

# Coronavirus Disease 2019 (COVID-19): A Preventive Approach to Dentistry

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• Conflicts of interest: none declared.

## ABSTRACT

**Objective:** the aim of this study is to, through a recent literature review, present the clinical characteristics of COVID 19, the known transmission routes, to address how dentists can identify suspected cases and, mainly, provide preventive measures to control and minimize infection in dental practice. **Material and Methods:** a bibliographical research was carried out in the MEDLINE (National Library of Medicine, USA - NLM) database, with the keywords COVID 19 and dental practice, from March 12nd to 16th of 2020, and three articles published in the current year were available. The selection criteria were articles in their full and free versions, written in the english language. **Results:** COVID-19 has fever, cough, sneezing and phlegm as the main clinical symptoms in mild considered cases. The main transmission routes are direct and through contact. In order to identify suspected cases, dentists should measure the patient's body temperature and apply a brief questionnaire. Professionals should frequently perform hand washing before and after the service and use personal protective equipments. Mouthwash with 1.0% Hydrogen Peroxide and 0.2% povidone-iodine to treatment is recommended. 0.12% Chlorhexidine is not effective. **Conclusion:** in times of disease outbreaks, new challenges arise, to which professionals must respond with even greater care with biosafety, ethics, zeal and preparation.

**Key words:** COVID-19; Coronavirus; Dentistry; Biosafety.

## Introduction

Pandemics are defined as epidemics of infectious diseases that spread over large geographical regions, occurring around the world at about the same time. Influenza, cholera, tuberculosis and phypthus are examples of significant pandemics in human history. In the last twenty years coronavirus has been responsible for two major pandemics, Severe Acute Respiratory Syndrome (SARS) in 2002, and MERS (Middle East Respiratory Syndrome) in 2012.<sup>1</sup>

In December 2019, an outbreak of pneumonia caused by a new coronavirus called 2019-nCoV, began in Wuhan, China, and quickly spread to twenty-four other countries.<sup>2</sup> The disease that the virus causes is called COVID 19, 'CO' meaning corona, 'VI' for virus and 'D' for disease. In the past, such condition was called "2019 new Coronavirus" or "2019-nCoV".<sup>3-5</sup> On January 30, 2020, the WHO (World Health Organization) declared a public health emergency and on March 11, 2020, it decreed a pandemic of this disease<sup>1-5</sup>

There are reports of four different types of coronavirus, some infect humans and mammals and others, only birds. SARS and MERS viruses have caused serious respiratory diseases and belong to beta-coronaviruses. The new coronavirus is also a beta-virus, it can cause respiratory infections and spreads faster than the previous ones. This virus has a membranous structure of protein spines and penetrates cells through ACE2 cell receptors (Angiotensin-Converting Enzyme 2).<sup>1</sup> Bats and humans are believed to be hosts of 2019-nCoV. It is also speculated the presence of

an intermediate host called Pangolim (squamous anteater), mammal that inhabits tropical areas of Asia and Africa.<sup>2</sup>

The first available data on the new coronavirus report is that it has a high capability of infection, but relatively low lethality. In Europe, the mortality rate fluctuates around 2%, although it increases according to age and can reach 8% in patients over 70 years. Individuals with chronic diseases such as diabetes, cardiovascular and respiratory diseases are also subjects to higher lethality.<sup>2,3</sup> Until March 12, 2020, more than 100 countries were affected, being over 150 thousand confirmed cases, 10 thousand new cases and 5.735 deaths.<sup>6</sup>

The main transmission routes of 2019-nCoV include direct transmission through cough, sneezing and spitting as well as transmission by contact with oral, nasal and eye mucous membranes (Table 1). Although the clinical manifestations do not include ocular symptoms, analyses of suspected and confirmed cases suggested that transmission is not limited to the respiratory tract.<sup>2</sup> In addition, it has been verified that the virus can be transmitted from one person to another through direct or indirect contact, fluids and saliva. In Germany, the transmission of the virus by contact with asymptomatic patients was confirmed.<sup>2,3</sup>

