

Clinical management and infection control protocols during the COVID-19 pandemic: An online survey

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Abstract.

BACKGROUND: SARS-CoV-2 (COVID-19) is considered a highly infectious and life threatening disease.

OBJECTIVE: The present paper aims to evaluate various aspects of preventive measures and clinical management of the scheduled visits for orthodontic patients to the dental clinics during the outbreak of COVID-19, and to assess how orthodontists dealt with this challenge.

METHODS: Orthodontists in private and public clinics were invited to fill a questionnaire that addressed infection control protocols and concerns about clinical management of patients in the clinics during the pandemic. Frequencies and percentages of the responses were obtained and compared using Chi-square tests.

RESULTS: About 77% of those working in private clinics, and 63% of those working in private and governmental clinics performed room disinfection following each patient. In case of patients needing urgent management and have active infection, 56% of the participants provided care under high infection control measures; on the contrary, 64% provided symptomatic intervention including orthodontic wax, analgesics and sometimes mouthwash.

CONCLUSION: The COVID-19 pandemic has had a negative impact on the orthodontic treatments. All pre-cautionary measures have to be made available in the clinic in order to minimize the spread of viral infection with continuous dental health care training.

Keywords: COVID-19, infection control, orthodontics

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1. Introduction

Since December 2019, a new coronavirus disease 2019 (COVID-19) has been identified as an acute respiratory infectious disease in the Chinese city of Wuhan. There was a fast transmission of infection from China to the world, so that, on January 30th, 2020, the World Health Organization (WHO) declared COVID-19 one of the public health emergencies of a global relevance [1–4]. To date, millions confirmed COVID-19 cases, which include over 4 millions death cases all over the world, were reported to the WHO, and those numbers are rising.

There were high concerns of this infection due to its high mortality and morbidity rate. National emergencies and forced lockdowns, social distancing as many efforts have been taken to contain the spread of the disease, leaving only essential services to continue [5–7].

Dental clinics are considered as a high-risk category as infection can be transmitted during aerosol generating dental procedures, or from patients' gatherings in the waiting room [8]. For that reason, strict infection control protocols should be used in dental practices to reduce the cross-infection between the dental staff and patients. Orthodontic treatment requires regular follow-up appointments and continued monitoring by the orthodontist to check the efficacy and/or any unacceptable effects [9,10].

During the COVID-19 pandemic dentists need to limit their work to non deferrable emergencies to avoid the possible spread of the infection [11]. Orthodontists also had to defer regular visits and checkup of their patients. Orthodontic emergencies (such as debonding of the brackets, removable appliance breakage, and oral cavity ulcers) that would usually need immediate visits was managed using teleorthodontics by communicating with patients via mobile messaging, chats and video calls [12–14].

Orthodontic treatment usually is a process that takes long duration of time. There were lots of patients who were already undergoing treatment when the COVID-19 pandemic hit, and eventually the regular checkup visits were suspended. Guidelines for clinical orthodontic treatment of patients during the pandemic are still deficient. Efficient infection control protocols should be adopted by all dental staff before the full return of orthodontic practice [15,16].

Many recommendations such as suspicion of elective dental treatment excluding emergencies, to facilitate social seclusion measures, decrease aerosol and the subsequent risk of infection have been adopted [10,17,18]. Due to postponement of orthodontic appointments, patients concern about the prolongation of the treatment [9] and worried about the planning of the next visit to the dentist and orthodontist [19,20].

The aims of the present work are to evaluate orthodontist knowledge and perceptions of COVID-19 in addition to infection control protocols and their clinical management for orthodontic patients during the COVID-19 pandemic.

2. Methods

2.1. Study design

The present paper used a questionnaire-based online survey to assess the knowledge and infection control measures used by orthodontists in private and public clinics during the COVID-19 pandemic. The questionnaire has been structured with the use of Google Forms. The link has been shared with orthodontists via social applications including Viber, Telegram and Messenger.

