

COVID-19 AND THE CHALLENGES OF MANAGEMENT IN PRIVATE DENTAL CLINICS IN EGYPT

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ABSTRACT

Background: One of the challenges that face effective dental and oral surgical treatment is reducing transmission of infectious diseases. This study assessed the challenges and the changes in management of patients in private dental clinics in Egypt in view of rapid spread of SARS-COVID-19.

Methods: Six private dental clinics in Egypt were enrolled in this study. Changes in the management protocols were recorded and evaluated. Data were collected about the changes in clinic policies and in infection control practices. The modifications in patient management and the number and types of treatment approaches either surgical or non-surgical for dental and oral conditions were recorded and evaluated.

Results: The most commonly followed guidelines were wearing gloves followed by wearing masks and using disposable products. Remote consultations and shortage of personal protective equipment were recorded by all clinics. Management approaches included conservative endodontic management for periapical lesions and fistulae. Aerosols and minor surgical interventions could not be avoided in many cases.

Conclusion: Conservative approaches were effective and could be considered during pandemic spread. Dental personnel should be more aware and more prepared for any pandemic spread. Management modifications and strict precautions should be followed.

KEYWORDS: COVID-19; infectious diseases; infection control; Conservative management, Oral Surgery; guidelines.

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INTRODUCTION

A research team in China in 2020 identified Sars Coronavirus 2 as the etiology of a pandemic known as COVID-19.¹ Since the first cases of COVID-19, the disease spreads all over the world and affects millions of people worldwide up till now. Seroprevalence studies² have shown a higher prevalence of antibodies to many viruses including influenza, respiratory virus and adenovirus among dentists compared with controls. Annual immunization of dental team workers against influenza were recommended to reduce the risk of transmission to patients, co-workers and family members. COVID-19 infection in humans occurs primarily by infection from person to person. COVID-19 infection causes a progressive destruction of respiratory mucosa especially the lower respiratory tract, during viral replication. Losses of sense of smell and taste have been recorded by Iranian people as one of the most heavily involved countries with COVID-19 during the outbreak of the disease. This urges infected persons to seek dental consultation.³

Findings suggest patients can remain infectious, even after symptomatic recovery. Fifty percent of patients treated for mild COVID-19 infections still have the virus up to eight days after symptoms disappeared, thus dental patients may be carriers without symptoms. Therefore, every effort should be done to make the necessary changes in their line of management to protect patients as well as the dental staff from unnecessary infection, and to keep their dental care system running effectively^{4,5}. This study assessed the changes in the management of Oral and

Maxillofacial conditions in private dental clinics in Egypt in view of the rapid spread of SARS-CoV 2. Assessment of infection control practices and evaluation of the used conservative approaches were also from the goals of the study. Highlighting the ethical considerations of management approaches to treat oral and maxillofacial conditions in private dental clinics in Egypt was also discussed.

MATERIALS AND METHODS

The protocol of this study was submitted to and approved by the Ethics Committee of Faculty of Dentistry of Mansoura University. After restrictions in population movement in Egypt, we conducted a prospective study to record every event that might be related to the pandemic in a sample of working private dental clinics in four Egyptian cities in Sharkia and Dakahlia Governorates.

Data were collected by the authors between 15 March till 14 August 2020. The investigators recorded any changes in clinic policies. Modifications of their usual management for patients regarding infection control practices, answering phone calls, or internet-based consultations were also recorded. Regulations followed other than usual to minimize chance for exposures and every unusual occurrence including modifications of treatment plan or decreased work hours according to restriction regulations set by the government. Data collected in the form of monthly questionnaire filled by every clinic for 5 months and prepared by the authors at the start of the study.

MONTHLY QUESTIONNAIRE FOR DENTAL CLINICS DURING PANDEMIC COVID 19

• Working hours	
• Dental staff in operating room*	
• Individuals in the waiting room*	
• Accompanying persons inside dental clinic*	

GENERAL POLICIES

* Write the average number, please.

• Answering phone calls	
• Internet-based consultations	
• Patients attendance to the clinic.	

VISITS & REMOTE CONSULTATIONS

* Write the exact number, please.

❖ INFECTION CONTROL PRACTICES

GENERAL				
	Always	Usually	Sometimes	Never
• Screening for the presence of symptoms related to COVID-19 for any person entering the dental clinic.				
• Number of individuals suspected of being infectious & isolated in separate waiting room.				
• Wearing facemask by all individuals (patients, accompanying persons & dental staff).				
• Hand sanitizer/ washing with soap & water for more than 20 seconds.				
• Physical distancing between persons in the waiting area.				
• Wait 15 min after patient dismissal before cleaning and disinfecting the room.				
• Disposal of Dental waste according to the requirement of medical wastes.				

