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Orthodontic treatment guidelines during Covid-19 pandemic outbreak: A review article

I Girish Kumar, Raghunath N, Jyothikiran H, Ravi S and Pradeep S

Abstract
The recent spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and its associated coronavirus disease has gripped the entire international community and caused widespread public health concerns. Despite global efforts to contain the disease spread, the outbreak is still on a rise because of the community spread pattern of this infection. This is a zoonotic infection, similar to other coronavirus infections, that is believed to have originated from bats and pangolins and later transmitted to humans. Once in the human body, this coronavirus (SARS-CoV-2) is abundantly present in nasopharyngeal and salivary secretions of affected patients, and its spread is predominantly thought to be respiratory droplet/contact in nature. Dental professionals, including orthodontist, may encounter patients with suspected or confirmed SARS-CoV-2 infection and will have to act diligently not only to provide care but at the same time prevent nosocomial spread of infection. Thus, the aim of this article is to provide a brief overview of the epidemiology, symptoms, and routes of transmission of this novel infection. In addition, specific recommendations for orthodontic practice. Coronavirus continues to spread, now is the time for orthodontic practices to get educated on the facts about the virus and review infection prevention and control procedures to protect staff and patients.

Keywords: Coronavirus, COVID-19, orthodontics, severe acute respiratory syndrome coronavirus 2; SARS-CoV-2

Introduction
The COVID-19 pandemic, also known as the coronavirus pandemic, is an ongoing pandemic of coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1]. The outbreak was first identified in Wuhan, China, in December 2019 [2] The World Health Organization declared the outbreak a public health emergency of international concern on 30 January, and a pandemic on 11th March [3]. As of 26 May 2020, more than 5.49 million cases of COVID-19 have been reported in more than 188 countries and territories, resulting in more than 346,000 deaths. More than 2.23 million people have recovered from the virus. The first case of the COVID-19 pandemic in India was reported on 30 January 2020. As of 26 May 2020, the Ministry of Health and Family Welfare have confirmed a total of 145,380 cases, 60,491 recoveries (including 1 migration) and 4,167 deaths in the country [4]. The virus is primarily spread between people during close contact, most often via small droplets produced by coughing, sneezing, and talking. The droplets usually fall to the ground or onto surfaces rather than travelling through air over long distances [5] Less commonly, people may become infected by touching a contaminated surface and then touching their face. It is most contagious during the first three days after the onset of symptoms, although spread is possible before symptoms appear, and from people who do not show symptoms. Common symptoms include fever, cough, fatigue, shortness of breath, and loss of sense of smell. Complications may include pneumonia and acute respiratory distress syndrome [6]. The time from exposure to onset of symptoms is typically around five days but may range from two to fourteen days [7]. There is no known vaccine or specific antiviral treatment. Given the widespread transmission of SARS-CoV-2 and reports of its spread to health care providers dental professionals are at high risk for nosocomial infection and can become potential carriers of the disease. These risks can be attributed to the unique nature of dental interventions, which include aerosol generation, handling of sharps, and proximity of the provider to the patient's oropharyngeal region. In addition, if adequate precautions are not

taken, the dental office can potentially expose patients to cross contamination. As the understanding of this novel disease is evolving, dental practices should be better prepared to identify a possible COVID-19 infection, and refer patients with suspected, confirmed, or a history of COVID-19 infection to appropriate treatment centers. In this article, we summarize current recommendations for diagnosing and managing patients with COVID-19. Although this information is current up to March 2020, we anticipate that new information will emerge and have provided URLs to several useful websites.

Materials and Methods

Considering the recent emergence of COVID-19, this review included publications in English and non-English languages that matched the search terms up to March 19, 2020. Studies were retrieved from the following databases: COVID-19 Open Research Dataset (CORD-19 2020)17 (March 13th, 2020 was the last published update), PubMed, MEDLINE, Scopus and Google Scholar. Non-English articles and abstracts were translated. The main author with the help of a research assistant conducted the search using the following terms: COVID; COVID-19; COVID-2019; 2019-nCoV; SARS-CoV-2; Corona; oral; mouth; dental; dentist; dentistry; stomatology; orthodontic; orthodontist; saliva; infection control; contamination; transmission. Studies included any of the search terms were selected and duplicates were eliminated. Screening of titles followed by abstracts were performed. Lastly, articles that fall within the scope of this review were included and retrieved in full text.