The current work was approved by the ethical committee of the Department of Orthodontics, Dentistry College, University of Baghdad (Ref. no. 29 in 20-1-2022) and followed the principles of the Declaration

Table 1
Demographic data of participants

Gender N (%)	Place of work N (%)	Qualification N (%)
Female 43 (53%)	Private 13 (16%)	Ph.D. 7 (8.64%)
Male 38 (47%)	Governmental 11 (14%)	M.Sc. 71 (87.65%)
	Both 57 (70%)	Certificate 3 (3.70%)

of Helsinki for human research. Consent forms were obtained from all orthodontists by way of a welcome note which explained the aim of the present work.

2.2. Sample

About 200 orthodontists were invited to participate in the study, of which 81 enrolled in the study.

2.3. Design of the questionnaire

The questions have been divided to four sections. The first section dealt with basic information of the participant, which includes gender, place of work and qualification.

The second and third sections evaluated infection control measures including personal protective equipment (PPE), disinfection, and instruction to reduce cross-contamination. The fourth section was dedicated to evaluate the clinical management of orthodontic patients during the pandemic. Elements of the questionnaire are provided in the Appendix. Participants had to answer all questions.

2.4. Statistical analyses

The statistical analyses have been carried out with SPSS (statistical package of social science) software version 25. Descriptive statistics have been obtained in form of frequencies and percentages. Pearson's Chi-square test was utilized for the comparisons. Results were considered significant at $P \leq 0.05$.

3. Results

81 orthodontists participated in this study and answered the questionnaire [43 females (53%) and 38 males (47%)]. According to their qualification, 87.65% had M.Sc., 8.64% had Ph.D. degree and 3.7% awarded certificates. Regarding their work place, 16% worked in private clinics, 14% worked in governmental clinics and 70% worked in both governmental and private clinics (Table 1).

Table 2 shows the frequency distributions, percentages and comparisons of responses for Section 2 according to the place of work: public, private clinics or both.

There is a general agreement among 90% of the orthodontists that the main route of the transmission of COVID-19 are inhalation of airborne, the direct contact with the body and the oral fluids, and the patient materials' dentists get in contact with them with no significant difference.

Regarding the type of PPE used in most governmental and private orthodontic clinics, about 93% of the orthodontists mentioned that they used a combination of goggles, medical hand gloves, medical head cap, medical face mask and protective suit, and the majority of them preferred using a face shield rather than goggles. Moreover, they preferred using a two-fold (double) disposable medical face mask and N95 face mask with a significant difference.

Table 2
Responses for Section 2

Question	Answer	Both	Governmental	Private	Total	X ²	p
Which of the following may be considered as one of the transmission ways of COVID-19?	Inhalation of airborne	4 (7%)	3 (27%)	1 (8%)	8 (10%)	3.314	0.191
	The direct contact with body and oral fluids	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
	Patient materials may work as risk factor if the dentists get in contact with them	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
	All the above	53 (93%)	8 (73%)	12 (92%)	73 (90%)		
Which personal protective equipment (PPE) did you use?	Total	57 (100%)	11 (100%)	13 (100%)	81 (100%)	3.273	0.774
	Protective eyewear (goggles)	1 (2%)	0 (0%)	0 (0%)	1 (1%)		
	Medical hand gloves	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
	Medical head cap	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
	Face shield	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
	Medical face mask	1 (2%)	1 (9%)	1 (8%)	3 (4%)		
	Protective suits	2 (4%)	0 (0%)	0 (0%)	2 (2%)		
	Combination	53 (93%)	10 (91%)	12 (92%)	75 (93%)		
	Total	57 (100%)	11 (100%)	13 (100%)	81 (100%)		
	Which of the following did you routinely use in the clinic for the prevention of eye contamination with infectious agents? What is the type of mask you used during routine daily work?	Goggles only	5 (9%)	0 (0%)	2 (15%)		
Face shield only		38 (67%)	9 (82%)	6 (46%)	53 (65%)		
Both		14 (25%)	2 (18%)	5 (38%)	21 (26%)		
Total		57 (100%)	11 (100%)	13 (100%)	81 (100%)		
One-fold disposable medical face mask		9 (16%)	7 (64%)	1 (8%)	17 (21%)		
Two-fold (double) disposable medical face mask		29 (51%)	3 (27%)	7 (54%)	39 (48%)		
N95 face mask		18 (32%)	1 (9%)	5 (38%)	24 (30%)		
Non-medical (reusable) face mask		1 (2%)	0 (0%)	0 (0%)	1 (1%)		
Total		57 (100%)	11 (100%)	13 (100%)	81 (100%)		

