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## **Covid-19: An orthodontic perspective**

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### **Abstract**

The COVID-19 outbreak has affected human existence in many ways, with uncertainty faced globally. The dental practice and orthodontic care during the pandemic and future practice will require precautionary and selective case evaluation based on the practitioner's judgment to reduce cross-contamination and prevent new outbreaks. This article aims to provide a comprehensive guideline for managing the orthodontic conditions and the patients at a clinical setup, using the currently available guidelines.

**Keywords:** dental practice, infection control, orthodontic treatment, SARS-CoV-2, Covid-19

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### **Introduction**

The corona virus disease 2019 (COVID-19) infection was first identified and reported in the year 2019 in a cluster of cases, caused by a newly identified Beta corona virus. Reported at Wuhan, the capital of China's Hubei province the virus was initially named as 2019 novel corona virus (2019-nCoV) by the World Health Organization (WHO) on January 12, 2020 [1]. The incubation period for individual infected with Covid-19 infection is between 2 to 14 days [2].

Fever, dry cough, sore throat, loss of taste, loss of smell (anosmia), or tiredness are the most common symptoms at onset of illness and headache, haemoptysis, nausea, vomiting and diarrhoea are the less common symptoms [3]. Some patient may report difficulty in breathing or shortness of breath. Pneumonia is also developed in some cases which can be seen on chest X-ray or chest CT. Novel corona virus infection primarily target lung and most common symptoms is acute respiratory distress syndrome (ARDS), effect were also seen in other vital organ such as heart (acute cardiac injury), kidney (acute kidney injury), liver (liver impairment) and death can occur in severe cases [4,5].

Dental staff and dental practitioners are considered to be at the highest risk of acquiring SARS-CoV-2 infection because of their prolonged face to face exposure to patients and exposure to respiratory secretions and aerosols produced during procedures like ultrasonic scaling and cavity/ access preparation using a high-speed air rotor with water jet cooling systems [1,6]. Therefore, it is the need of the hour for dental professionals to update their knowledge regarding disease control and modify their clinical strategies recommended by the authorities to provide safe environment for themselves and their team against infections [7]. The present scenario has caused orthodontic care providers to

abruptly suspend active orthodontic treatment. At present, limited information and guidelines for clinical orthodontic care and the management of patients are available [8,9]. This article aims to provide a comprehensive guideline for managing the orthodontic conditions and the patients at a clinical setup, using the currently available guidelines.

### **Covid-19 infection in healthcare workers [10]**

The 3 patterns of Covid-19 transmission suggested in the literature include the following: a) sporadic cases occurring in communities; b) transmission within families; and c) nosocomial transmission. Health care related Covid-19 transmission is associated with high morbidity, extended use of mechanical ventilation and fatality rates of up to 5%; this type of transmission can be attributed to shortcomings in observing stringent infection control protocols.

Furthermore, Covid-19 has been reported to be viable in hospital like environments for up to 48 hours with a stability that is unaltered during aerosolization. Healthcare workers could be infected with Covid-19 through exposure in the community or at their workplace, they could be diagnosed late, and they could remain asymptomatic or mildly symptomatic.

Furthermore, unsuspected cases entering healthcare facilities have been considered the main source of MERS-CoV.4 Considering these aspects and those healthcare workers may continue to work regardless of being symptomatic, the possibility of transmitting the infection to their patients is also high.

### Risk of transmission in a dental office

Saliva can have a pivotal role in the human-to-human transmission, and salivary diagnostics may provide a convenient and cost-effective point-of-care platform for COVID-19 infection. The COVID-19 measures around 120 nm (0.12 μm) and aerosol particle sizes range from 3-100 nm. The use of a FFP3 respirator offers a filtration rate of 99% of all particles measuring up to 0.6 μm. Currently, the COVID-19 transmission routes are still to be determined, but human-to-human transmission is definitely the most evident one [11].