Symptoms

Patients with COVID-19 usually present with clinical symptoms of fever, dry cough, and myalgia. In addition, less obvious symptoms such as nausea, diarrhea, reduced sense of smell (hyposmia), and abnormal taste sensation (dysguesia) have also been reported Fig.1. In addition, abnormal chest X-ray and computed tomographic findings such as ground-glass opacities are typically found in the chest [8]. Notably, about 80% of these patients have only mild symptoms that resemble flulike symptoms and seasonal allergies, which might lead to an increased number of undiagnosed cases. Comparison of clinical symptoms and incubation time of human coronaviruses Table.1. These asymptomatic patients can act as "carriers" and also serve as reservoir for re-emergence of infection. Although SARS-CoV-2 is known to be highly transmissible when patients are most symptomatic, it is noteworthy that the incubation period can range from 0 to 24 days, therefore transmission can occur before any symptoms are apparent. Severe forms of this disease have a predilection for men with a mean age of 56

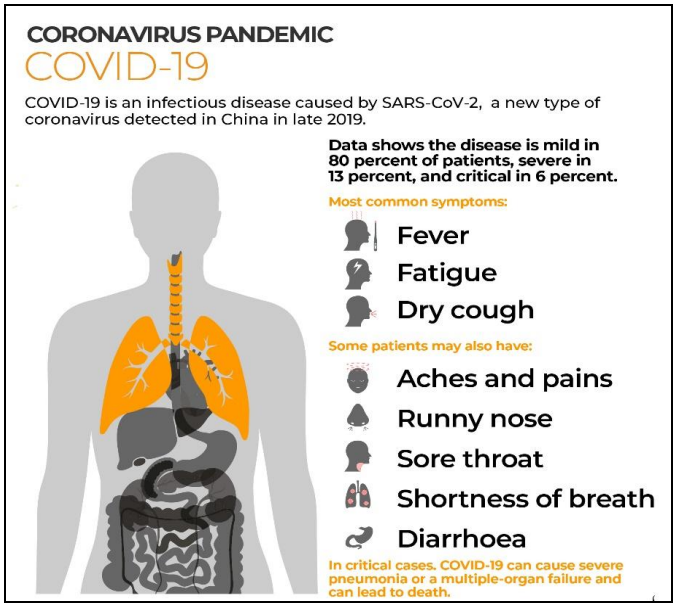


Fig 1: Most common symptoms in Covid-19

Years with pre-existing chronic illnesses such as cardiovascular disease or immunosuppression. The higher-risk patient population manifests symptoms typical of pneumonia or acute respiratory distress syndrome.

Table 1: Comparison of clinical symptoms and incubation time of human coronaviruses

HUMAN coronaviruses	Clinical symptoms	Incubation period
229E	General malaise, headache, nasal discharge, sneezing, sore throat, fever and cough (10–20% of patients)	2–5 days
OC43	General malaise, headache, nasal discharge, sneezing, sore throat, fever and cough (10–20% of patients)	2–5 days
NL63	Cough, rhinorrhea, tachypnea, fever, hypoxia, obstructive laryngitis (croup)	2–4 days
HKU1	Fever, running nose, cough, dyspnoea	2–4 days
SARS - CoV	Fever, myalgia, headache, malaise, chills, non-productive cough, dyspnoea, respiratory distress, diarrhoea (30–40% of patients)	2–11 days
MERS - CoV	Fever, cough, chills, sore throat, myalgia, arthralgia, dyspnea, pneumonia, diarrhea and vomiting (one third of patients), acute renal impairment	2–13 days
2019-nCoV	Malaise, fever, dry cough, cough, dyspnea, myalgia, fatigue	1–14 days