Table 3
Responses for Section 3

Questions	Answers	Both	Governmental	Private	Total	X ²	p
Did you or one of your staff members take the body temperature for every orthodontic patient before starting your treatment?	Yes	8 (14%)	2 (18%)	5 (38%)	15 (19%)	4.413	0.353
	No	31 (54%)	7 (64%)	5 (38%)	43 (53%)		
	Sometimes	18 (32%)	2 (18%)	3 (23%)	23 (28%)		
	Total	57 (100%)	11 (100%)	13 (100%)	81 (100%)		
Did you pre-check and ask the patients some questions about the general health status, and if there is a history of travel, they should ask whether the patient gets in contact with any suspected or confirmed cases?	Yes	32 (56%)	7 (64%)	11 (85%)	50 (62%)	5.071	0.280
	No	7 (12%)	2 (18%)	1 (8%)	10 (12%)		
	Sometimes	18 (32%)	2 (18%)	1 (8%)	21 (26%)		
	Total	57 (100%)	11 (100%)	13 (100%)	81 (100%)		
Did you instruct the patient to wear medical mask and gloves before entering the clinic?	Yes	44 (77%)	7 (64%)	12 (92%)	63 (78%)	3.130	0.209
	No	13 (23%)	4 (36%)	1 (8%)	18 (22%)		
	Total	57 (100%)	11 (100%)	13 (100%)	81 (100%)		
	Yes	9 (16%)	0 (0%)	4 (31%)	13 (16%)		
Did you use extra-oral suction machine in addition to saliva ejectors for decreasing the formation of aerosols?	No	46 (81%)	9 (82%)	9 (69%)	64 (79%)	8.955	0.062
	Sometimes	2 (4%)	2 (18%)	0 (0%)	4 (5%)		
	Total	57 (100%)	11 (100%)	13 (100%)	81 (100%)		
	After each patient	37 (65%)	4 (36%)	10 (77%)	51 (63%)		
How many times did you disinfect and clean the operating room including chairs, the handles of the door, desks, and walls?	Once per day	10 (18%)	6 (55%)	0 (0%)	16 (20%)	12.434	0.014
	At the beginning and ending of work day	10 (18%)	1 (9%)	3 (23%)	14 (17%)		
	Total	57 (100%)	11 (100%)	13 (100%)	81 (100%)		
	Autoclave	3 (5%)	0 (0%)	2 (15%)	5 (6%)		
To prevent the risk of the cross-contamination, what did you use?	Autoclave, using rapid and highly efficient disinfecting agents	10 (18%)	0 (0%)	1 (8%)	11 (14%)	31.6	0.002
	Disposable instruments	0 (0%)	2 (18%)	0 (0%)	2 (2%)		
	Disposable instruments, Autoclave	2 (4%)	0 (0%)	1 (8%)	3 (4%)		
	Using rapid and highly efficient disinfecting agents	1 (2%)	2 (18%)	0 (0%)	3 (4%)		
Using rapid and highly efficient disinfecting agents	Disposable instruments, Using rapid and highly efficient disinfecting agents	2 (4%)	2 (18%)	0 (0%)	4 (5%)	2.606	0.626
	All of the above	39 (68%)	5 (45%)	9 (69%)	53 (65%)		
	Total	57 (100%)	11 (100%)	13 (100%)	81 (100%)		
	Yes	12 (21%)	1 (9%)	2 (15%)	15 (19%)		
Did you routinely prepare antimicrobial mouth wash for every orthodontic patient before treatment?	No	22 (39%)	7 (64%)	6 (46%)	35 (43%)	2.606	0.626
	Sometimes	23 (40%)	3 (27%)	5 (38%)	31 (38%)		
	Total	57 (100%)	11 (100%)	13 (100%)	81 (100%)		