Due to the characteristics of dental care, which include face-to-face proximity between patients and dentists, frequent exposure to saliva, blood and other fluids, production of aerosols, and use of manual cutting instruments, biosafety measures are essential to prevent the transmission of microorganisms.<sup>6,7</sup> In situations of outbreaks of certain diseases, caution with the daily practice becomes even more necessary

so that professionals and patients are protected.<sup>2,3</sup>. Thus, the aim of this study is to, through a recent literature review, present clinical characteristics of COVID 19, the known transmission routes, to address how the dentist can identify suspected cases and, mainly, preventive measures to control and minimize infection in dental practice.

**Table 1.** Transmission routes

Sort of transmission	Main characteristics
Direct	Through sneezing, droplets of saliva other body secretions
Through contact	With nasal, oral and ocular mucous membranes
In dentistry	After touching contaminated surfaces with your hands and then scratching or touching eyes, nose or mouth

### Material and Methods

A bibliographical research was carried out in the MEDLINE (National Library of Medicine, USA - NLM) database, with the keywords *COVID 19* and *dental practice*, from March 12nd to 16th of 2020, and three articles published in the current year were available. The selection criteria were articles in their full and free versions, written in the english language. In addition to these, the following technical reports were also references: the European Centre for Disease Prevention and Control<sup>8</sup>; Consejo General de Dentistas de España;<sup>9</sup> Plataforma Integrada de Vigilância em Saúde. Programa nacional e mundial da infecção pelo COVID-19 (novo Coronavírus);<sup>10</sup> Technical note nº 04/2020 GVIMS/ GGES/ANVISA (updated in 02/17/2020);<sup>11</sup>

### Results and Discussion

#### Clinical characteristics of COVID 19

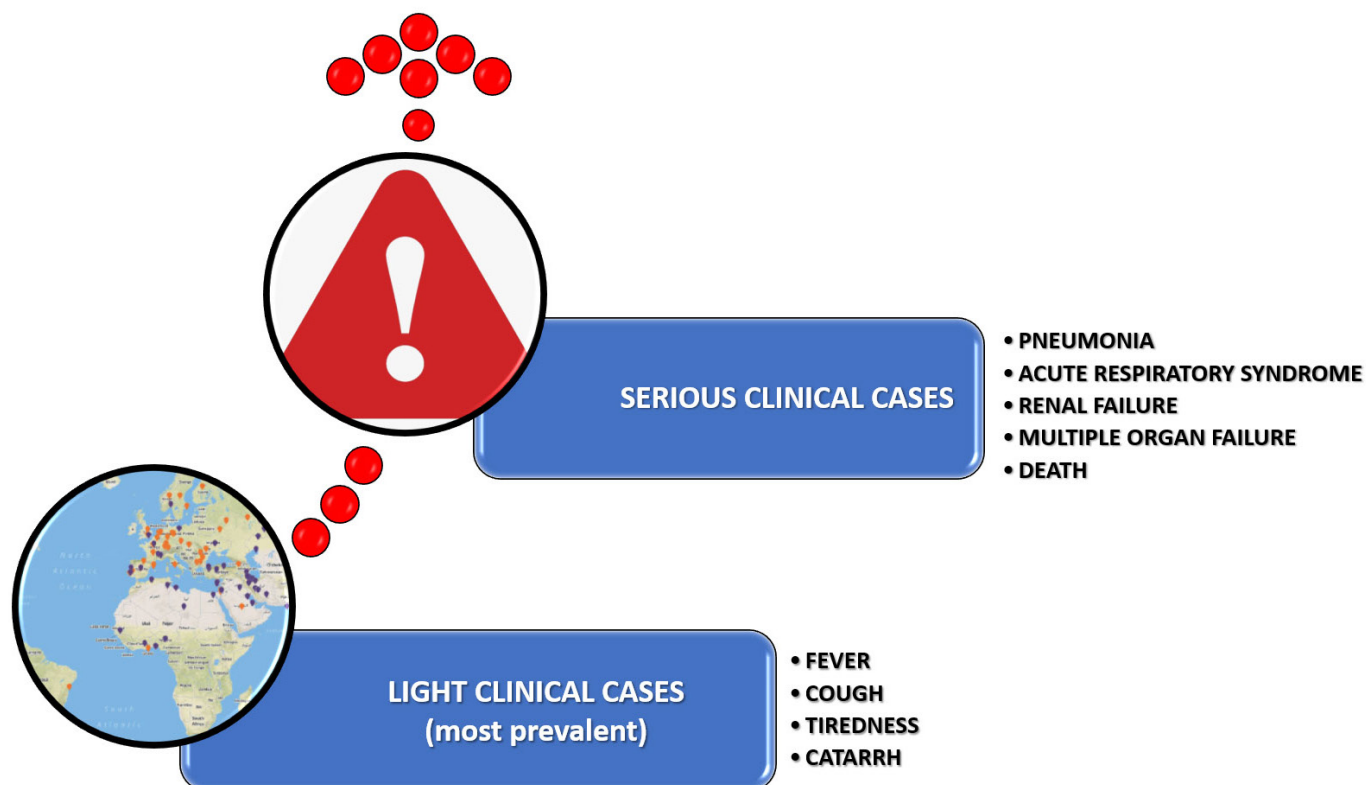
The clinical characteristics may include fever, cough and shortness of breath. (Figure 1). In severe cases, the infection can cause pneumonia or breathing difficulties. Unusually, the disease can be fatal. These symptoms are similar to a flu or to a common cold, much more frequent diseases than COVID-19.