### Implications for Orthodontic Management during and After the Pandemic

**Telescreening and Triage:** The word ‘tele’ means ‘distant’, and therefore teledentistry satisfies the need for social distancing as has been advocated by the health authorities all across the globe to contain the spread of SARS-COV-2 virus. Teledentistry can be incorporated into routine dental practice as it offers a wide range of applications such as remote triaging of the suspected COVID-19 patients for dental treatment and decreasing the unnecessary exposure of healthy or uninfected patients by decreasing their visits to already burdened dental offices and hospitals. Tele dentistry is a safe, convenient approach to resume dental practice during this pandemic. All instruction to the patient can be delivered effectively and at the same time dentist can also assess the need of the dental treatment [12].

A trained clinical staff member should perform an initial telephone triage or telescreen procedure before the dental appointment to assess the vulnerability of patients and the potential threat they may pose to members of the professional team, other patients, and accompanying people [13].

### History Recording and Patient Evaluation

A detailed and in-depth COVID-19 screening questionnaire, including medical history, social history gatherings, meetings, and travel history to assess the true emergency, is taken as soon as a patient reports to the clinic. The trained dental staff should measure the patient’s body temperature, using a noncontact forehead infrared thermal sensor. As per the Center for Disease Control and Prevention (CDC) guidelines, individuals exposed to a person with COVID-19 or a patient presenting with fever (99.32°F/37.4°C or higher), and any high-risk patient suspected as per the questionnaire should wear a mask or use a tissue to cover a cough and be offered separate space to wait [14].

### Preparation of Dental Clinic Ventilation and air quality management

Maintain air circulation through a frequent opening of windows and using an independent exhaust blower to extract the room air into the atmosphere. HEPA air filter system and UV light may be used [2].

### Preparation of Clinic entrance, reception and waiting [12]

- Display visual alerts at the entrance of the clinic and reception area about respiratory hygiene, cough etiquette, social distancing, and disposal of contaminated items in trash cans.
- As soon as the patient enters the reception area, ask them to wash their hands using hand wash or alcohol-based hand rub.

Use tissue paper or hand dryer to dry the hands instead of towels. Tissue paper dispenser and foot-operated waste bin are mandatory.

- Include temperature recordings as part of your routine patient assessment before performing any dental procedure. A noncontact forehead thermometer can be used to measure the patient's body temperature.
- Use of glass/plastic protective barrier at the reception desk or registration counter help in reducing the chances of infection and ensure safety of staff members.

Appointments should be scheduled such that social distancing can be maintained in the waiting room. Another alternative is for the patient to wait outside or in their vehicle and they can be contacted via telephone when it is their turn to be seen. It is recommended that the patients avoid bringing companions to their appointment, except for instances where the patient requires assistance. This can be communicated to the patient at the time of scheduling an appointment.

### Changing Room [2]

Separate dedicated area to be available for dentist and other staff members to wear personal protective equipments and donning and doffing of PPE kit.

### Sterilisation room [2]

Dedicated and trained staff should be there to take care of all the instruments that include transport, cleaning, drying, sterilisation (as per manufacture’s instruction), storage and testing the quality of sterilisation and maintaining the sterilization record.

### Equipment and instrumentation [2]

Dental operatories should be equipped with following equipments

- High volume extra oral suction
- Fumigation systems
- HEPA air filter system
- Ultra-Low Air Penetration
- UV lights
- Infrared thermometer
- Pulse oximeter
- N95 masks
- Eye wears
- Appropriate PPE kit
- Non touched or automatic sanitizer dispenser

### Disinfection of Dental Clinic [15].

According to the available literatures corona virus has ability to survive in the environment for several hours up to days. Therefore it is necessary to disinfect the operatory area as before their re-use.

### Surface Disinfection [12]

#### Floors

- Mop the floor with 1% sodium hypochlorite solution with a contact time of 10 min. Use separate mops for the clinical area.
- Unidirectional mopping technique should be followed by mopping from inner to outer area.

- Ideally the floor should be cleaned after every patient or after a major splash or two hourly periods.
- Wash and disinfect the mop with clean water and 1% sodium hypochlorite and leave it for sun drying.

#### Rest of the surfaces

- Freshly prepared 1% sodium hypochlorite (contact time: 10 min) is used.
- Disinfection should be done daily before starting work, after every procedure, and at the end of the day.

#### Delicate Electronic equipment

It should be wiped with alcohol-based rub/spirit (60%–90% alcohol) swab before each patient contact.