Table 4
Responses for Section 4

Questions	Answers	Both	Gover	Private	Total	X ²	p
If a patient claimed that he had a history of positive COVID-19 within the past 14 days, what is your management?	Postpone the treatment for at least additional 14 days	36 (63%)	8 (73%)	9 (69%)	53 (65%)	1.923	0.750
	Carried out the routine orthodontic treatment	2 (4%)	1 (9%)	1 (8%)	4 (5%)		
	Applied only emergency practices with high infection control measurements	19 (33%)	2 (18%)	3 (23%)	24 (30%)		
If a patient had a confirmed case of COVID-19 and needed urgent management for an ulcer caused by the arch wire, what will you do?	Total	57 (100%)	11 (100%)	13 (100%)	81 (100%)	6.122	0.190
	Treat the patient with highly infection control measurements	32 (56%)	3 (27%)	4 (31%)	39 (48%)		
	Provide his parents or relatives with orthodontic wax, analgesics and sometimes mouthwash	19 (33%)	7 (64%)	8 (62%)	34 (42%)		
If a patient gets a vaccine for COVID-19, what is your management?	Total	6 (11%)	1 (9%)	1 (8%)	8 (10%)	7.222	0.125
	Postpone the treatment for at least additional 14 days	57 (100%)	11 (100%)	13 (100%)	81 (100%)		
	Carried out the routine orthodontic treatment	12 (21%)	0 (0%)	4 (31%)	16 (20%)		
After the period of COVID-19 breakout and lockdown, did you shift your choice for the brackets, archwires and traction methods to self-ligating brackets, CuNiTi archwires and NiTi traction spring to get extended visits?	Applied only emergency practices	33 (58%)	6 (55%)	6 (46%)	45 (56%)	3.178	0.528
	Total	12 (21%)	5 (45%)	3 (23%)	20 (25%)		
	Yes	57 (100%)	11 (100%)	13 (100%)	81 (100%)		
With the development of new COVID-19 variants, did you change the protection and precautions strategies?	No	5 (9%)	3 (27%)	1 (8%)	9 (11%)	1.084	0.582
	In some cases	34 (60%)	5 (45%)	9 (69%)	48 (59%)		
	Total	18 (32%)	3 (27%)	3 (23%)	24 (30%)		
With the development of new COVID-19 variants, did you change the protection and precautions strategies?	Yes	57 (100%)	11 (100%)	13 (100%)	81 (100%)	1.084	0.582
	No	18 (32%)	2 (18%)	3 (23%)	23 (28%)		
	Total	39 (68%)	9 (82%)	10 (77%)	58 (72%)		
With the development of new COVID-19 variants, did you change the protection and precautions strategies?	Yes	57 (100%)	11 (100%)	13 (100%)	81 (100%)	1.084	0.582
	No	18 (32%)	2 (18%)	3 (23%)	23 (28%)		
	Total	39 (68%)	9 (82%)	10 (77%)	58 (72%)		

Table 3 demonstrates the frequency distributions, percentages and comparison of orthodontists' responses regarding Sections 3 and 4 (infection control protocols).

Regarding the number of times disinfecting and cleaning of the operating room performed, about 63% clean and disinfect after each patients while 20% once per day and 17% at the beginning and end of the working day with no significant difference.