That is why tests are needed to confirm if someone has the COVID-19.<sup>6</sup>

Currently, there is no vaccine available. However, many of the symptoms can be treated and an early assistance from a healthcare professional can make the disease less dangerous. There are several clinical trials being conducted to evaluate possible therapies for COVID-19.<sup>1-6</sup>

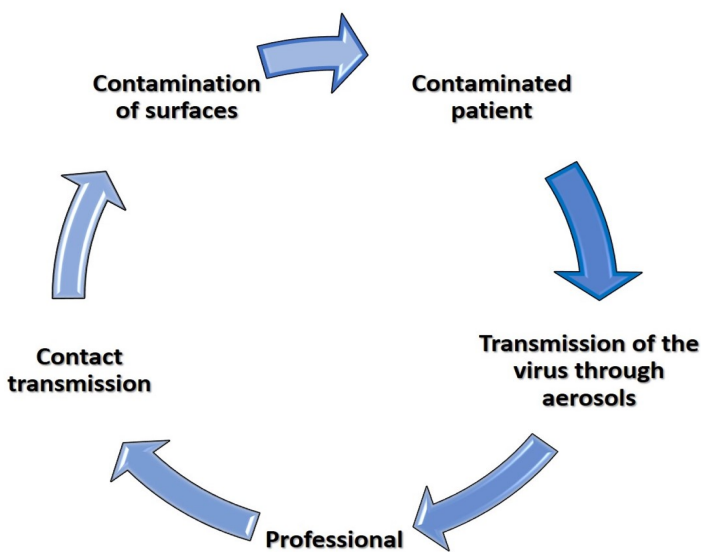
#### Known transmission routes

The virus is transmitted through direct contact with respiratory droplets of an infected person (generated through coughing and sneezing). Individuals may also be infected by touching surfaces contaminated by the virus and then the face (e.g., eyes, nose, mouth) (Figure 2). The



**Figure 1.** Diagram with the clinical characteristics of the COVID-19 disease.

COVID-19 virus can survive on surfaces for several hours, but ordinary disinfectants can kill it.<sup>1-6</sup> Elderly people and those with chronic medical conditions, such as diabetes and heart diseases, seem to be more exposed to the risk of developing severe symptoms. As it is a new virus, its behavior in children is still uncertain. It is known that it is possible for people of any age to be infected with the virus, but so far there is a relatively low number of cases of COVID-19 reported among children. The scientific community have been gradually informing people about how it affects children and other population groups such as pregnant women and immunosuppressed patients. The virus can be fatal in rare cases, mainly among elderly people with pre-existing medical conditions.<sup>6,7</sup>



