

Knowledge, Attitude, and Practice of Infection Control among Dental Healthcare Personnel: The Updated Guidelines for COVID-19 in Dental Settings

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ABSTRACT

Aim: The study sought to evaluate the knowledge, attitude, and practice of infection control among dental healthcare personnel (DHCP) in dental settings, with updated guidelines and recommendations regarding the coronavirus disease (COVID-19) pandemic.

Materials and methods: This was an observational cross-sectional study. A self-administrative online survey consisting of 45 close-ended statements was prepared, validated, and revised by an expert panel, and pilot tested with a convenience sample. The survey comprised four parts covering the following aspects: demographic data, infection control facilities in the dental office, knowledge of infection control measures, and attitude toward infection control. Data were collected, analyzed, and presented as frequencies and percentages or means and standard deviations, when applicable. The independent *t*-test or analysis of variance (ANOVA), as appropriate, were used for differences in knowledge and attitude scores between the groups, with the significance level of *p*-value < 0.05.

Results: Out of 176 participants, 54 (30.7%) were men, and 122 (69.3%) were women. A total of 143 participants were dental practitioners (81.3%), and more than half [94 (53.4%)] were from governmental universities, followed by those from government dental clinics [44 (25%)]. In general, most participants acknowledged the infection control facilities in their dental offices. Dental assistants, respondents working in private universities, and respondents working in the eastern region showed better knowledge than their counterparts (*p* < 0.05). However, no significant differences were noticed between the different groups concerning attitude toward infection control (*p* > 0.05).

Conclusion: The participants exhibited acceptable knowledge and attitude, with respondents from private universities and dental assistance attaining better knowledge scores. More infection control programs and training courses should be implemented in dental settings.

Keywords: Attitude, Compliance, Coronavirus disease, Dental knowledge, Dental students, Infection control.

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CLINICAL SIGNIFICANCE

In clinical practice, the DHCP are highly exposed to infectious diseases, including COVID-19. Therefore, knowledge regarding infection control measures and their practice are important to avoid the risk of infection transmission.

INTRODUCTION

Oral health care is essential for our general health. Occasionally, oro-dental examination can reveal signs and symptoms of certain conditions or systemic diseases. The DHCP must possess knowledge and skills to deal with noninfectious or infectious patients to prevent or reduce cross-contamination in dental settings. The oral cavity hosts a number of pathogenic microorganisms that can cause severe infections and diseases.^{1,2} Hence, dental healthcare providers must maintain proper cleanliness in their practice, with a particular focus on infection control and prevention measures.

The World Health Organization (WHO) defines the Infection Prevention and Control (IPC) as “a scientific approach and practical solution that aims to prevent the harm caused by infection to patients and health workers.” The IPC is at a remarkable position in the patient safety and quality universal health coverage given its relevance to both health workers and patients at every healthcare encounter.³ In dental practice, the patient and the dentist face a high chance of exposure to infection either through direct or indirect contact between them; needle injury, which is caused by insufficient sterilized equipment, is an example of

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exposure involving contaminated supply and the most common injury in dental clinics.⁴ In addition, air-borne pathogens can cause respiratory tract diseases, such as pneumonia caused by *Streptococcus* or tuberculosis (TB). Cross-infection control in dental settings is a critical issue that should be practiced daily by following the recommendations and guidelines provided by “Centers for Disease Control and Prevention (CDC)” and recommendations of “Occupational Safety and Health Administration.”