About 14% of orthodontists used autoclave and rapid and highly efficient disinfecting agents, 18% using disposable instruments and 39% used a combination of autoclave, disposable instruments and rapidly and highly efficient disinfecting agents to prevent the cross-contamination among patients.

Most orthodontists in different work places replied a positive responses regarding the pre-checking and asking patients a few questions about overall health status, and in the case where there's a history of travel, or whether the patient becomes in contact with confirmed or suspected cases, and instruct their patients to wear masks and gloves prior to entering the clinic as a part of infection control measurements. On the other hand, 79% of the orthodontists responded negatively regarding the use of extra-oral suction machine in addition to saliva ejectors for decreasing the formation of aerosols. About 43% of the participants prepared anti-microbial mouthwashes before commencing the usual visits.

The general percentages of the negative and positive responses to every question in Section 4 of the questionnaire are shown in Table 4. Regarding the clinical management of orthodontic patients attending the clinics, 65% of orthodontists preferred postponing the treatment for at least additional 14 days if a patient claimed that had a history of positive COVID-19 during the past 14 days, while 33% are handling only emergency practices with high infection control measurements on the other hand, if a patient had a confirmed case of COVID-19 and needed urgent management for an ulcer caused by the arch wire, 56% treat the patient with highly infection control measurements, but 64% mentioned that they provide his parents or relatives of the patients with orthodontic wax, analgesics and sometimes mouthwash.

About 58% of the orthodontists provided routine orthodontic treatment, while 31% postponed the treatment for at least an additional 14 days, and 21% applied only emergency practices for patients who obtained a vaccine for COVID-19. About 59% responded negatively towards changing to use self-ligating brackets, CuNiTi or NiTi traction spring to get more intervals between visits. Similarly but in slightly higher percentage, 72% of the participants did not change their protection protocol in spite of the development of the newer variation of COVID-19.

4. Discussion

Since the WHO declared COVID-19 a pandemic in March 2020, COVID-19 infection caused a disastrous worldwide effect, forcing counties to claim total or partial lockdown as an attempt to restrain the spread of the virus. They adapted many regulations such as encouraging people to stay home and go outside only when necessary and perform social distancing.

Many studies have been published to clarify the signs, symptoms and complications of COVID-19 in addition to the treatment protocols [21–23]. The transmission of COVID-19 infection is considered as one of the risks for patients who are in close contact with other individuals that have been infected, and at the same time the risks are higher amongst the subjects who work in close contact with patients. The distance from the working field to the dentist is approximately 35–40 cm; most orthodontic procedures are time consuming, which places both the orthodontist and the patients at great risk of contracting COVID-19 [24].

To date there are no recommendations or global guidelines for orthodontic practice during the existence of the pandemic, so this opens the way for orthodontists to make the decision to either or not proceed their

work. Orthodontic treatment may continue for about 2 to 3 years with frequent orthodontic appointments each 4–6 weeks, which makes orthodontic patients unique, for that reason it is necessary to follow strict infection control protocols [25].

The COVID-19 pandemic has taken a special consideration among countries due to many restrictions that have taken place in daily life. The risk of getting infected forced many dental clinics to close which put orthodontic patients who underwent orthodontic treatment in a peculiar situation, due to obstacles to their systematic visits for orthodontists. The present paper aims at the assessment of challenges that are faced by the orthodontists and their preferable solutions in order to overcome those challenges throughout the pandemic.

A study overview found that most orthodontists (93%) claimed to use a combination of PPE and did not use an extra-oral suction device to reduce the risk of cross contamination as most orthodontic procedures, except cleaning the teeth from composite after debonding, did not require a hand piece or high speed turbine. Besides that, they disinfected and cleaned the operating room after each patient due to their high knowledge about the period of the incubation and the route of COVID-19 transmission.