INSIDE DENTAL OFFICE				
	Always	Usually	Sometimes	Never
• Frequent gloves change				
• Face masks				
• Hand sanitizer/ washing with soap & water for more than 20 seconds.				
• Face shields				
• Eye goggles				
• Disposable rinsing cups and bracket table covers				
• Disposable gowns				
• Over heads				
• Over shoes				
• Long sleeved gowns				

• MANAGEMENT MODIFICATIONS

<ul style="list-style-type: none"> • Pain related to impacted tooth <p>Number of cases</p> <ul style="list-style-type: none"> <input type="checkbox"/> Drug prescription only. <input type="checkbox"/> Reduction of opposing cusps. <input type="checkbox"/> Local management of pericoronitis <input type="checkbox"/> Tooth extraction
<ul style="list-style-type: none"> • Endodontic visits: <p>Single visit</p> <p>More than 1 visit</p>
<ul style="list-style-type: none"> • Special emergency cases & their management:

❖ UNUSUAL EVENTS REGARDING INFECTION TRANSMISSION

	Yes	No
• Sick leaves of one of the staff members.		
• Reported infection of one of the staff members.		
• Reported infection of any of the patients.		
• Closure of the clinic for a certain period.		
• Emergency hospitalization of any of the patients.		
*Please, write if any other events occurred:		

Data of patients treated during 5 months of pandemic were recorded, to help identify the management changes and the ethical considerations related to the pandemic spread condition. Data were recorded about the number and types of treatment approaches either surgical or non-surgical for oral and maxillofacial conditions. The number and types of conservative management approaches performed for patients and their outcomes were analyzed. We have concentrated on private dental clinics as the only available source of study.

Results of the lockdown

Six clinics have examined a total of 960 patients. At the same period in the last year, they examined 2456 patients. Although the clinics did not close completely, they were operating in about 40% of their normal capacity. The total work hours decreased according to governmental restriction regulations to 58% of the usual time. (Table 1) Two clinics showed more than 50% reduction of work time. They opted to temporarily close their doors either intended by the owner for fear from infection or due to presence of an infected staff member with COVID 19. During the first two months of the study, clinics provided emergency services only. Moreover, more than 90% of the study periods showed a great reduction in the number of patients seeking dental treatment compared to the same period of the last year in spite of the lock of governmental dental clinics.^{6,7} Return of the normal flow of patients at the end of the lockdown period was noticed. Before the pandemic spread, working hours for clinics was late in the day. After governmental regulations the working hours of the clinics changed to earlier in the day. Although public clinics in hospitals were closed, this was not reflected to the patient rate on the studied clinics.

Six different private dental clinics in Sharkia and Dakahlia Governorates, Egypt, participated in the study, the generalization of the results to dentists in other areas of Egypt is unclear, and more studies should be conducted in other regions.

TABLE (1) Scheduling patient visits and their rate of flow to the clinic

	Study Period (15 March 2020-14 August 2020) Operating capacity 40% total work hours 58%	Comparable period (15 March 2019-14 August 2019)
Answering phone calls	245 calls	Unavailable data
Internet-based consultations	88	Unavailable data
Patient visit to the clinic	960	2456

Sometimes, many patients were found together in the waiting room. This is because the working time was reduced due to the rules. Many clinics led extra patients waiting in their cars on request by mobile phone.

Ethical analysis of duty to treat

Schuklenk asked: “Do health care professionals have a professional obligation to provide care to COVID-19 patients?”⁸ In Egypt, dental professionals have no professional obligation to provide care to patients during the pandemic spread. The choice was only between economic considerations and the fear of risk of being infected. Sick leave policies were provided for dental staff members. A female dentist stopped working for fear of the pandemic. Dental assistants were trained for infection control practices and the appropriate use of personal protective equipment (PPE). The least essential number of dental staff members was permitted to be present during patient management. All official outpatient dental clinics in Egypt were closed with the lockdown restrictions. Being fearful of transmission of infection, patients as well as dentists avoided dental management as possible.⁹