In December 2019, new viral infection (COVID-19) caused by coronavirus “severe acute respiratory syndrome coronavirus 2 virus” spread in Wuhan, China. The WHO has recently classified COVID-19

as a global pandemic. The pathogen involved is responsible for symptoms of acute infection of the respiratory tract and can spread quickly via air (breathing).⁵ It is well-known that dental procedures can generate a huge number of droplets and aerosols. However, the standard protective measures practiced in the daily clinical work are not effective in preventing the spread of COVID-19, especially when patients are in incubation period or when clinical symptoms are absent in the patient. Although COVID-19 patients are identified or suspected, dental health professionals still potentially face the high risk of exposure during aerosol-generating procedures, particularly during face-to-face contact with patients. Notably, infection control can be achieved by standard guidelines to reduce the risk of exposure to COVID-19.⁶ Implementation of universal precautions in dental surgeries effectively prevents microbial pollution and cross-contamination. This practice is strongly supported by organizations, such as the WHO, CDC, and American Dental Association (ADA). Furthermore, following the universal precautions, the careful prescreening of patients and the additional preventive measures are necessary before dental treatment.^{7,8} Improvement of infection controls in the last centuries has been remarkable due to evidence-based guidelines for reducing healthcare worker-associated infections and antimicrobial resistance.^{9,10}

A study by Goriuc et al.¹¹ explain the new guidelines that most dental clinic perform such as patient screening and temperature control, air purification, hand sanitizing, and the use of protective equipment and physical barriers, but not all the countries follow these guidelines. It depends on the number of affected cases in their region; if it increases, they will go to follow the emergency plan that very stick to the guidelines. For example, in the Kingdom Saudi Arabia (KSA), during the pandemic, persons cannot go to work or any place without app that shows if you have got contacted with affected person or not. Since we still living in the pandemic, even though we are living in stable conditions, we need continuous education about the infection control in dental office.

With the current recurrence of COVID-19, recommendations toward the IPC are highly emphasized to prevent the spread of the disease.¹²⁻¹⁵ Studies related to the IPC in dental settings after the COVID-19 pandemic are lacking. The current study aimed to assess the knowledge, attitude, and practice of infection control among the DHCP in dental settings, with updated guidelines and recommendations concerning the COVID-19 pandemic. The study focused on answering the following statements/questions: What are the facilities provided in dental settings? What chart is used for documentation of routine checkups and reporting of accidental injury in dental settings? To what extent are the DHCP practicing guidelines and regulations to prevent infectious diseases, particularly during the COVID-19 pandemic?

MATERIALS AND METHODS

An observational cross-sectional study was conducted among the DHCP and completed in November 2022. Before commencing the study, an ethical approval was obtained from the Institutional Review Board (IRB), Riyadh Elm University (SRS/2020/26/204/199). The survey was designed to obtain information about infection (facilities) in dental office and knowledge and attitude toward the DHCP. Inclusion criteria included dentists, dental hygienists, dental assistants, dental laboratory technicians (in-office), students, and trainees, all are termed as oral healthcare personnel (DHCP). However, medical professionals who were not involved in providing dental care, such as doctors, nurses, radiologists, laboratory

technicians, and scientists as well as dental students not yet enter the clinic were excluded. Participants from students who start practicing in the clinic and dentist practitioners were classified in the same category because we are looking in general aspect who have good knowledge regarding the guidelines of COVID-19 in dental settings at that time and how they perform these in the dental clinic. The questionnaire was distributed through links designed in Google Forms, and data protection and anonymity were guaranteed. The option "Show link to submit another response" was disabled to make the Google Form more reliable. The questionnaire was self-administered in English-language and consisted of 45 close-ended statements. The statements were obtained and modified based on the general guidelines for infection control of the CDC and recommendations of the Occupational Safety And Health Administration (OSHA). The survey comprised four parts covering the following aspects: 5 demographic questions (the first section), 10 questions assessing infection control facilities in dental offices (the second section), 16 questions investigating the knowledge of infection control measures (the third section), and 14 questions about attitude toward infection control in the dental office (the fourth section). The questionnaire was validated and revised by an expert panel in the field of health, who corrected and modified several statements with a type of face validity. The questionnaire was then pilot tested among 41 participants to explore the clarity of questions, completeness of response options, the suitability of time required to complete the questionnaire, and the feasibility of data collection technique. The sample of the pilot study was excluded in the final results.

The internal consistency of questionnaire items was tested using Cronbach's α and considered acceptable if the α value was $\geq 70\%$. The collected data were then analyzed and presented in frequencies and percentages (for categorical variables) or means and standard deviations (for continuous variables). Differences between knowledge and attitude scores among groups were tested using independent *t*-test and the ANOVA, as appropriate. A *p*-value < 0.05 was considered significant for all tests.

