

# Evaluation of Infection Control Measures of Iraqi Dentists in Dental Practices

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## Abstract

**Objectives:** The objective of this study was to investigate the knowledge, attitudes, and behavior of Iraqi dentists in Al-Najaf City regarding infection control measures.

**Materials and Method:** A questionnaire was designed to obtain information about procedures used for the prevention of cross infection in dental practices. The study population included all dentists in Al-Najaf City, Iraq, in September 2019 (n=500) to whom the questionnaires were distributed. The questionnaire was designed to collect data on sociodemographic characteristics, knowledge and practice of infection control procedures, cleaning, disinfection, sterilization, hand hygiene, use of personal protective equipment, immunization, prevention and handling of occupational hazards, and antisepsis.

**Results:** From the 500 dentists to whom the questionnaires were submitted, 372 participated in the study (overall response rate 74.4%). Half of the dentists (50%) expressed concern about risks of infection transmitted in dental practices. The rate of vaccination against hepatitis B was good among dentists (76%). Iraqi practitioners widely apply certain basic infection control measures, such as hand washing (85%) and wearing gloves (90%) and face masks (84%), but poorly address other important issues, such as examining medical history records (65%), wearing protective eye wear (41%) and disposable gowns for surgery (30%), and using rubber dam (18%), preoperative mouth rinses (25%) and puncture-resistant containers (34%).

**Conclusions:** The knowledge, attitude, and behavior of Iraqi dentists about infection control measures are relatively weak. Improved compliance with recommended infection control measures is required for all dentists. Continuing education programs and short courses/workshops about cross infection and infection control measures are important to improve the knowledge, awareness, attitude, and behavior of Iraqi dentists.

**Keywords:** *Infection control measures, knowledge, attitude, Iraqi dentists.*

## Introduction

Infection control is an important concern in all healthcare services worldwide. In dentistry, healthcare workers and patients are vulnerable to different types

of pathogens, such as human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), mycobacterium tuberculosis, staphylococci, streptococci, herpes viruses, and varicella-zoster virus, during dental procedures through direct contact with blood, oral fluids, saliva, and airborne droplets containing infectious agents or indirect contact with contaminated instruments, equipment, and environmental surfaces (1,2). Health organizations, such as the Center for Disease Control, Occupational Safety and Health Administration, American Dental Association, National Sanitary Department, and National Institute of Health and Clinical Excellence have established precautionary guidelines to

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provide a safe environment and prevent transmission of infections among dental healthcare workers and patients. These guidelines should be followed and applied in all dental activities for all patients regardless of their infection conditions (3,4,5,6). Several factors, such as knowledge, educational background (7,8), lack of motive, costs (9), professional and sociodemographic variables(10,11), and availability and access to required materials and equipment (12,13) affect compliance with effective infection control measures by dental healthcare workers. Despite many studies about infection control procedures in several countries, no such research on dental infection control measures has been conducted in Iraq. Consequently, the goal of this study was to evaluate infection control measures of Iraqi dentists in dental practices.

### Materials and Method

The study was conducted as a descriptive survey of infection control measures in the dental practices of Iraqi dentists in Al-Najaf City. A self-administered questionnaire was designed to assess the knowledge, attitude, and practices of infection control measures by dentists. The questionnaire was pretested, revised, and retested before use. The study population included all dentists in Al-Najaf City, Iraq, in September 2019 (n=500) to whom the questionnaires were distributed. Three researchers gathered questionnaire data by face-to-face interviews. No tracking system was used to determine who responded to ensure anonymity. The questionnaire used in this study was adapted from similar previous studies(20,21). Institutional ethical committee approval was obtained before administration of the questionnaire. The questionnaire consisted of 26 questions involving the following: **Part 1** included general information about gender (female/male) and type of practice (general practitioner/specialist). **Part 2** sought infection control knowledge and awareness (sources of infection control knowledge, infectious diseases, transmission of infection, records of patient medical history, and dentist HBV vaccination). **Part 3** recorded hand hygiene practices and use of personal protective equipment (washing hands, using gloves, protective eyewear, mask, head cover, and disposable gowns) and control of aerosol (use of rubber dam, high-volume evacuator, and preoperative mouth rinses). **Part 4** noted practices on cleaning, disinfection, and sterilization of dental instruments and recorded incidences of injuries due to use of sharp objects and use of puncture-resistant containers for disposal of

sharp instruments. Questionnaire data were collected and analyzed using SPSS software version 25/2017. Descriptive statistics included frequency distributions and percentages. Inferential statistics, including Chi-square test, was used to assess statistical significance according to gender and type of practice.