Mode of Transmission

Respiratory infections can be transmitted through droplets of different sizes: when the droplet particles are >5-10 μm in diameter they are referred to as respiratory droplets, and when then are <5μm in diameter, they are referred to as droplet nuclei [9]. According to current evidence, COVID-19 virus is primarily transmitted between people through respiratory droplets and contact routes. In an analysis of 75,465 COVID-19 cases in China, airborne transmission was not reported [10]. Droplet transmission occurs when a person is in in close contact (within 1 m) with someone who has respiratory symptoms (e.g., coughing or sneezing) and is therefore at risk of having his/her mucosae (mouth and nose) or conjunctiva (eyes) exposed to potentially infective respiratory droplets. Transmission may also occur through fomites in the immediate environment around the infected person [11]. Therefore, transmission of the COVID-19 virus can occur by direct contact with infected people and indirect contact with surfaces in the immediate environment or with objects used on the infected person (e.g., stethoscope or thermometer). Airborne transmission is different from droplet transmission as it refers to the presence of microbes within droplet nuclei, which are generally considered to be particles <5μm in diameter, can remain in the air for long periods of time and be

transmitted to others over distances greater than 1m. In the context of COVID-19, airborne transmission may be possible in specific circumstances and settings in which procedures or support treatments that generate aerosols are performed; i.e., endotracheal intubation, bronchoscopy, open suctioning, administration of nebulized treatment, manual ventilation before intubation, turning the patient to the prone position, disconnecting the patient from the ventilator, non-invasive positive-pressure ventilation, tracheostomy, and cardiopulmonary resuscitation. Although, cross-transmission of COVID-19 within a dental facility has not been reported so far, however taking into consideration the recent onset of the disease and deficiency in data, the risk is still elevated. Previous studies have reported cross-transmission of infection within the dental facilities including Hepatitis B and Hepatitis C. In the United States, orthodontists are ranked the second highest incidence to acquire Hepatitis B. Meng *et al*. reported 9 confirmed cases of COVID-19 within ental team members at the School and Hospital of Stomatology, Wuhan University (SHSWH) [12]. While this was possibly an infection from an outside source other than the dental facility, those infected personnel could be contagious during their latency period and infect other team members or patients visiting the dental clinic. This brings the importance of taking strict measures to ensure safety and avoid possible transmission within the orthodontic practice. There is some evidence that COVID-19 infection may lead to intestinal infection and be present in faeces. However, to date only one study has cultured the COVID-19 virus from a single stool specimen. There have been no reports of faecal−oral transmission of the COVID-19 virus to date.

Implications of recent findings of detection of COVID-19 virus from air sampling

To date, some scientific publications provide initial evidence on whether the COVID-19 virus can be detected in the air and thus, some news outlets have suggested that there has been airborne transmission. These initial findings need to be interpreted carefully. A recent publication in the New England Journal of Medicine has evaluated virus persistence of the COVID-19 virus [13]. In this experimental study, aerosols were generated using a three-jet Collison nebulizer and fed into a Goldberg drum under controlled laboratory conditions. This is a high-powered machine that does not reflect normal human cough conditions. Further, the finding of COVID-19 virus in aerosol particles up to 3 hours does not reflect a clinical setting in which aerosol-generating procedures are performed that is, this was an experimentally induced aerosol-generating procedure. There are reports from settings where symptomatic COVID-19 patients have been admitted and in which no COVID-19 RNA was detected in air samples [14]. WHO is aware of other studies which have evaluated the presence of COVID-19 RNA in air samples, but which are not yet published in peer-reviewed journals.It is important to note that the detection of RNA in environmental samples based on PCR-based assays is not indicative of viable virus that could be transmissible. Further studies are needed to determine whether it is possible to detect COVID-19 virus in air samples from patient rooms where no procedures or support treatments that generate aerosols are ongoing. As evidence emerges, it is important to know whether viable virus is found and what role it may play in transmission.

Orthodontic Treatment Guidelines for Covid-19

Identification

As Dental health care personnel especially Orthodontist are exposed to oral cavity which is a common route for infection transmission, he/she should be alert. They will have to be careful while providing treatment to prevent nosocomial spread of infection.