RESULTS

A total of 176 DHCP participated in this study, of which 54 (30.7%) were men, and 122 (69.3%) were women. Most participants were dental practitioners (143 [81.3%]), whereas dental assistants accounted for 18.8% (33). More than half of the participants were from public universities (53.4%), followed by those from public dental clinics (25%). [Table 1](#) provides additional details regarding the participants.

[Table 2](#) shows the acknowledgment and availability of infection control facilities in the dental setting. The results revealed that more than half of the participants ($n = 105$; 59.7%) noticed the availability of infection control units in their dental clinics. Almost two-thirds (67.6%) of the dental team constantly use personal protective equipment, 28.4% reported occasionally using it, and 1.1% never do. A total of 9.1% of the participants never had biohazardous waste for discharged teeth and contaminated blood in their clinics. Moreover, 16.5% of the participants never had a chart diagram for sharp injuries in their unit, whereas 19.3% reported occasionally having it. Meanwhile, 90.9% of the respondents exhibited and acknowledged the availability of containers for sharp objects in their dental unit.

[Table 3](#) compares the knowledge of infection control measures among the dental team. The mean knowledge scores between genders and age-groups were not statistically significant

Table 1: Demographic variables of the study participants

Variables	n	%
Gander		
Male	54	30.7
Female	122	69.3
Age		
20–35	153	86.9
Above 36	23	13.1
Professional status		
Dental practitioner	143	81.3
Dental assistant	33	18.8
Area of work		
Public university	94	53.4
Private university	27	15.3
Public dental clinic	44	25
Private dental clinic	11	6.3

Table 3: Comparison of mean knowledge scores among different groups

Variables	Mean	SD	p
Gender			
Male	1.94	4.21	0.176
Female	3.08	5.13	
Age			
20–35	2.58	4.80	0.265
Above 36	3.78	5.38	
Professional status			
Dental practitioner	2.03	4.28	<0.001
Dental assistant	5.79	6.12	
Area of work			
Government university	2.57	4.73 ^a	<0.001
Private university	6.07	6.04 ^b	
Government dental clinic	1.14	3.32 ^a	
Private dental clinic	2.27	5.06 ^{ab}	

Different superscript letters refer to significant difference at p -value < 0.05

Table 2: Responses to the acknowledgement of the infection control facilities in the dental office

Questions	Always	Occasionally	Never	I don't know
The infection control unit available in my dental clinic when need guidance and consultations unit	105 59.7%	44 25.0%	5 2.8%	22 12.5%
Sterilizers center unit work sufficiently in my dental clinic	127 72.2%	40 22.7%	5 2.8%	4 2.3%
Sterile hand soap and hand disinfection for hand cleaning are available in my dental clinic	152 86.4%	19 10.8%	2 1.1%	2 1.1%
Personal Protective Equipment (PPE) its available in my dental unit	119 67.6%	50 28.4%	6 3.4%	1 0.6%
Sharp hazard containers are available in my dental unit	160 90.9%	14 8.0%	0 0.0%	2 1.1%
Biohazardous waste for discharged teeth and blood contaminated is available in my dental unit	120 68.2%	25 14.2%	16 9.1%	15 8.5%
Chat on universal and standard precaution measures is displayed in my unit	97 55.1%	35 19.9%	14 8.0%	28 15.9%
Chart diagram for sharp injuries is displayed in my unit	86 48.9%	34 19.3%	29 16.5%	26 14.8%
Goggles and face shield are available whenever I need them	26 14.8%	11 6.3%	3 1.7%	1 0.6%

($p > 0.05$). However, dental assistants were more knowledgeable than dental practitioners ($p < 0.001$). Respondents who worked in private universities were notably well-informed compared with their counterparts ($p < 0.05$). Almost equal mean attitude scores were noticed among all groups, with no significant differences (Fig. 1).