### Results

Out of the 500 dentists to whom the questionnaires were distributed, 372 participated in the study, with an overall response rate of 74.4%: 247 (66%) of the respondents were women, and 125 (34%) were men. One hundred sixty (43%) of the respondents were specialists, and 212 (57%) were general practitioners. The sociodemographic characteristics of the participants are shown in (table 1).

**Table 1: Sociodemographic characteristics of dentists**

Characteristic		N	%
Gender	Female	247	66
	Male	125	34
Type of practice	Specialist	160	43
	General Practitioner	212	57

**Table 2: Knowledge, attitude, and behavior of dentists relative to infectious diseases.**

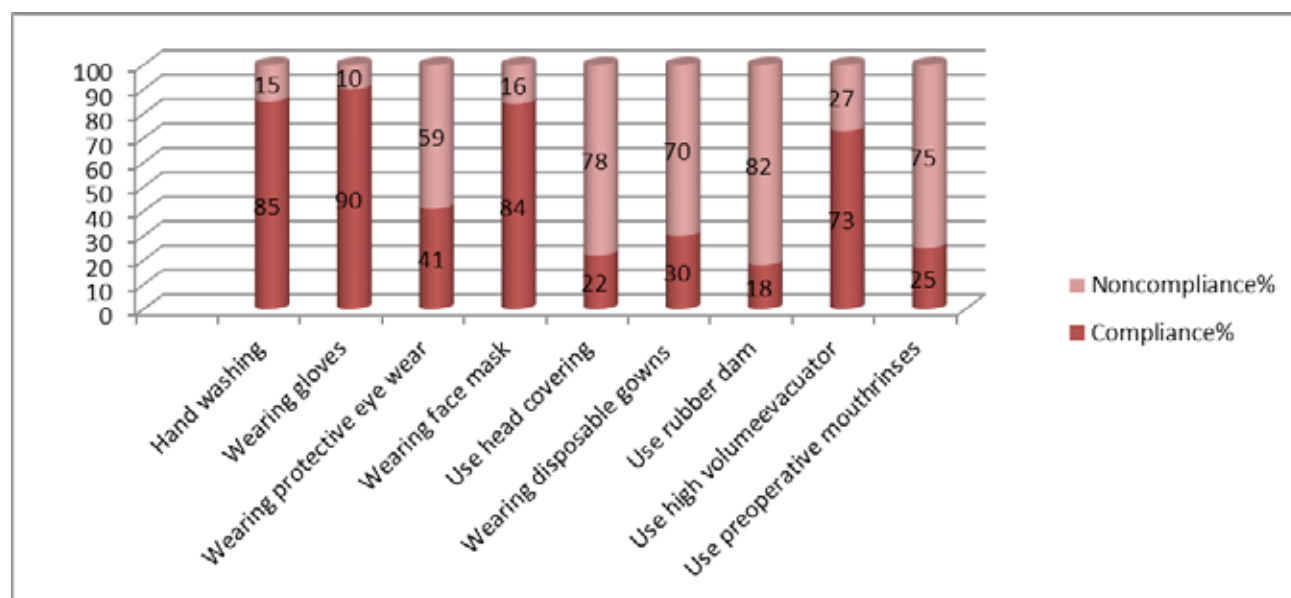
Q	N	%
<b>Source of knowledge about infection control</b>		
Dental school courses	190	51
Scientific meetings	89	24
Postgraduate courses	71	19
Dental journals	15	4
Other	7	2
<b>Infectious diseases considered important by the Participants</b>		
HIV(AIDS)	165	44
HBV, HCV	151	41
Mycobacterium tuberculosis	36	10
Neisseria gonorrhoeae	12	3
Treponema pallidum	8	2
<b>Knowledge about transmission of infectious diseases</b>		
Infection can be transmitted in dental practice	186	50
Infection can be transmitted through splatter/splash	110	30
Infection can be transmitted through percutaneous route	76	20