There was a significant difference regarding the type of mask used during routine daily work 51% preferred using a two-fold disposable medical mask while 32% preferred using N95 mask those findings may be a result of different dissemination ways of information concerning the type of mask that better protects them from contracting COVID-19.

The orthodontists preferred to postpone the treatment of patients who tested positive during the last 14 days to at least an additional 14 days (63%), applied only emergency practices with high infection control measurements (33%), and carried out the routine orthodontic treatment (9%). This can be explained due to the lack of evidence-based definitive reports that patients after 14 days cannot transmit the infection to the others, especially in patients without any symptoms.

A high rate of respondents perceived using the autoclave, a disposable instrument and highly efficient disinfecting agents' combination, as a way to prevent the risk of cross-contamination (68%). This perception maybe add to their high knowledge concerning the period of the incubation and route of COVID-19 transmission. This result is in line with previous studies [26,27].

The orthodontists shared similar perceptions. As the research on the impacts of COVID-19 amongst orthodontists has shown, most of them considered this infection to be dangerous, which is why they instruct patients to wear medical gloves and masks prior to entering their clinic, pre-check and ask patients a few questions on their general health status, and in case there was a history of travel, they ask whether the patient got in contact with either confirmed or suspected cases, following the recommendation of the WHO [28,29].

The orthodontists can take advantage of several guidelines and recommendations, which were proposed in the literature [8] to have the ability to provide their patients with suitable care and protect themselves as well.

According to findings, attention has to be directed towards the orthodontic patients due to their prolonged time of treatment. Numerous acceleration modalities were stated in the literature and have to be put in consideration in clinical practice to help reduce the treatment duration and avoid issues that could be related to it [30].

With the development of new COVID-19 variants, most respondents did not change the protection and precautions strategies they adopted and had an important role in preventing the risk of cross-contamination and made the treatment process easier. Also, participants differed between responses regarding the way of treatment if the patient gets a vaccine for COVID-19, addressing their management as postpone the treatment for at least additional 14 days, which was not an option in the other and most of them carried out the routine orthodontic treatment, while other chose to applied only emergency practices.

The main focus has been directed towards accessing the percentage of orthodontists who were able to complete their treatments for patients who had a confirmed case of COVID-19 and needed urgent management. The majority of them chose to treat the patient with highly infection control measurements, while only 11% used one of the social media elements to manage the case and considering that Internet became one of the alternative ways for some of the patients to seek information and experience from the individuals that have gone through the same situation [31].

A high number of participants reported that if the patient claimed to have a history of positive COVID-19 during the last 14 days, they postponed the treatment for at least an additional 14 days. This might be explained by their fear from contracting COVID-19 and making the choice of visiting clinics.

Generally, during the periods of lockdown, orthodontics specifically and dentistry in general were influenced in two parts. For the educational part, many lectures were given online as face-to-face lectures have stopped. Dental students showed a low-moderate degree of satisfaction with a positive attitude towards technology-based learning and the quality of presentation of the scientific materials [32]. The other aspect was regarding the daily practice as many have closed their clinics and depended on the symptomatic management of the cases so the duration of the orthodontic treatment and follow up visits were compromised [33,34].

Many conservative approaches could be used in the management of orofacial and orthodontic pain [35]. Moreover, the role of teledentistry became obvious during this period as it is considered the safest approach for communication with patients [36–40] and benefitted from Youtube mainly to explain many problem solutions through the available videos [41–43].

The small sample size and the incomplete information about full protection or protocol of protection of COVID-19 [44,45] are the major limitations of the current study.

5. Conclusions

The COVID-19 pandemic has had important negative impacts on the orthodontic treatments. As orthodontic clinics consider reopening to meet patients' needs, thorough and precise infection control measures must be followed. All pre-cautionary measures of COVID-19 have to be made available in the clinic in order to minimize the spread of viral infection. Continuous dental health care training of workers and patients is advised.

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Conflict of interest

The authors declare that they have no conflict of interest.