DISCUSSION

As infectious diseases rapidly spread worldwide, e.g., COVID-19, healthcare practitioners are expected to possess sufficient

knowledge and attitude to prevent and control such conditions. Dental healthcare practitioners come into close contact with other people most of the time and therefore have a high chance of being exposed to respiratory droplets and/or aerosols, which are the primary transmission route of COVID-19. This study was conducted to evaluate the knowledge of the DHCP regarding the management of infectious diseases in the dental setting in the era of COVID-19. Our results showed overall good knowledge and attitude toward infection control measures, whereas a fair result was obtained for the acknowledgment of infection control facilities, which indicates the need for improvement. The lack of knowledge can be due to

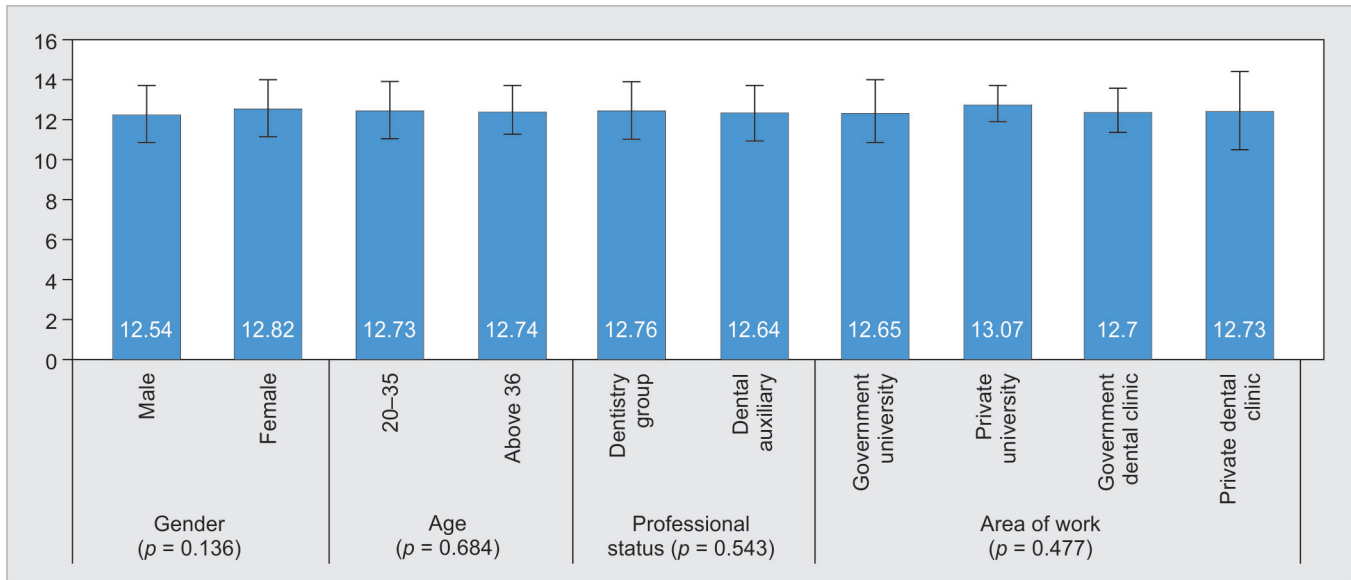


Fig. 1: Comparison of mean attitude scores among different group

insufficient teaching courses in colleges or weak supervision and observations. The study of Alharbi et al.¹⁶ regarding knowledge, attitude, and compliance to infection control guidelines by students and faculty members revealed the lack of knowledge in basic infection control standards. Furthermore, Assiri et al.¹⁷ showed a similar result among dental students. Both studies assured the importance of additional training and educational intervention regarding infection control. Private universities showed the most positive results with excellent knowledge and positive attitude toward infection control measures. This finding can be due to the emphasis on policies and guidelines of infection control by private universities as a teaching institute. Public dental clinics showed poor mean scores on knowledge of infection control measures, which can be due to the disregard for the need for strict protocols and guidelines toward infection control or the lack of awareness of their importance. Respondents aged above 36 years old showed slightly higher mean knowledge scores than younger respondents, and this result may be attributed to their years of clinical experience and degree.