Q	N	%
<b>Asking about medical history</b>		
Yes	242	65
No	130	35
<b>Asking about dentist's vaccination against Hepatitis B</b>		
Yes	281	76
No	91	24

(Table 2) illustrates the knowledge, attitude, and behavior of the participating dentists concerning infectious diseases. The main source of knowledge related to infection control was dental school courses (51%) and scientific meetings (24%). About 44% and 41% of the participants considered HIV and HBV, HCV as the most serious potential threats in dental practices. Half of the participants expressed concern about risks of infection transmitted in dental practices. The mode of transmission through splatter was recognized by

30% of the participants, whereas the percutaneous route was acknowledged by only 20%. About 65% of the participants reported reviewing the medical history of their patients prior to initiating treatment. The rate of vaccination against HBV was good among dentists (76%).

(Figure 1) summarizes the compliance of the surveyed dentists with hand hygiene practices, use of personal protective equipment and aerosol control. Hand washing (85%) and wearing gloves (90%) and face masks (84%) were more widely implemented by most participants, whereas protective eyewear (41%), head covering (22%), and disposable gowns for surgery (30%) were less widely applied. Low rates of using rubber dam (18%) and preoperative mouth rinse (25%) were observed, whereas (73%) of the dentists used high-volume evacuators.



**Figure 1: Graph summarizing hand hygiene practices, use of personal protective equipment, and aerosol control.**

Table 3 shows the cleaning, disinfection, sterilization practices, the incidence of accidents in using sharp instruments during the previous year, and use of puncture-resistant container for disposal of sharp instruments among dentists. Most dentists (83%) depended on manual washing to clean used instruments. Instruments were immersed in decontaminant solutions mainly before washing (67%). Autoclaving was the preferred means of sterilization (64%), but some dentists still used dry heat sterilizers (36%). Participants used heat sterilization

for burs (49%) and for endodontic files (62%). Nearly half (49%) of the surveyed dentists applied barriers for dental unit surfaces, whereas (41%) used wrapping bags for instrument sterilization. Routine wiping of working surfaces with surface disinfectant was reported by (75%) of the participants. Accidents involving the use of sharp instruments were experienced by more than half of the participants (59%). Special puncture-resistant containers for disposal of sharp instruments were used by (34%) of the surveyed dentists. Potential correlations between

sociodemographic characteristics (gender and type of practice) and HB vaccination, hand hygiene, and use of personal protective equipment were evaluated using Chi-square test (Table 4). Female dentists reported a higher rate of wearing protective eyewear ( $p = 0.000$ ) and face mask ( $p = 0.012$ ) than their male counterparts, whereas general practitioners reported a higher rate of HB vaccination ( $p = 0.023$ ) than specialists.

**Table 3: Cleaning, disinfection, sterilization practices, accident of sharp instruments during last year, and use a puncture resistant container.**

Q	N	%
<b>Method of cleaning used instruments</b>		
Manual washing	308	83
Ultrasonic cleaner	49	13
Washer disinfectant	15	4

Q	N	%
<b>Timing of immersion of the used instruments in decontaminant solution</b>		
Before washing	249	67
After washing	123	33
<b>Kind of sterilizer used</b>		
Autoclave	238	64
Dry heat	134	36
Use of heat sterilization for burs	182	49
Use of heat sterilization for endodontic files	231	62
Use of wrapping bags for instruments sterilization	152	41
Use of surface barriers for dental unit surfaces	184	49
Use of any surface disinfectant for routine wiping	279	75
Any accident of sharp instruments during last year	219	59
Use a puncture resistant container for sharp instruments	127	34

**Table 4: Correlations between sociodemographic characteristics (gender and type of practice) with HB vaccination, hand hygiene and use of personal protective equipment.**

Q	Females		Males		Comparison		Specialist		General Practitioner		Comparison	
	N	%	N	%	X <sup>2</sup>	p-value	N	%	N	%	X <sup>2</sup>	p-value
Dentist's HB vaccination	185	66	96	34	0.162	0.687	130	46	151	54	4.958	0.023
Hand washing	216	68	100	32	3.602	0.058	140	44	176	56	1.432	0.231
Wearing gloves	225	67	110	33	0.887	0.346	144	43	191	57	0.001	0.974
Wearing protective eye wear	120	79	31	21	19.468	0.000	70	46	81	54	1.162	0.281
Wearing face mask	215	69	96	31	6.354	0.012	136	44	175	56	0.400	0.527
Wearing disposable gowns	75	68	36	32	0.097	0.755	52	47	58	53	1.157	0.282