Remote consultations

All clinics recorded remote consultations. A total of 245 phone calls and 88 internet-based consultations were recorded. No available data about similar consultations in the same period of the last year. The only notice is a marked increase in this type of management. All these consultations were free of charge. In three clinics, patients were instructed to call ahead before arrival when scheduling appointments. Rescheduling of appointments was done to decrease the number of patients at the same time. There were no ethical consequences for the delay of treatment from dentists or from patients. The ethical considerations of misdiagnosis possibility were not evaluated. Remote consultations were recommended to treat or follow up patients to ensure patient safety and minimize unnecessarily repeated patient contact.^{9,10}

Infection control practices

No screening for the presence of symptoms related to COVID-19 for any person entering the dental clinic was done. Persons with symptoms of suspected COVID-19 or other respiratory infection (e.g., cough) were not allowed to wait among other patients seeking care. Ten patients were asked to sit in a separate room. Upon arrival, patients and their accompanying persons were instructed to wear a facemask upon entry to clinic and to consider hand hygiene and cough etiquette. Two clinics facilitated easy access to respiratory hygiene supplies (hand sanitizer, tissues and face masks, if available). Physical distancing between persons in the waiting area was facilitated as possible. Accompanying persons or visitors were not permitted during aerosol-generating procedures. However, eighteen accompanying persons refused leaving patients alone. In two clinics, dental patients were opted to wait in their vehicle or outside the clinic where they were contacted by mobile phone. Implementing staff policies to minimize the number of persons who enter the room was done in five clinics.

Infection control measures were implemented before patient arrival in all clinics. Routine cleaning

and disinfection procedures were followed with covering frequently touched surfaces, cleaning the clinics appropriately and disinfecting the surfaces. Clinics ensured that hand hygiene supplies were readily available in every care location. All staff performed strict hand hygiene before and after contact with the patient or potentially infectious materials as well as before putting on and upon removal of PPE, including gloves. Hand hygiene in clinics was performed by washing with soap and water for more than 20 seconds.

The most commonly followed infection control guideline was wearing gloves, masks, face shields and using disposable products. All studied clinics used gloves and face masks. Four clinics regularly used face shields. All clinic staff used conventional respiratory protection. Gloves were discarded before leaving care area. Isolation gowns were frequently used when operating with ultrasonic scalers and high speed only, and were discarded when became soiled. Filtering face piece respirator (N95) was not available. Facemasks were used for more than one patient then thrown away in the trash due to shortage of supply. Disposable rinsing cups and bracket table covers were discarded after every patient as regular. Management of laundry and dental waste were performed as routine procedures. Cloth gowns were not laundered after each use except after any surgical intervention. Overhead, overshoes as well as disposable long-sleeved gowns were rarely used. Eye goggles and face shields were frequently used. Autoclaves were used by all clinics.

This study showed a shortage of PPE supplies among dental clinics in Sharkia and Dakahlia Governorates during COVID-19 pandemic spread. These results concur with the results of other studies in many countries that concluded that the demands concerning PPE increased significantly.^{10,11}

The participating dentists had positive attitudes toward the safety and efficacy of infection control precautions. This is going along with other studies that exhibited positive attitudes of dentists towards

following standard infection control regulations¹²⁻¹⁴. The results of the present study revealed that dentists and all staff with direct patient contact followed standard precautions with all patients.

Unusual events regarding infection transmission

Remarkable events were not recorded during more than two thirds of the study period, except for: a single case of patient death one month after his last visit to the clinic, one clinic stopped working for a month because a receptionist died after being infected and the dentist exhibited the symptoms of COVID-19. Another patient was hospitalized in the intensive care unit from one of the clinics.

The findings of the present study stated that dentists are following standard infection control guidelines in general. Considering COVID-19 pandemic, insufficient precautions were considered regarding measuring patients' temperature with the unavailability of possible testing for the disease. There is absence of Egyptian governmental infection control practices for private clinics in general including dental clinics. These results show a trend toward dependence of dentists upon their background knowledge, colleagues, and internet news, which in turn may play a major role in affecting their lack of special infection protocol precautions for COVID-19.¹³

No previous studies were found to assess the practice of dentists towards patient management and infection control guidelines followed in their private dental clinics in a pandemic. To the best of our knowledge, this study is the first study in Egypt to assess the management modifications made by dentists in the era of COVID-19. There is a lack of specific guideline for the protection of dental workers such as oral and maxillofacial surgeons dealing with procedures in the oral cavity.¹⁰ Dentists in Egypt may not be able to provide the ideal service for their patients due to many reasons such as the barriers hindering infection control.¹⁵ In this study, we believe that infection control regulations regarding patient management are very important.