Availability of data and materials

Data are available from the corresponding authors upon reasonable request.

Ethics statement

Formal consent and ethical approval were obtained from the participants.

Author contributions

RAF, MN, MMM, GM and MC: Methodology, Investigation, Writing-Original draft preparation, Critical review of intellectual contents and approval of the final version to be published. AES, ASK: Methodology, Investigation, Visualization, Supervision, Critical review of intellectual contents and approval of the final version to be published. RAR, MN, AFA: Conceptualization, Data curation, Resources, Original draft preparation, Writing-Review and editing, Project administration, Critical review of intellectual contents and approval of the final version to be published.

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Appendix: Google Form

Section 1

E-mail:

Gender: Male, Female

Qualification: M.Sc., Ph.D., Certificate

Place of work: Private, Governmental, Both

Section 2

1. **Which of the following may be considered as one of the transmission ways of COVID-19?**
 - Inhalation of airborne
 - The direct contact with body and oral fluids
 - Patient materials may work as risk factor if the dentists get in contact with them
 - All the above
2. **What personal protective equipment (PPE) did you use? (You can choose more than one answer)**
 - Protective eyewear (goggles)
 - Medical hand gloves
 - Medical head cap
 - Face shield
 - Medical face mask
 - Protective suits
3. **Which of the following did you routinely use in the clinic for the prevention of eye contamination with infectious agents?**
 - Goggles only
 - Face shield only
 - Both
4. **What is the type of mask you used during routine daily work?**
 - Onefold disposable medical face mask
 - Two-fold (double) disposable medical face mask
 - N95 face mask
 - Non-medical (reusable) face mask

Section 3

5. **How many times did you disinfect and clean the operating room including chairs, the handles of the door, desks, and walls?**
 - After each patient
 - Once per day
 - At the beginning and ending of work day
6. **To prevent the risk of the cross-contamination, what did you use? (You can choose more than one answer)**
 - Disposable instruments
 - Autoclave
 - Using rapid and highly efficient disinfecting agents
 - All of the above
7. **Did you routinely prepare antimicrobial mouth wash for every orthodontic patient before treatment?**
 - Yes
 - No
 - Sometimes
8. **Did you or one of your staff members take the body temperature for every orthodontic patient before starting your treatment?**
 - Yes
 - No
 - Sometimes
9. **Did you pre-check and ask the patients some questions about the general health status, and if there is a history of travel, they should ask whether the patient gets in contact with any suspected or confirmed cases?**
 - Yes
 - No
 - Sometimes
10. **Did you instruct the patient to wear medical mask and gloves before entering the clinic?**
 - Yes
 - No
11. **Did you use extra-oral suction machine in addition to saliva ejectors for decreasing the formation of aerosols?**
 - Yes
 - No
 - Sometimes

Section 4

12. **With the development of new COVID-19 variants, did you change the protection and precautions strategies?**
 - Yes
 - No
13. **If a patient claimed that he had a history of positive COVID-19 within the past 14 days, what is your management?**

- Postpone the treatment for at least additional 14 days
 - Carried out the routine orthodontic treatment
 - Applied only emergency practices with high infection control measurements
14. **If a patient had a confirmed case of COVID-19 and needed urgent management for an ulcer caused by the arch wire, what will you do?**
- Treat the patient with highly infection control measurements
 - Provide his parents or relatives with orthodontic wax, analgesics and sometimes mouthwash
 - Use one of the social media elements to manage the case
15. **If a patient gets a vaccine for COVID-19, what is your management?**
- Postpone the treatment for at least additional 14 days
 - Carried out the routine orthodontic treatment
 - Applied only emergency practices
16. **After the period of COVID-19 breakout and lockdown, did you shift your choice for the brackets, archwires and traction methods to self-ligating brackets, CuNiTi archwires and NiTi traction spring to get extended visits?**
- Yes
 - No
 - In some cases.