### Discussion

Dentistry is a profession that involves constant risk of exposure to various environmental and human infectious agents that can be transmitted through blood, oral and oropharyngeal secretions, air, and water<sup>(14)</sup>. Contamination can affect dentists, patients, and even members of their family. Occupational hazards involving blood and other organic fluids account for the most frequent exposure, resulting in a high risk of contracting diseases, such as HIV, HBV, HCV, mycobacterium tuberculosis, staphylococci, streptococci, herpes viruses, and other viruses and bacteria<sup>(15,16)</sup>. Given these facts, we highlighted several actions that must be applied to reduce the risks in dental practices: (I) cleaning, disinfection, and sterilization; (II) hand hygiene practices and use of

personal protective equipment; (III) immunization; (IV) prevention and handling of occupational hazards; and (V) antisepsis<sup>(17,18)</sup>.

In this study, Iraqi practitioners widely applied certain basic infection control measures, such as hand washing (85%), wearing gloves (90%) and face masks (84%), and using high-volume suction (73%) but poorly addressed other important issues, such as reviewing medical history records (65%); wearing protective eyewear (41%), head covering (22%), and disposable gowns for surgery (30%); sterilization of burs (49%) and endodontic files (62%); and using wrapping bags for instruments (41%), surface barriers for dental unit surfaces (49%), rubber dam (18%), preoperative mouth rinses (25%), and puncture-resistant containers (34%).

Similar findings are reported by previous studies. For example, Al Rabeah and Mohamed<sup>(19)</sup> showed that all dentists in Riyadh use gloves, 90% wear masks, 49.8% use high-volume suction, and 56.20% utilize puncture-resistant containers. Yuzbasioglu et al.<sup>(20)</sup> stated that 5.20% of Turkish dentists prefer rubber dam, 13.90% apply pre-procedural mouth rinses, 41.60% use high-volume suction, and 37.80% utilize puncture-resistant containers. Dagher et al.<sup>(21)</sup> reported that dentists in Lebanon wear gloves (92.4%), masks (89.1%), and eyewear (45.7%) and use rubber dam (20.8%), preoperative mouth rinses (51.0%), and high-volume evacuators (71.4%). In this study, 44% of the surveyed dentists considered HIV as the most worrisome infectious disease; by comparison, 41% considered HBV as the most serious infectious disease. However, the risk of acquiring HBV is reportedly considerably greater than that of HIV among non-immune dental anesthesiologists<sup>(22)</sup> and the mortality risk of HBV infection is greater than that of HIV<sup>(23)</sup>. Although the microorganisms listed in Table 2 are important in dental practice, the dentists that participated in this survey had inadequate knowledge of the risks they pose. Half of the surveyed dentists were aware of infectious risks associated with dental procedures and had good rate of HBV vaccination (76%) comparable with those observed in developed countries<sup>(21)</sup>. The wide application of manual washing to clean used instruments (83%) is likely associated with incidences of accidental percutaneous injuries (59%) among the surveyed dentists. However, adherence to several specific infection control practices, such as use of protective eye wear and wearing face mask, is remarkably different between genders, with women showing better compliance than their male counterparts. This finding coincides with the results of previously published surveys<sup>(11)</sup>. With regard to HB vaccination, general practitioners showed better compliance than specialists because HB vaccine in Iraq is usually available in governmental dental health centers where general practitioners work. Thus, obtaining vaccines is easier for general practitioners than for dental specialists.

### Conclusion

The knowledge, attitude, and behavior of Iraqi dentists about infection control measures are relatively weak. This situation indicates that cross infection control topics do not elicit interest among dentists, or a deficiency exists in continuing dental education on how to avoid cross infection in dental practices. Further studies should be designed to identify the reasons.

Improved compliance with recommended infection control measures is required for all dentists. Continuing education programs and short courses/workshops about cross infection and infection control procedures are important to improve the knowledge, awareness, attitude, and behavior of Iraqi dentists.

**Conflict of Interest:** None

**Funding:** Self

**Ethical Clearance:** Not required

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