#### Fogging

This method is called “No-touch surface disinfection.” 20% (w/v) working solution of hydrogen peroxide (stabilized by 0.01% of silver nitrate) is prepared. The amount of solution required is approximately 1000 mL per 1000 cubic feet.

- Immediately after the procedure, exit the room and close the operatory for half hour. This allows the aerosols/droplets to settle down.
- A 2-step surface cleaning is performed.
- Fogging is done for 45 min followed by a dwell time of 1 h.
- The room can then be opened and fans switched on for aeration.
- Wet surfaces can be dried/cleaned using a sterile cloth or clean cloth.

#### Modifying the different orthodontic procedures in a dental office<sup>16</sup>

If the patient is tested negative for the symptoms with no travel history and also willing for the treatment then the procedures must be carried out definitely after certain modifications.

- Instead of using arotors for removing the composite off the tooth we must use composite removing pliers to chip off the left over composite.

- Avoiding bonding new cases will be the priority.
- Wire change and proceeding with the space closure must be done
- No disimpactions or exposure of tooth must be carried out
- No impressions must be taken
- Most orthodontic appliances can be left as it is for some months without detriment to the patient if the patient continues with the usual after care instructions Aerosol generating procedures (AGP) should only be undertaken to provide urgent care where no other option is available as it presents a higher risk of transmission.
- Any patient requesting urgent care should first be triaged by telephone or online video-link by an orthodontist to assess the clinical urgency, offer any interim self-care advice and make an appointment for face-to-face assessment if absolutely necessary. Broadcast communication is the key after all.
- In general, it is recommended during the outbreak to postpone any routine appointments and restrict Patients visits to emergency treatment only.

#### Orthodontic supplies and instruments<sup>[16]</sup>.

The following are recommendations to reduce risk of cross contamination and help protect vulnerable patients as well as the orthodontic staff:

- Orthodontic pliers can be sterilized with steam autoclave sterilization, ultrasound bath and thermal disinfection or disinfected with chemical substances 2% glutaraldehyde or 0.25% PAA. Instrument cassettes can be effectively used, with pliers preferably sterilized in an open position.
- Autoclave is preferred over cold sterilization, without negatively affecting surface characterization of arch wires.
- Orthodontic markers can be autoclaved or disinfected using glutaraldehyde solution.
- Cleaning photographic retractors with washer disinfector was reported as the most effective method of decontamination.

**Table 1:** Synopsis of the recommendations for Orthodontic practice<sup>[17]</sup>

Clinical Setting	Safety measures for COVID-19
New office environment	<ul style="list-style-type: none"> <li>▪ Installation of physical barriers at reception and waiting area.</li> <li>▪ Patient screening via telecommunication for obtaining a patient's health history or contact history related to COVID19.</li> <li>▪ An electronic screening questionnaire to be filled and temperature should be checked on the arrival of a patient at the office.</li> <li>▪ Utilization of proper ventilation with negative suction in operatory rooms and air purifiers.</li> <li>▪ Tele dentistry for non-emergency appointments.</li> </ul>
Infection Control	<ul style="list-style-type: none"> <li>▪ Proper use of PPE is critical, including fit-tested N95 masks, double gloving, over the gown, and face/eye protection in case of any emergency treatment to be done.</li> <li>▪ Hand hygiene should be maintained by all present in the office either by washing hands by soap for 20 s or by using alcohol-based hand rubs.</li> <li>▪ The patient may be advised to do preoperational mouth rinse containing 1% hydrogen peroxide or 0.2% povidone-iodine for 15 s.</li> <li>▪ Thorough disinfection and waste disposal should be followed after the dental procedure is done.</li> <li>▪ Rigorous sterilization should be done along with appropriate autoclaving of materials used.</li> </ul>
Patient Scheduling	<ul style="list-style-type: none"> <li>▪ Tele-dentistry/Virtual consultations for initial screening.</li> <li>▪ Categorize and schedule based on urgency and procedure required.</li> <li>▪ Pre-examination and triage.</li> <li>▪ Emphasize basic COVID-safety protocols (Facemasks, hand sanitization, social distancing).</li> <li>▪ Patient/accompanying persons to wait in the car until instructed.</li> </ul>