Management modifications during the pandemic

Treatment was planned on a case-by-case basis. Careful past-medical histories were considered to help identify those who suffered from Covid-19. Disposable examination instruments were frequently used. Biopsies collection adhered to standard precautions. High speed or ultrasonic scalers were performed cautiously and only as an emergency treatment. Vomiting inducing-procedures were performed cautiously and avoided if possible. Procedures such as treatment of abscesses, teeth extraction and related complications such as bleeding, oro-antral communications closure, treatment of pulpitis, etc. were handled. During the peak of the pandemic, only urgent procedures were performed while elective ones were not allowed.

There was a decrease in maxillofacial surgery trauma cases, which can be attributed to the lockdown regulated by the government. Trauma cases were mostly follow-up visits or for removal of appliances like arch bar. A common complaint was the absence of many cases before delivery of prosthetic appliances or splints. One patient asked for a rapid removal of her orthodontic appliance.

Intermittent burs usage allows aerosols contamination. Severe pain after implant placement in the lower jaw was encountered in four cases. Non-steroidal anti-inflammatory analgesics were found sufficient in two cases while Tegretol 150 mg was prescribed for 2 resistant cases.

One visit endodontic protocol was considered whenever possible with rubber dam application. The most commonly followed approaches were conservative endodontic management for periapical lesions and fistulae. Lower molar bi-sectioning, injection therapy, and minor tooth reductions were from the recorded approaches during this period. Surgical interventions like teeth extraction, abscess drainage, and exposure for or removal of implant fixtures could not be avoided in many cases. Surgical removal of mucocele was performed in two cases. (**Table 2**)

TABLE (2) Special clinic policies that were followed during the study period of pandemic COVID 19

<ul style="list-style-type: none"> Screening for the presence of symptoms related to COVID-19 for any person entering the dental clinic: 2 clinics. <p>Ten patients were asked to sit in a separate room.</p>
<ul style="list-style-type: none"> Persons were instructed to wear a facemask upon entry to clinic and to consider hand hygiene and cough etiquette: 6 clinics
<ul style="list-style-type: none"> Two clinics facilitated easy access to respiratory hygiene supplies (hand sanitizer, tissues and face masks, if available)
<ul style="list-style-type: none"> The least essential number of dental staff members was permitted to be present during patient management: 6 clinics
<ul style="list-style-type: none"> Physical distancing between persons in the waiting area was facilitated as possible: clinics. <p>Extra patients waiting in their cars on request by mobile phone</p>
<ul style="list-style-type: none"> Accompanying persons or visitors were not permitted during aerosol-generating procedures: 5 clinics, however, eighteen accompanying persons refused leaving patients alone.
<ul style="list-style-type: none"> Patients were instructed to call ahead before arrival when scheduling appointments. Rescheduling of appointments was done to decrease the number of patients at the waiting room at the same time

Non-surgical conservative management of impacted teeth, oroantral fistulae, pregnancy tumor and TMJ disorders were considered in most of the cases. Approaches to relieve symptoms of impacted teeth included drug prescription, reduction of opposing cusps and local management of pericoronitis. Periapical cysts were treated conservatively in most of the cases by endodontic management of related teeth. Repair of a fractured complete denture was done. Marsupialization was done in one case to relieve swelling. This was selected as a less invasive operation with shorter duration. The outcomes of the study viewed that increased conservative management with fear of

being infected can be explained by the fact that large numbers of patients are following distancing governmental rules.

Discussion of the ethical considerations

Many questions aroused with the discussion of this study. We recognize the limitations of this report and acknowledge that additional studies are necessary to determine the best protocol to protect dental staff from becoming infected with SARS-CoV2 while they are providing care for patients. There was no financial support for dentists in Egypt, moreover, they faced a shortage in PPE with an increase in its cost. Do the fees of dental treatment have to be increased as dentists have incurred more expenses for infection control products?

Various variables, such as dentist fears, patient fears, restriction governmental rules, and financial concerns have been documented to impair the flow of patients during the pandemic.^{6,7}

From an ethical point of view, there is no definite guideline outlining what procedure is urgent in dentistry¹⁵. There is no distinction and dentists treated many simple non-urgent cases for financial reasons. What are the emergency and urgent dental conditions? Are the risks of deferral of surgery under control until COVID-19 pandemic situation is settled?

During pandemic spread, rapid conservative approaches are therefore recommended for clinical application. Do the differences in protocols including the types of management impair the results in some clinical circumstances?