**Figure 2.** Flowchart with transmission route of the COVID-19 disease. Adapted from Xian Peng, Xin Xu, Yuqing Li, Lei Cheng, Xuedong Zhou, Biao Ren. Transmission routes of n2019-nCoV and controls in dental practice. *Int J Oral Sci.* 2020;12(1):9.<sup>2</sup>

Hence, like other respiratory infections such as the flu or the common cold, public health measures to slow the spread of diseases are critical. Public health measures are day-to-day preventive actions that include:<sup>6</sup>

- ✓ staying home when feeling ill;
- ✓ covering mouth and nose with the elbow or flexed tissue when coughing or sneezing. Discard used tissue immediately;
- ✓ frequently washing hands with soap and water; and
- ✓ cleaning surfaces and frequently touched objects.

### COVID-19 suspected cases identification in dental practice

Health organizations recommend that patients in febrile and in the acute phase of the disease do not receive dental assistance. In case of failure to comply with this rule, it is important that the dentist is able to identify suspected cases of COVID-19. To this end, body temperature is the first analyzed

parameter, using a digital forehead thermometer that does not require physical contact. Furthermore, a questionnaire with the questions below should be applied to patients before they sit in the dental chair.<sup>2,5</sup>

### Outpatient or emergency care in dental service or clinics<sup>2-11</sup>

On arrival and waiting for dental care:

1. ensure pre-consultation, early recognition and control of the source (isolate patients with suspected infection of the COVID-19);

2. use standard precautions for all patients: This precautions assume that all people are potentially infected or colonized by a pathogen that can be transmitted in the healthcare environment and should be implemented for all suspected or confirmed cases. Close attention should be paid to the placement and removal of any Personal Protective Equipment (PPE);

3. implement additional precautions (for droplets and contact) for suspected and confirmed cases of infection with COVID-19;