- One of the main challenges in the dental healthcare is the difficulty in the infected patient identification, due to both the necessity of a proper diagnostic pattern (test swabs) and the chance to manage asymptomatic patients. For this reason, every patient should be treated as infected to avoid any risk.
- In the dental practice transmission of COVID-19 is commonly via aerosol [15]. Identify patients with an acute respiratory illness. Unique feature of COVID-19 is it causes both Upper & lower respiratory tract infection.
- Take proper medical history. Its symptoms include Fever, dry cough, fatigue, sputum production, shortness of breath, myalgia/ arthralgia, sore throat, headache, chills, nausea & vomiting, nasal congestion, diarrhea, hemoptysis & conjunctival congestion.
- Patient's body temperature should be checked using a non-contact forehead thermometer or with cameras having infrared thermal sensors. Elective dental care procedures should be deferred in Patients who present with fever (>100.4°F = 38°C) and/or respiratory disease symptoms for at least 2-3 weeks.
- Ask every patient about their travel history in the last 14 days or being in contact with such person having travel history.
- While confirming appointments or during the arrival of patients for treatment, appropriate questions should be asked which includes whether patients have been in close contact with someone who has been diagnosed with or is under investigation for COVID-19.
- Patients answering yes to these questions should be counseled or encouraged to contact their physician as early as possible for COVID- 19 diagnosis.
- If dentists or staff member comes in contact with a COVID-19 patient, he/she should get screening immediately.

Infection control measures

To help prevent the transmission, various infection control measures should be followed:

- Mouth rinse prior to any procedure using 0.12 to 0.2% chlorhexidine gluconate could help minimize the number of microbes within the oral cavity.6,49
- Personal protection equipment (PPE) is mandatory while treating such patients.
- Studies have shown that SARS (Severe acute respiratory syndrome) and MERS (Middle East respiratory syndrome) were highly susceptible to povidone iodine mouth rinse. Therefore, to minimize the load of corona viruses in the saliva preprocedural mouth rinse with 0.2% povidone-iodine should be done [16].
- High-speed evacuation should be used for dental procedures producing an aerosol (for e.g.) Using a high-speed handpiece or ultrasonic scaler during dental cleaning at bonding, bracket repositioning, and debonding visits produces aerosol and splatter in the

operatory. This aerosol could be contaminated with patient's blood, saliva, or high concentrations of infectious microbes exceeding those produced by coughing or sneezing. Moreover, aerosol containing microbes was found to reach as far as 2 meters from the patient's mouth, with the highest concentrations [17]. This means microbes could contaminate surfaces throughout the operatory. A study performed using a florescence dye with high-speed handpiece found that the fluorescence dye reached more than 2 feet from the dental chair. The dye was even found in the noses of the operator and assistant, having penetrated their facial protective gear. Another study reported trace of aerosol were found on operators' scrub jacket sleeves and chest area. The aerosol could contaminate the dental unit waterline, resulting in the spread of infection [17]. Aerosols containing germs of 0.5-10 micrometres or less have the ability to remain airborne longer, increasing the risk of being inhaled and entering deeper areas of lung, posing a potential infectious hazard. This collectively presents an alarming threat with the highly contagious COVID-19

- Perform hand hygiene with soap and water for at least 20 seconds. 60% alcohol based Sanitizers should be used.
- Face masks should be provided to patients who are coughing. Aerosol production should be restricted, and if necessary, particulate respirator such as N95, EU FFP2, or equivalent in addition to face shield are required. Although COVID-19 was categorized as Group B infectious disease, the guidelines suggest that healthcare providers perform protective measures similar to those reserved for Group A infectious diseases (as Cholera and Plague) [18].
- Patients should be kept in isolation room to prevent transmission of disease to other patients and personnel.
- Routine cleaning and disinfection strategies should be followed in dental offices.
- Proper Fumigation should be done in dental office
- Adequate ventilation of the operatory and waiting area with new air, high airflow, or with air filters is advised, with special attention to minimizing number of patients in the waiting area and allowing adequate space for social distancing [19].
- Operation room could be contaminated with droplets and aerosol. A recent study reported SARS-CoV-2 viability up to 3 hours in aerosol, with half-life of 5.6 hours on stainless steel and 6.8 hours on plastic surfaces [20]. Therefore, strict surface disinfection protocol should be applied after every patient.
- Medical wastes during the outbreak should be handled as infectious medical wastes. Double -layer yellow antileakage medical waste marked with a special tag is recommended [21].

