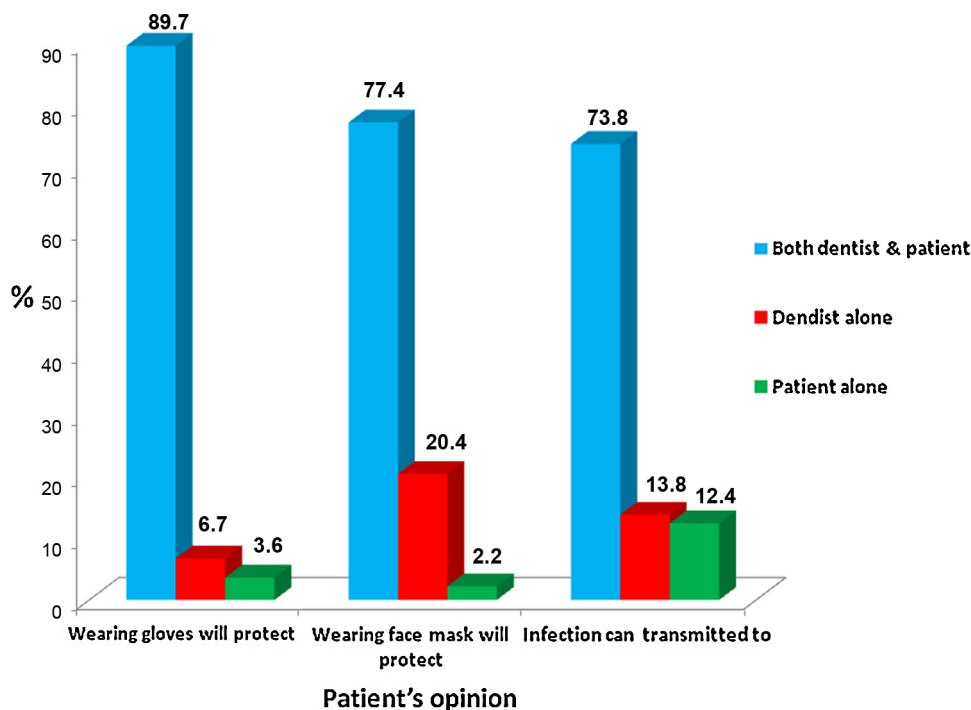


Fig. 1 Opinions of patients attended dental clinics of King Abdulaziz University Hospital regarding protective measures and cross-infection during dental practice.

than older studies reported from Egypt [20] and from a comparative study done among patients from UK and Hong Kong [21]. This discrepancy may be attributed to lack of adequate information, or less phobia against dental cross-infection during the time of conduction of the previous studies. Similarly, almost all our participants perceived dentist using gloves during providing dental care as an important protective measure, which agrees with the study of Riyadh [4]. However, these results are much better than many other older studies [20,22–25], and this may be due to the same reasons.

The majority (89.8%) of our participants agreed that wearing gloves by the dentist during dental care will protect both dentist and patient. The corresponding percentages from Nigeria [23] was only 64.0%. On the other hand, Bowden et al. [26], reported that only 31% of their patients believed that wearing gloves can protect the dentist from patient. This inconsistency may be also due to the time of conduction of their study.

Regarding self-reported practices, more than half of our participants said that they would refuse receiving dental care from a dentist who treated other patient infected with HIV, Furthermore; about 70.0% would refuse receiving treatment from a dentist who is infected with HIV. Sofola, et al. [27] reported similar results among Nigerian patients.

On the other hand, it was reported that half of Indian patients would not attend a clinic that HIV/AIDS and HBV patients were treated [28].

The present study showed that the commonest source of participants' information about dental infections came from social media, followed by television, newspapers and magazines. Similarly, other study done on other health problem in Jeddah showed that social media is the main source of information [29]. Social media is considered nowadays an effective and accessible method to spread information and raise public awareness about health and diseases [29]. These findings highlight the importance of use of such sources in spreading health information. On the other hand, Grace et al. [25] reported that newspapers and magazines followed by television were the commonest source information among patients from Maryland, USA. The cause of this discrepancy may be due to time of conduction of both studies; with increasing use of social media nowadays. The cause of their higher source of information that obtained from television may be due to conduction of programs about infection control in Maryland at that time.

Sterilization and disinfection of instruments are of utmost significance in dental offices, for preventing the transmission of infection from patient to patient and from instrument to patient [4]. In

the present study, more than half of the respondents knew autoclaving as a method of disinfection of the dental instruments. This response is much better than results from the study of Riyadh; as only about one-fourth of their participants knew that autoclave is the best method of sterilization [4].

## Conclusion

A good attitude towards infection control in dentistry was prevailed among patients attending dental clinics of KAUH. Knowledge and the self-reported practice need some improvement. The main source of patients' information was social media.

Patients attended dental clinics need to be equipped with better knowledge about cross-infection in dentistry through educational programs which can include both providers and consumers. It can be mainly through social media to increase public awareness about cross-infections among large number of population. It can be done also through TV programs, public places, university, schools and shopping malls. These programs can help in elimination of dental infection through increasing awareness of both consumers and providers about the required protection measures.

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## Competing interests

None declared.

## Ethical approval

The study was approved by the Institutional Review Board (IRB) of the Faculty of Dentistry, KAUH. Administrative approvals were taken and a written consent was taken from each accepted participant.

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