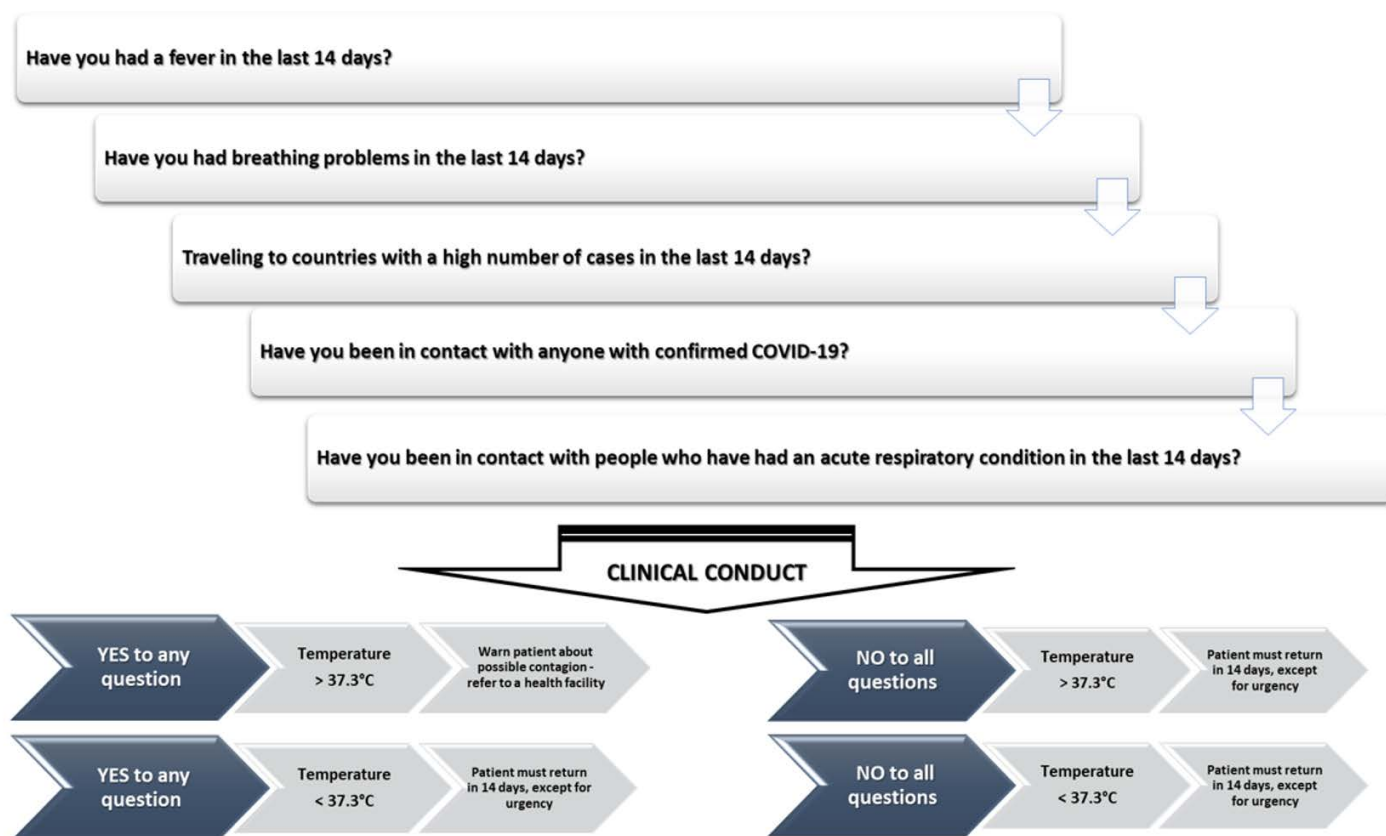
4. implement precautions for aerosols in special situations. Procedures that can generate aerosols should preferably be performed in a respiratory isolation unit with negative pressure and HEPA (High Efficiency Particulate Arrestance) filter. In the absence of this type of unit, use a single dental office with closed doors and restrict the number of professionals during these procedures. In addition, it should be oriented the mandatory use of the respiratory protection mask (particulate respirator) with minimal efficacy in the filtration of 95% of particles up to 0.3 $\mu$  (type N95, N99, N100, PFF2 or PFF3) by dentistry professionals. The use during dental care, when indicated, of powerful suckers such as vacuum pump, reduce the dissemination of aerosols to the environment. Four-handed work should be stimulated for dissemination control.

Pre-Consultation:

In case of an asymptomatic patient, there should not be any dental procedure and he must be warned to seek for medical care.

Directed and strict anamnesis – Question (Figure 3):

- If he had fever or has been febrile in the past 14 days.
- If he had breathing difficulties (such as cough and trouble to breathe) in the past 14 days.
- If he had been to a country with COVID-19 transmission notification in the past 14 days.
- If he had close contact with a COVID-19 confirmed patient.
- If he had close contact with people who came from a location with COVID-19 transmission notification or who had documented fever or breathing problems in the past 14 days.



**Figure 3.** Flowchart of addressed anamnesis distribution with questions that should be asked to patients on arrival, screening and waiting for dental care.

- If he had close contact with at least 2 people who had documented fever or breathing problems in the past 14 days

- If he had recently been to some kind of meeting/gathering or had close contact with many unknown people.

- If he answered yes to a big number of questions and his body temperature was below 37.3°C, the dentist can postpone the appointment for 14 days after the exposure date. The patient should be instructed to quarantine at home and report any fever or flu symptoms to health services indicated by the local health organization.

- If he answered yes to a big number of questions and his body temperature was above 37.3°C, he must be immediately quarantined and the dentist should refer him to local health care, not performing any dental procedure.

- If the patient answered no to every question and his body temperature is below 37.3°C, the dentist can assist him with extra protection measures and avoiding sprays or procedures that form aerosol.

- If the patient answered no, but had a higher temperature than 37.3°C, he will be instructed to go to a health service (for medical care) and won't be assisted by the dentist.

- Body temperature should be preferentially measured with a non contact digital forehead thermometer and this procedure needs to happen at all assistances (to the patient and his companion).