Dental surgeons are particularly vulnerable to transmission of COVID-19. Close proximity to patients and the aerosol generating procedures are responsible.¹⁶ The first step in the diagnosis of COVID-19 depends largely on the measurement of body temperature. Those patients are capable of transmitting corona virus even after they are recovered from symptoms.¹⁷

The knowledge of safety and efficacy of the infection control practices should be updated to improve public health. Standard precautions assume that every person is potentially infected.¹⁸⁻²⁰ Can patients who are COVID-19-positive receive routine dental care? Should recovery from COVID-19 be confirmed before dental treatment? What about the effectiveness of infection control and protection at the dental office, financial support offered to dental practitioners; and changes in the dental treatment? Should they be surveyed during pandemic spread? Should we consider weighing care benefit against the potential risk of infection from COVID-19?

The American Dental Association intern guidance (2020) has adopted a list of emergent and urgent dental care including: Dental Emergency cases, such as Cellulitis, extra or intraoral swelling compromising airways, uncontrolled bleeding and urgent dental needs including; dental pain due to pulpal inflammation, pericoronitis, dry socket, localized dental abscess, fractured tooth causing pain, dental trauma, suture removal, denture repair due to injury to soft tissue or prior to medical care, soft tissue injury from orthodontic wire/ appliance, dental treatment prior to medical care e.g. radiation therapy and biopsy of abnormal tissue.¹⁵

CONCLUSIONS

Careful medical histories can help identify those who require special dental treatment during pandemic spread. Conservative approaches could be considered during pandemic spread for management of oral surgical conditions. However, on the basis of the current study, it is possible to conclude that standard precautions were followed with all patients, whether or not they have been diagnosed

with COVID-19. Aerosols and minor surgical interventions sometimes were necessary and could not be prevented. The patient cooperation is an important measure that should be taken into consideration to ensure appropriateness of infection control measures and patient safety.

RECOMMENDATIONS

Dentists should select appropriate PPE and provide it to their team in accordance. Dental personnel should wear barrier precautions (e.g., gloves, masks, and protective eyewear) whenever there is potential for contact with patients. Dental clinics should have policies and procedures describing a recommended sequence for safely donning and doffing PPE. All dental clinics must ensure that their personnel are correctly trained and capable of implementing infection control procedures. Individual dental staff personnel should ensure they understand and can adhere to infection control requirements during different patient care activities such as cleaning and disinfecting the environmental surfaces, collecting specimens, handling contaminated instruments. In addition, we recommend that dental staff members should undergo continuous education and training to be able to provide their patients with accurate and optimal care especially in any possible COVID-19 like pandemic spread. Dentists should be aware of the danger of contamination when treating patients during the pandemic spread, especially for patients with highly contagious diseases such as COVID-19. Dental clinics have to be organized in such a way to minimize the risk of cross-infection among patients. Moreover, the regulatory authorities should keep an eye on the infection control practices. (**Table 3**).

TABLE (3) Special recommendations for minimize the risk of transmission of COVID 19 in dental clinics¹⁵

- Social distancing & reducing the number of individuals including dental staff and accompanying persons in the clinic room to minimum requirement.
 - Use proper PPE with adhering to the correct protocol of their putting and removing.
 - Wait 15 min after patient dismissal before cleaning and disinfecting the room.
 - Non-surgical conservative management are recommended.
 - Atraumatic restorative techniques are recommended.
 - Use resorbable sutures following surgical procedures.
 - Minimizes the use aerosol-generating instruments like three-way syringe, ultrasonic devices and high-speed hand pieces.
 - Handle dental impressions and prosthesis using the necessary PPE.
- Transport Specimen to the dental lab in a leak proof sealed bag.
- Dental waste should be disposed of according to the requirement of medical wastes

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Abbreviations: Personal Protective Equipment (PPE)