Another study conducted at King Saud University among dental faculty members and students revealed acceptable attitude and compliance levels; specifically, faculty members showed higher attitude scores, students exhibited a higher compliance, whereas a fair knowledge level was observed in both groups.¹⁸ Our study revealed that private universities exhibited excellent knowledge compared with public universities. A study conducted on cross-infection control procedures implemented by Turkish dentists concluded their relatively weak knowledge on the matter.¹⁹

According to a recent study in Wuhan, China, the DHCP must constantly be aware of infectious threats that challenge the current infection control regimen, especially in dental practices and schools of dental medicine.²⁰ Another study in Italy stated that the DHCP can play an essential role in stopping the transmission chain if they are fully aware of infectious diseases and their modes of transmission.⁵ Cross-contamination occurs in multiple ways, including direct,

indirect, through droplets generated from dental procedures, and air-borne transmission (Fig. 2). Direct transmission can occur with saliva and blood as major vectors. By contrast, indirect transmission “is associated with accidental punctures made by contaminated needles or injuries by sharp instruments, such as the tip of explorers or scalars.” The spraying of hand-pieces in the dental unit can result in droplet infection. However, air-borne transmission, such as that of TB, “is different from droplet transmission because it refers to the presence of microbes within droplet nuclei, which are generally include particles <5 μm in diameter and can remain in the air for long periods and be transmitted to others over distances greater than 1 m.”

During the COVID-19 pandemic, the ADA suggested that “all elective dental procedures be deferred and only patients with true dental emergencies be treated.”²¹ Several published reports have segregated dental healthcare workers based on their level of qualification while assessing their knowledge of viral infections, such as COVID-19.¹⁶ Quadri et al. concluded that the DHCP in Saudi Arabia have appropriate basic information on COVID-19.⁹ The current study aimed to obtain updated information for the assessment of knowledge level of the dental team and their clinical skills and management of infectious diseases in dental settings in a wider-scale multicenter area, identify existing gaps, and set ideal measures to address training deficiencies with updated guidelines and recommendations regarding the COVID-19 pandemic in the Kingdom of Saudi Arabia. Our study showed that institutes in specific regions must acknowledge infection control facilities, enhance their knowledge, and show an excellent attitude toward infection control measures.

The WHO is working continuously to update the IPC guidelines. The most recent update was on December 22, 2021, and the WHO has a page dedicated to a section called “Coronavirus Disease (COVID-19).” All updated guidelines and recent studies related to today’s registration for COVID-19 were posted in that section (Fig. 3). The Recent Local Protocols in KSA include the updated COVID-