Self protection of Orthodontist and staff members

Four units were involved in each patient dental management

- One administrative staff member;
- One nursing staff member outside the operative area;
- One nursing staff member inside the operative area;
- One clinician.

In the private practice, the nursing staff outside the operative area could simultaneously carry out the administrative role, such as secretarial work, reception duties, and payments. All operators followed the same prevention rules. Respecting good personal hygiene rules was an essential requirement. A shower before going to work and after activities will certainly be recommended practice.

Author advice is to shave facial hair, to keep the fingernails short, and avoid the use of any accessories such as watches, rings, bracelets, etc. It is also advised to wash hands with alcohol-based hand sanitizer for at least 20 seconds before and after each treatment, and limit contacts with surfaces, computers, drawers etc., as much as possible. Moreover, clinicians should avoid touching their faces, including eyes, nose and mouth. Sterile preparation criteria should be applied on every step of the clinical practice, including the operator dressing–undressing routine. The clothing must include: shoe covers, disposable caps, disposable waterproof gowns, disposable gloves, protective glasses and visors, and protectie masks.

Table 2: Personal protective equipment under different scenarios.

DPI	Outside the Operative Area	Non- aerosol Generating Procedures	Aerosol Generating Procedures
Surgical mask FFP2/FFP3 mask	Yes	Yes	Yes
Face shield			Yes
Protective glasses		Yes	Yes
Gloves	Yes	Yes	Yes
Cap	Yes	Yes	Yes
Protective waterproof clothing			Yes
Shoe cover		Yes	Yes

As per the respiratory protection masks, a certified high filtration percentage (>94%) is recommended, such as Europe "filtering facepiece 2" (FFP2), U.S. "NIOSH N95", China "KN95", Australian/New Zealand "P2", Korea "1st class", or Japan "DS" [22]. We suggest the use of very high filtration (>99%) facial devices, like FFP3 masks. A brief comparison between FFP protective devices is shown in Table 3 [23].

Table 3: Aerosol filtration percentage and internal leak rate for FFP masks.

Types of Masks	Specifications
FFP1	Aerosol filtration percentage: 80% minimum Internal leak rate: Maximum 22%
FFP2 (equivalent to N95)	Aerosol filtration percentage: Not less than 94% Internal leak rate: Maximum 8%
FFP3	Aerosol filtration percentage: Not less than 99% for EN 149-FFP3. And 99.95% for EN 143-P3 Internal leak rate: Maximum 2%

Due to the fact that the patient may still produce droplets by coughing or sneezing, and that airborne transmission has not been ruled out as a spreading mechanism, a safe and cautious approach is then strongly advised. We have adopted protective glasses and visors and FFP3 masks even when performing non-aerosol-generating procedures. Protective glasses and visors must be disinfected with 70% ethyl alcohol before and after every treatment. Alternative protective head gear designs have been proposed; among them, protective masks based on models used for snorkeling and diving, completely cleanable and equipped with interchangeable disposable P3 filters, have been developed by the Engineering Department of the University of Messina, and look promising. A critical issue of this adapted devices could be represented by the fact that eyeglasses, magnifying systems, and lighting systems are rendered impossible to wear

Donning and Doffing Instructions of PPE

The type of PPE will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type o PPE. Use safe work practices to protect yourself and limit the spread of contamination.

Donning

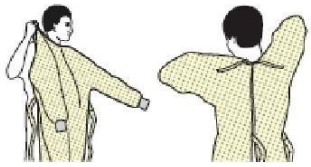
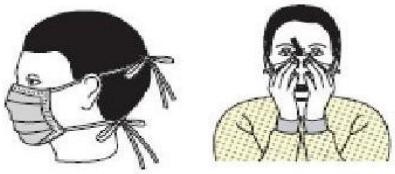
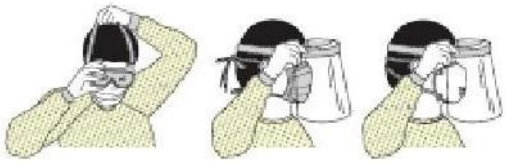
Gown • Fully cover torso from neck to knees, arms to end of wrists and wrap around neck • Fasten in back of neck and wrist	
Mask or Respirator • Secure ties or elastic bands at middle of head and neck • Fit Flexible band to nose bridge • Fit snug to face and below chin • Fit-check respirator	
Goggles or Face Shield • Place over face and eyes and adjust to fit	
Gloves • Extend to cover wrist of isolation gown	