- Patients that show respiratory infection symptoms

should only be assisted if there's an emergency (all other treatments should be postponed from 14 days to a month). If there's dental care need, professionals should evaluate and decide together which safety measures are appropriated to avoid any potential disease dissemination between patients, their companions and the staff.

### Preventive measures to control and minimize infection in dental practice

**Hand washing:** Touching contaminated surfaces with your hands and then inoculating the virus on nasal, oral and ocular mucous membranes is a very important transmission route. For that reason, strict hand washing, using water and soap for 20-30 seconds (Figure 4), must be done before and after any kind of dental practice. Alcohol hand sanitizers (at 70% concentration) can also be used, for at least 20 seconds, unless there is any visible dirt. Hands should be washed before and after putting on and taking off the procedure gloves. After the hand wash, they should be dried using paper towel. It is important to emphasize that this practice has as an important principle taking off all accessories, such as rings, bracelets, necklaces, earrings and watches, to assist any patients.

**Personal protective equipments (PPE):** All of the personal protective equipments must be worn at all times, including head covers, gloves, medical coats, masks and goggles, and professionals must be extra careful when



Figure 4. Initial procedure of basic hand washing with soap and water.

taking them off. Face protectors and goggles can be used to ensure a wider protection, but the face mask shall always be used. All face protectors must be disinfected after each patient. The professional and the team should use, besides the mask, goggles, disposable head covers and medical coats (that don't need to be disposable). Conventional glasses are not considered personal protective equipments because of their lack of sideward protection. All personal protective equipments must be taken off before the dentist leaves the dental office, and the professional must be extra careful when doing this, to prevent any possible contamination (the staff should also be trained for this procedure). Face masks must be removed by their elastic bands, and must not be touched during dental service, hanged on the neck or put inside a pocket (contaminated sites). If the patient is at a temporary isolated site, the dentist must wear: surgical mask, medical cloak, gloves and goggles.

**Mouth rinse before dental practice:** It is known that to rinse your mouth before any dental procedures reduces microorganisms on surfaces and in the environment. However, if it is done with 0.12% chlorhexidine, commonly used in dentistry, it is not effective to prevent coronavirus' transmission. Since the virus is susceptible to oxidation it is recommended to use 1.0% hydrogen peroxide or 0.2% povidone-iodine.

**Absolute isolation technique:** The use of a rubber dam in the absolute isolation minimizes the production of aerosol contaminated by saliva and blood when using a high speed dental handpiece or an ultrasonic cleaner. If this isolation can

not be done, the decalcified tooth tissue should be removed only by using hand instruments, with the ART (Atraumatic Restorative Treatment) and manual teeth scaling, in order to minimize aerosol formation.

**Use of dental turbines, handpieces and contra-angles with a anti-reflux system:** Dental instruments with anti-reflux or anti-retraction valves are recommended to avoid cross infection. Although this is already included in biosafety measures, the need for handpieces to be autoclaved after each patient is reinforced.

**Dental office and clinical environment surfaces disinfection:** Surfaces contaminated via aerosol or direct contact must be properly cleaned and disinfected by the end of each patient's appointment using 0.1% sodium hypochlorite, 0.5% hydrogen peroxide or alcohol (at 70% concentration). All touched surfaces must be disinfected and the disposable protection items must be thrown away after each patient, since it was found that the Coronavirus is able to survive from 2 to 9 days in objects.

**Remove magazines from the waiting room:** In order to avoid transmission via touching contaminated objects and then touching mouth, eyes or nose.

**Cough manners/respiratory hygiene:** When coughing or sneezing, mouth and nose should be covered using the elbow, disposable tissues thrown away in the appropriate place and hands washed right after that.

**Sharp objects usage safety:** Infections may occur if there is an accident with sharp objects or if there is direct contact between mucous membranes and contaminated hands.

**Instruments and devices sterilization:** All used material, including handpieces (which must have anti-reflux valves) shall be autoclaved after each patient.