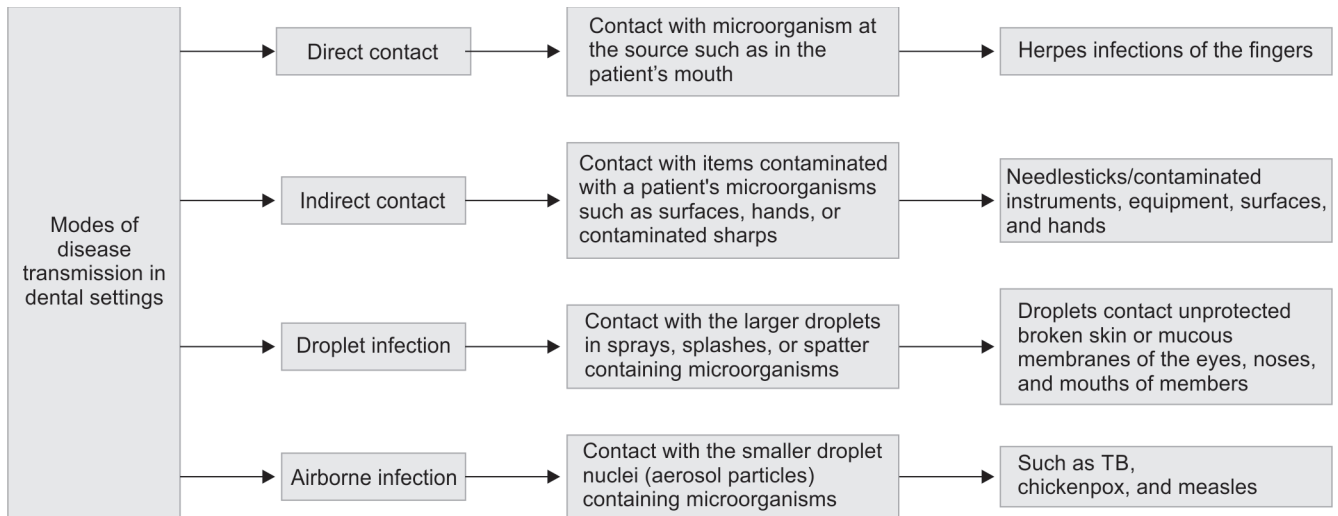


Fig. 2: Modes of disease transmission in dental settings (adapted from Miller 2018)

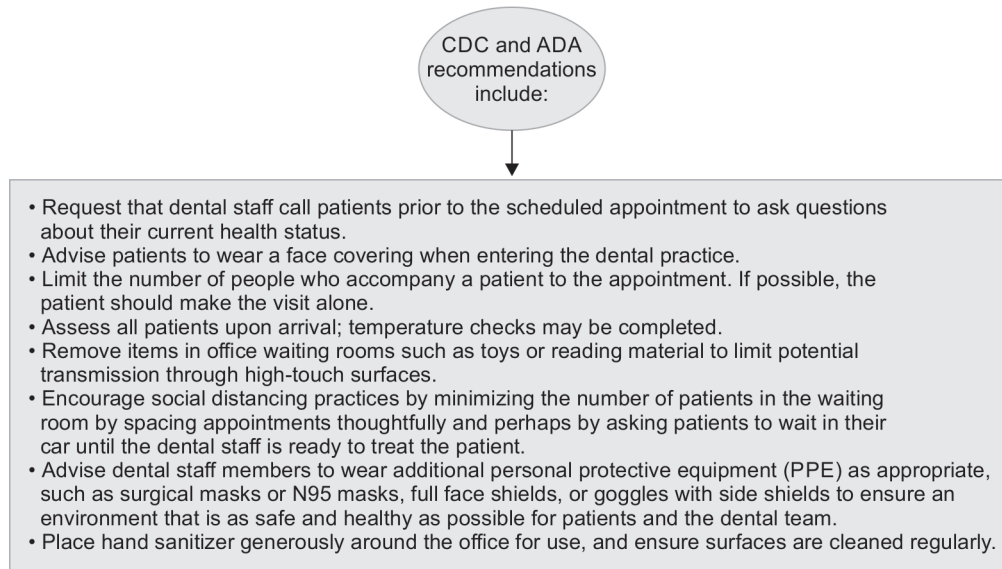


Fig. 3: CDC and ADA recommendations for infection control related to COVID-19

19 guidelines by the Ministry of Health (MOH)-approved scientific instruction manuals and guidelines for dental healthcare workers on how to deal with COVID-19 patients, given that the guidelines are updated on a continuous basis and the last updated was on December 14, 2022 under document file (dental emergency protocol during COVID-19 pandemic 2022). Detailed description of patient category treatments used by MOH in dental settings are shown in [Flowchart 1](#).

In situations in which keeping a distance from COVID-19 patients or taking care of persons with COVID-19 is inevitable, the current protocol suggested by the CDC²⁰ is “to use as many prevention strategies as you can, such as practicing hand hygiene, consistently and correctly wearing a high-quality mask, improving

ventilation, and keeping your distance, when possible, from the person who is sick or who tested positive.” The study’s limitation was that the sample size was insufficient for generalization. Therefore, future studies involving larger sample sizes are highly recommended.