Fig 2: Donning Sequence for putting on PPE

Here is the another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. Remove all PPE before exiting the patient room except a respirator, if worn remove the respirator after leaving the patient room and closing the door. Remove PPE in the following sequence:

Doffing

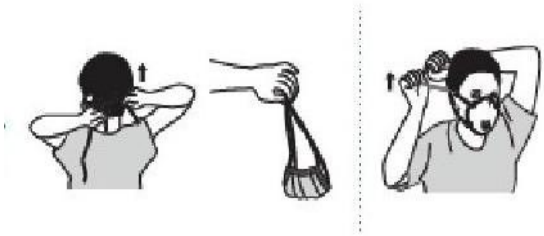
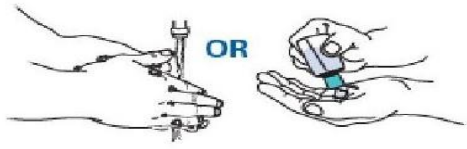
<table>
<tr>
<td>Gown and Gloves
Gown front and sleeves and the outside of gloves are contaminated.
If your hands get contaminated during gown or glove removal immediately wash your hands or use an alcohol based hand sanitizer.
Grasp the grown in the front and pull away from your body so that the ties break, touching outside of gown inside out into a bundle.
While removing the gown, fold or roll the gown inside out into a bundle
As you are removing, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into a waste container.</td>
<td> 
</td>
</tr>
<tr>
<td>Goggles or Face Shield
Outside of goggles or face shield are contaminated.
If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol based hand sanitizer.
Remove goggles or face shield from the back by lifting head band and without touching the front of the goggles or face shield.
If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container</td>
<td>  </td>
</tr>
<tr>
<td>Mask or Respirator
Front of mask or respirator is contaminated- DO NOT TOUCH.
If your hands get contaminated during mask or respirator remove immediately wash your hands or use alcohol based hand sanitizer.
Grasp bottom ties or elastics of mask or respirator, then the ones at the top and remove without touching the front.
Discard in a waste container.</td>
<td>  </td>
</tr>
<tr>
<td>Wash hand or use an alcohol based hand sanitizer immediately after removing all PPE</td>
<td> 
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Fig 3: Doffing sequence to safely remove PPE

Environmental Management

During the treatment, the work environment must be kept closed, and we suggest to implement in operating rooms ventilation and air filtration systems suitable for the health activity. The access to the operating area must be restricted as much as possible, even to other staff members, if not strictly necessary. Moreover, no more than one patient should be treated in the same working space (e.g., rooms with multiple dental chairs), unless the working units are properly divided from one another. Environmental management should not be underestimated. Every surface in the waiting room must be considered at risk; for this reason, it must be sanitized and properly ventilated before and after each appointment. All handles, seats and furniture should be cleaned. Everything that can come into contact with the patient (buttons, counters, chairs) has to be disinfected. Toilets must be sanitized before the entry of each patient and after his exit from the environment. They should be equipped with soap and alcoholic gel solutions for hand disinfection as well as disposable wipes. Operating areas and all surfaces must be disinfected before and after each treatment and be adequately ventilated. Our suggestion is to choose rapid acting, broad spectrum disinfectants (Table 4), following manufacturer's instructions whenever using them. In accordance with the provisions of the Hygiene and Preventive Medicine Unit of our University Hospital, surface cleaning was performed with

70% ethyl alcohol, followed by sanitation with potassium peroxymonosulphate solutions, alternating sodium hypochlorite 2.5% and 55% hydroalcoholic solution with quaternary ammonium propionate. Every product was applied using disposable tissues.

Table 4: Broad spectrum chemicals for environment disinfection.