**Additional measures:** It is important that in the waiting rooms there is alcohol hand sanitizers (at 70% concentration) available, hand and cough/respiratory hygiene orientation and instructions to personal protective equipments use. It should be also warned that people should not touch their eyes, nose and mouth, and the dentist and staff should constantly be evaluated by a doctor, having their temperature measured twice a day (the first one being before starting to work and the second during the work hours). In case any team member has a higher temperature than 37.3°C, this person must not work for 14 days.

## Conclusion

In Dentistry, the virus' main transmission route is the aerosol formed by the high speed dental handpiece, which contains blood, saliva and fluids. In order to identify suspected cases the dentist should measure the patient's body temperature and carry out a directed anamnesis. To minimize contamination and cross infection during the dental assistance, through a preventive dental approach,

the professional must frequently wash his hands, before and after any dental procedure, and wear personal protective equipments. It is recommended to mouth-rinse with 1.0% hydrogen peroxide or 0.2% povidone-iodine before any dental treatment, to do the absolute isolation technique, use a high speed dental handpiece with anti-reflux system,

disinfect surfaces and to have other extra measures with the transmission via contact route, such as removing magazines from the waiting rooms. When there is a disease outbreak, new challenges appear, to which health professionals shall answer by being even more careful when considering biosafety, ethics, zeal e preparation.

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## References

1. Hao Xu, Liang Zhong, Jiabin Deng, Jiakuan Peng, Hongxia Dan, Xin Zeng, et al. High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa. *Int J Oral Sci.* 2020;12(1):8.
2. Xian Peng, Xin Xu, Yuqing Li, Lei Cheng, Xuedong Zhou, Biao Ren. Transmission routes of n2019-nCoV and controls in dental practice. *Int J Oral Sci.* 2020;12(1):9.
3. Zhang, W., Jiang, X. Measures and suggestions for the prevention and control of the novel Coronavirus in dental institutions. *Front Oral Maxillofac Med.* 2020;2:4.
4. Li ZY, Meng LY. Prevention and control of new coronavirus infection in oral diagnosis and treatment[J]. *Chin J Stomatol.* 2020,55(4):217-22.
5. Bi Xiaoqin, Xiong Maojing, Chen Lixian, Bai Yuanyan, Tian Li, Yang Hui. Nursing prevention and control of the novel coronavirus pneumonia in oral and maxillofacial surgery[J]. *Int J Stomatol.* 2020,47(2):244-48.
6. World Health Organization (WHO). Coronavirus disease (COVID-19) outbreak. [Internet]. 2020 [access em 16 de março de 2020]. Available in: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
7. Laishuan W, Yuan S, Tiantian X, Jianhua F, Xing F, Dezhi M, et al. Chinese expert consensus on the perinatal and neonatal management for the prevention and control of the 2019 novel coronavirus infection (First edition). *Ann Transl Med.* 2020;8(3):47

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## Additional References

8. European Centre for Disease Prevention and Control. Infection prevention and control for the care of patients with 2019-nCoV in healthcare settings. [access on March 13, 2020] Available in: <https://www.ecdc.europa.eu/>
9. Consejo General de Dentistas de España. El nuevo Coronavirus 2019-nCoV y el manejo del paciente dental. Actualización coronavirus en clínica dental. [access on March 13, 2020]. Available in: <https://www.consejodentistas.es/>
10. Plataforma Integrada de Vigilância em Saúde. Programa nacional e mundial da infecção pelo COVID-19 (novo coronavírus). [access on March 13, 2020]. Available in: <http://plataforma.saude.gov.br/>
11. Ministério da Saúde - Agência Nacional de Vigilância Sanitária (ANVISA) Nota Técnica nº 04/2020 GVIMS/GGTES/ANVISA (updated on 02.17.2020) - Orientações para serviços de saúde: medidas de prevenção e controle que devem ser adotadas durante a assistência aos casos suspeitos ou confirmados de infecção pelo novo Coronavírus (nCoV). [access on March 16, 2020] Available in: <http://portal.anvisa.gov.br/coronavirus>

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## Mini Curriculum and Author's Contribution

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