CONCLUSION

Within the limitation of this study, the knowledge and attitude observed among the participants were generally acceptable. However, more training programs on infection control measures should be implemented to achieve the required knowledge for better health and infection prevention.

Flowchart 1: Treatment categories and guidelines recommended by the Ministry of Health, KSA

The treatment categories for dental treatment by the Ministry of Health



Various types of emergency dental care		
Emergent dental care	Urgent (essential) dental care	Non-urgent (non-essential) dental care
Any situation that could pose a threat to life requires immediate attention in dentistry treatment by the medical emergency centers. Examples of uncontrolled bleeding, significant infection (e.g., cellulitis), facial swelling and oral facial trauma potentially compromising the patient's airway.	It focuses on the management of severe or uncontrolled symptoms that cannot be managed by the patient and require the patient to see a dentist in a designated urgent dental care center.	It includes all routine and elective dental and/or maxillofacial procedures.
		Advice and self-care
		Mild or moderate symptoms managed remotely by the dentist (by phone) providing advice and help, which may involve analgesics and antimicrobials.

Dental triage protocol	
Remote dental triage	Urgent dental triage in the designated dental clinic
<ol style="list-style-type: none"> All emergency/urgent cases should be triaged remotely (Call Center 937 or Dental Center phone), to decrease the overflow in the emergency department. A history of the patient condition and medical status should be assessed. All patients should be screened for COVID-19 triage questions (Travel history in the last 14 days, exposed to a person who is diagnosed or suspected to COVID-19 in the last 14 days, fever, cough, or shortness of breath). Suspected cases of COVID-19 should follow the MOH guideline for handling of suspected cases. In a special needed situation, a photo of the site where the complaint comes from is sent to the team by the route determined by the dental staff. Use the recommended management of the most common presenting symptoms to the emergency dental care as a simple guide for remote triage. Remote dental triage should focus on the provision of advice, analgesics and/or antibiotics (where appropriate). Patients are advised that the dental care is severely restricted at this period and to call back after 48–72 hours if the symptoms have not resolved. If needed, referrals are done to the nearby medical emergency center or the designated dental centers, who can provide the required care. National ID or Iqama number and contact number should be used for registration during the remote triage. 	<ol style="list-style-type: none"> All patients should be registered in the database with the National ID or Iqama number. Body temperature should be measured in the triage room. Patients should be asked for COVID-19 and fill the triage questionnaire. Identify the suspected cases of COVID-19 and follow the MOH guideline for handling of suspected cases. Use the recommended management of the most common presenting symptoms to the emergency dental care as a simple guide for clinical triage. Adequate staff training and specifically appropriate human behavior.

(Source: <https://www.moh.gov.sa/Ministry/MediaCenter/Publications/Documents/MOH-Dental-emergency-guideline.pdf>)