Disinfectants	Required Exposure Time
70% ethyl alcohol	5 min
Potassium peroxymonosulphate solution (1/100 dilution)	5 min
2.5% sodium hypochlorite	5 min
55% hydroalcoholic/l. [‘solution with quaternary ammonium propionate	5 min

Orthodontic materials and instruments

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

- Whenever possible, every dental procedure must limit the amount of aerosol produced to a minimum, avoiding the use of the air-water syringe or scale.
- It is essential to always use a double high-speed aspiration and anti-reflux handpieces to limit the risk of cross-infections.
- Intraoral X-ray exams should be limited due to the stimulation of saliva production, preferring extra-oral dental exams such as panoramic radiography or cone beam CT.
- Dental impression and models should be sanitized with alcohol-based cleaners. Digital impressions are highly suggested. Dental chair, handpieces, lamp and suction system hoses are managed as specified in Table 2
- Orthodontic pliers can be sterilized with steam autoclave sterilization, ultrasound bath and thermal disinfection or disinfected with chemical substances 2% glutaraldehyde or 0.25% or 0.55% Ortho - Phtaladehyde solution [OPAHYDE] for High level sterilization.
- Any single-use instrument must be properly disposed.
- PAA. Instrument cassettes can be effectively used, with pliers preferably sterilized in an open position [24]
- Autoclave is preferred over cold sterilization, without negatively affecting surface characterization of arch wires[25]
- 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.
- TCDBs could be effectively decontaminated from bacterial infection[26]
- It is safe to use tried-in orthodontic bands after adequate pre-cleaning and sterilization.
- Decontamination does not jeopardize clinical stability of miniscrews nor mechanical properties of elastomeric chains.
- Flushing DUWL for at least 2 minutes or using disinfectants improves quality of water within the dental unit and minimize risk of infection[27]

Who Recommendations

Based on the available evidence, including the recent publications mentioned. WHO continues to recommend droplet and contact precautions for those people caring for COVID-19 patients. WHO continues to recommend airborne precautions for circumstances and settings in which aerosol generating procedures and support treatment are performed, according to risk assessment. These recommendations are consistent with other national and international guidelines, including those developed by the European Society of Intensive Care Medicine and Society of Critical Care Medicine and those currently used in Australia, Canada, and United Kingdom [28]. At the same time, other countries and organizations, including the US Centers for Diseases Control and Prevention and the European Centre for Disease Prevention and Control, recommend airborne precautions for any situation involving the care of COVID-19 patients, and consider the use of medical masks as an acceptable option in case of shortages of respirators (N95, FFP2 or FFP3) [29]. Current WHO recommendations emphasize the importance of rational and appropriate use of all PPE,20 not only masks, which requires correct and rigorous behaviour from health care workers, particularly in doffing procedures and hand hygiene practices. WHO also recommends staff training on these recommendations, as well as the adequate procurement and availability of the necessary PPE and other supplies and facilities. Finally, WHO continues to emphasize the utmost importance of frequent hand hygiene, respiratory etiquette, and environmental cleaning and disinfection, as well as the importance of maintaining physical distances and avoidance of close, unprotected contact with people with fever or respiratory symptoms[30] WHO carefully monitors emerging evidence about this critical topic and will update this scientific brief as more information becomes available.

Conclusion

Following the announcement of the disease outbreak by international or local authorities, dentists can play a significant role in disrupting the transmission chain, thereby reducing the incidence of disease by simply postponing all non-emergency dental care for all patients. Dental professionals must be fully aware of 2019-nCoV spreading modalities, how to identify patients with this infection, and, most importantly, self-protection considerations. The effect of chlorhexidine, which is commonly used for preprocedural mouth washing in dental practice, has not yet been demonstrated to be capable of eliminating 2019nCoV. SARS-CoV-2 is the first highly contagious pandemic infection of this millennium. While cross-contamination within any dental setting has not been reported, dentists in all disciplines, including orthodontists, need to be constantly aware of the emerging infectious threats and informed of updates in infection control guidelines. Findings of this review reinforce the importance of good work practices including hygiene, infection control, and personal protection. Given the high transmissibility of COVID-19, controlling aerosol and human-to-human contact while limiting treatment to emergency cases is advised during the outbreak. It is the

responsibility of the orthodontic team to ensure safety and stop cross contamination within the clinical facility. Finally, the impact of COVID-19 on the orthodontic practice, cost of illness and whether clear aligners that require minimal appointments are superior to fixed orthodontics in the event of a future outbreak, are questions remained to be answered.

Refernces

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