Orthodontic emergencies	<ul style="list-style-type: none"> <li>▪ Some can be managed by the patient at home like soft tissue irritation by bracket/wire, broken/loose elastic chains/ligatures/elastic ties, broken bracket, part of appliance or retainer, etc.</li> <li>▪ Emergencies to be managed at the clinic - active and functional appliances, part of any appliance embedded in gingiva leading to pain and discomfort, etc.</li> </ul>
Orthodontic Records	<ul style="list-style-type: none"> <li>▪ Extraoral radiography is preferred over intraoral radiography.</li> <li>▪ Photographs should be taken in separate rooms and for one patient single-use retractors or reflectors should be used.</li> <li>▪ Intra-oral digital scanners or CBCT generated STL files may be used for 3D software models instead of alginate or silicone impressions.</li> </ul>
Bonding and other AGPs	<ul style="list-style-type: none"> <li>▪ High-volume suction is critical for AGPs.</li> <li>▪ For bonding self-etch primers or liquid gel and/or low viscosity etchants with minimal or no rinsing; use of GIC or BPA free adhesives.</li> <li>▪ Indirect bonding techniques or minimal bonding techniques like CAT can be preferred.</li> <li>▪ Use of rubber dam/peri-oral dam is also recommended for all AGPs.</li> <li>▪ Inter-proximal reduction can be coupled in same appointment as bonding. Alternatively, use of abrasive strips preferred over burs for Inter proximal reduction.</li> </ul>
Extractions	<ul style="list-style-type: none"> <li>▪ Can be avoided until any signs of abscess or cyst may be seen</li> <li>▪ Over-spitting of saliva avoided and high-volume suction may be used</li> <li>▪ Prefer local anesthetics gels over sprays</li> </ul>
Wire change	<ul style="list-style-type: none"> <li>▪ Use of individualized packed archwires.</li> <li>▪ Disinfect archwire with 75% alcohol when removed from the mouth.</li> <li>▪ Use a double layer of gloves in the potential risk of laceration from the archwire.</li> </ul>
De-bonding	<ul style="list-style-type: none"> <li>• Use of anti-retraction handpieces and high-volume suction</li> <li>• Most bonding material remnants be removed via hand instruments</li> <li>• For removing large composite attachment, use carbide of tungsten burs under water cooling conditions and powerful suction system or hand instruments whenever possible to reduce aerosol.</li> </ul>
Retention	<ul style="list-style-type: none"> <li>• Thermoplastic retainers may be preferred as can be fabricated through 3D software models of the patients</li> <li>• Postpone fixed retention</li> </ul>

## Discussion

The dental practice and orthodontic care during the pandemic and future practice will require precautionary and selective case evaluation based on the practitioner's judgment to reduce cross-contamination and prevent new outbreaks.<sup>18</sup> From the present evidence of COVID-Era, the potential demands for appliance selection include careful patient screening and collection of records; minimal physical visits; utilizing technology at its best; virtual consultations but the use of PPE for physical appointments; and lesser AGPs with a lesser risk of air-borne transmission<sup>[17]</sup>.

The clinic disinfection protocols during pre-treatment, during treatment, and post-treatment should be strictly followed. The staff and patients' well-being should be given maximum priority<sup>[18]</sup>. The proposed workflow and guidelines collected from various health regulatory authorities in the article will provide appropriate and effective management of dental and orthodontic care during the COVID-19 pandemic and post-COVID practice.

## Conclusion

SARS-CoV-2 or COVID-19 pandemic has affected the economic, psychosocial, and social lives of orthodontists as well as orthodontic patients, with increased levels of anxiety and distress. The clinician should follow the guidelines provided by the concerned health regulatory authorities. Modification and redesign of the dental clinic might be required to maintain efficient air circulation and ventilation and appropriate standard PPE. Effective telescreens and triaging should be part of a routine clinical screening protocol until the uncertainty of the COVID-19 pandemic subsides. Any suspected patient with signs and symptoms of COVID-19 should require deferred orthodontic care and a referral to the COVID-19 screening unit as a priority. The dental treatment should be minimally invasive, of minimal

contact, and avoid aerosols generation.

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