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REFERENCES

- Volgenant CMC, de Soet JJ. Cross-transmission in the dental office: Does this make you ill? *Curr Oral Health Rep* 2018;5(4):221–228. DOI: 10.1007/s40496-018-0201-3.
- Ward K. Airborne contamination in dentistry: The final challenge. *Dental Nurs* 2006;2(10):500–503. DOI: <https://doi.org/10.12968/denn.2006.2.10.29919>.
- World Health Organization. Improving infection prevention and control at the health facility: interim practical manual supporting implementation of the WHO guidelines on core components of infection prevention and control programmes. World Health Organization, 2018. <https://apps.who.int/iris/handle/10665/279788> [Access date: 15 Nov. 2022]
- Laheij AM, Kistler JO, Belibasakis GN, et al. Healthcare-associated viral and bacterial infections in dentistry. *J Oral Microbiol* 2012;4:17659. DOI: 10.3402/jom.v4i0.17659.
- Bizzoca ME, Campisi G, Muzio LL. Covid-19 pandemic: What changes for dentists and oral medicine experts? A narrative review and novel approaches to infection containment. *Int J Environ Res Public Health* 2020;17(11):3793. DOI: 10.3390/ijerph17113793.
- World Health Organization. Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations: Scientific brief, 29 March 2020. World Health Organization, 2020. <https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations> [Access date: 20 Nov. 2022]
- Mathur R. Ethics preparedness for infectious disease outbreaks research in India: A case for novel coronavirus disease 2019. *Indian J Med Res* 2020;151(2 & 3):124–131. DOI: 10.4103/ijmr.IJMR_463_20.
- Mourya DT, Yadav PD, Ullas PT, et al. Emerging/re-emerging viral diseases & new viruses on the Indian horizon. *Indian J Med Res* 2019;149(4):447–467. DOI: 10.4103/ijmr.IJMR_1239_18.
- Quadri MFA, Jafer MA, Alqahtani AS, et al. Novel corona virus disease (COVID-19) awareness among the dental interns, dental auxiliaries and dental specialists in Saudi Arabia: A nationwide study. *J Infect Public Health* 2020;13(6):856–864. DOI: 10.1016/j.jiph.2020.05.010.
- Torriani F, Taplitz R. History of infection prevention and control: Infectious Diseases. 2010:76–85. DOI: 10.1016/B978-0-323-04579-7.00006-X.
- Goriuc A, Sandu D, Tatarciuc M, et al. The impact of the COVID-19 pandemic on dentistry and dental education: A narrative review. *Int J Environ Res Public Health* 2022;19(5):2537. DOI: 10.3390/ijerph19052537.
- García-Silva I, Govea-Alonso DO, Rosales-Mendoza S. Current status of mucosal vaccines against SARS-CoV2: a hope for protective immunity. *Expert Opin Biol Ther* 2023;1–16. DOI: 10.1080/14712598.2022.2156284.
- Kaushik N, Mitra S, Baek EJ, et al. The inactivation and destruction of viruses by reactive oxygen species generated through physical and cold atmospheric plasma techniques: Current status and perspectives. *J Adv Res* 2023;43:59–71. DOI: 10.1016/j.jare.2022.03.002.
- Hurtado MM, Macías M, Morales-Asencio JM. A new form of checking obsessive-compulsive disorder in physicians: Another consequence of the COVID-19 pandemic. A case series. *Psychiatry Res Case Rep* 2023;2(1):100085. DOI: 10.1016/j.psycr.2022.100085.
- Zhang N, Tseng HY, Thai J, et al. Health communication needs for COVID-19 prevention and control among college students. *J Am Coll Health* 2023;1–6. DOI: 10.1080/07448481.2022.2155060.
- Alharbi G, Shono N, Alballaa L, et al. Knowledge, attitude and compliance of infection control guidelines among dental faculty members and students in KSU. *BMC Oral Health* 2019;19(1):7. DOI: 10.1186/s12903-018-0706-0.
- Assiri KI, Kaleem SM, Ibrahim M, et al. Knowledge, attitude, and practice of infection control among dental students in King Khalid University, Abha. *J Int Oral Health* 2018;10(2):83–87. DOI: 10.4103/jioh.jioh_6_18.
- Gaffar BO, El Tantawi M, Al-Ansari AA, et al. Knowledge and practices of dentists regarding MERS-CoV. A cross-sectional survey in Saudi Arabia. *Saudi Med J* 2019;40(7):714–720. DOI: 10.15537/smj.2019.7.24304.
- Yüzbaşıoğlu E, Saraç D, Canbaz S, et al. A survey of cross-infection control procedures: knowledge and attitudes of Turkish dentists. *J Appl Oral Sci* 2009;17(6):565–569. DOI: 10.1590/s1678-77572009000600005.
- Meng Y, Wu P, Lu W, et al. Sex-specific clinical characteristics and prognosis of coronavirus disease-19 infection in Wuhan, China: A retrospective study of 168 severe patients. *PLoS Pathog* 2020;16(4):e1008520. DOI: 10.1371/journal.ppat.1008520.
- American Dental Association. Coronavirus frequently asked questions. 2020. <https://www.ada.org/publications/ada-news/2020/march/ada-adds-frequently-asked-questions-from-dentists-to-coronavirus-resources> [Access date 15 Dec 2022]