REFERENCES

1. Zheng J. (2020) SARS-CoV-2: an Emerging Coronavirus that Causes a Global Threat. *Int J Biol Sci.* 16(10): 1678–1685. doi: 10.7150/ijbs.45053.
2. Davies KJ, Herbert AM, Westmoreland D, Bagg J. (1994) Seroepidemiological study of respiratory virus infections among dental surgeons. *Br Dent J* 176:262-5.
3. Keyhan S O, Fallahi H R, and Cheshmi B (2020) Dysosmia and dysgeusia due to the 2019 Novel Coronavirus; a hypothesis that needs further investigation. *Maxillofac Plast Reconstr Surg.* 42(1): 9. doi: 10.1186/s40902-020-00254-7.
4. Chang D; Mo G, Yuan X, Tao Y, Peng X, Wang F, Xie L, Sharma L, Dela Cruz C S, and Qin E. (2020) “Time Kinetics of Viral Clearance and Resolution of Symptoms in Novel Coronavirus Infection”. *American Journal of Respiratory and Critical Care Medicine* 201(9):1150-1152. doi:10.1164/rccm.202003-0524LE.
5. Lauer S A; Grantz, K H; Bi Q, Jones F K, Zheng Q, Meredith H R, Azman A S, Reich N G, Lessler J (2020) The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application. *Ann Intern Med* 172 (9): 577-582. Doi: 10.7326/M20-0504.
6. Alharbi A, Alharbi S, and Alqaidi S (2020) Guidelines for dental care provision during the COVID-19 pandemic. *Saudi Dent J* 32(4):181-186. Doi: 10.1016/j.sdentj.2020.04.001.
7. Zimmermann M, Nkenke E. (2020) Approaches to the management of patients in oral and maxillofacial surgery during COVID-19 pandemic. *J Craniomaxillofac Surg.* 48(5): 521-526. Doi:10.1016/j.jcms.2020.03.011.
8. Schuklenk U. (2020) The ethical challenges of the SARS-CoV-2 pandemic in the global south and the global north – same and different. *Developing World Bioethics.* 2020; 395(10232): 62-64. Doi:10.1016/S0140-6736(20)30806-0.
9. Dave M, Seoudi N, Coulthard P. (2020) Urgent dental care for patients during the COVID-19 pandemic. *The Lancet Surg.* 20(2): 1257. <https://doi.org/10.1111/dewb.12263>.
10. Blackhall K.K, Downie I.P., Ramchandani P., Shields H., Brennan P.A., Singh R.P. (2020) Provision of Emergency Maxillofacial Service During the COVID-19 Pandemic : A Collaborative Five Centre UK Study. *Br J Oral Maxillofac Surg.* 58(6): 698-703. DOI:<https://doi.org/10.1016/j.bjoms.2020.05.020>.
11. Mahmood S U, Crimbly F, Khan S, Choudry E, and Mehwish S. (2020) Strategies for Rational Use of Personal Protective Equipment (PPE) Among Healthcare Providers During the COVID-19 Crisis. *Cureus.* 12(5): e8248. doi: 10.7759/cureus.8248.
12. Alharbi G, Shono N, Alballaa L, Aloui A. (2019) Knowledge, attitude and compliance of infection control guidelines among dental faculty members and students in KSU *BMC Oral Health* 19(7): 521-526. <https://doi.org/10.1186/s12903-018-0706-0>.
13. Daniel SJ, Kumar S. Teledentistry: a key component in access to care. *J Evid Based Dent Pract.* 2014;14(Suppl):201–208. doi: 10.1016/j.jebdp.2014.02.008.

14. Banakar, M., Bagheri Lankarani, K., Jafarpour, D. Moayed S, Banakar MH, Sadeghi AM..COVID-19 transmission risk and protective protocols in dentistry: a systematic review. *BMC Oral Health* 20, 275 (2020). <https://doi.org/10.1186/s12903-020-01270-9>
15. Aldahlawi SA, Afifi IK. COVID-19 in dental practice: Transmission risk, infection control challenge, and clinical implications. *Open Dent. J.* 2020 Jul 21;14(1): 348-354. DOI: 10.2174/1874210602014010348
16. World Health Organization. Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations. Scientific brief 2020. Available from: <https://www.who.int/publications-detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations>
17. Center for Disease Control and Prevention (CDC). Interim infection prevention and control guidance for dental settings during the COVID-19 response 2020. Available from <https://www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings.html>
18. Chughtai AA, Khan W. Use of personal protective equipment to protect against respiratory infections in Pakistan: A systematic review. *J Infect Public Health* 2020; 13(3): 385-90.
19. Coulthard P. The oral surgery response to coronavirus disease (COVID 19). Keep calm and carry on? *Oral Surg* 2020; 13(2): 95-7
20. Jain M, Mathur A, Mathur A, Mukhi PU, Ahire M, Pingal C. Qualitative and quantitative analysis of bacterial aerosols in dental clinical settings: Risk exposure towards dentist, auxiliary staff, and patients. *J Family Med Prim Care* 2020; 9(2): 1003-8.