

## Impact of COVID-19 on periodontal therapy: An overview.

Impacto de COVID-19 en la terapia periodontal:  
Una visión general.

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On December 31, 2019, a cluster of cases of pneumonia was reported in Wuhan, China. Eventually, medical personnel attributed the cause to a virus not previously identified in humans. This virus is now known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

This novel coronavirus belongs to a large family of viruses that can cause illnesses ranging from the common cold to more severe diseases. Symptoms of the novel coronavirus include fever, shortness of breath, cough and difficulty breathing. In more severe cases usually involving the elderly, immunocompromised or those with significant comorbidities, pneumonia, acute respiratory syndrome, kidney failure and death can occur. This sounds frightening; however, influenza viruses pose a far more serious threat to the health of staff and patients.<sup>1</sup>

Human coronaviruses can remain infectious on inanimate surfaces at room temperature for up to 9 days. At a temperature of 30°C or more the duration of persistence is shorter. Veterinary coronaviruses have been shown to persist even longer, for 28 days.

Contamination of frequent touched surfaces in dental and oral healthcare settings are therefore a potential source of viral transmission.<sup>2</sup> Periodontal diseases are biofilm-mediated, chronic infectious diseases and are the most common cause of tooth loss in the modern world.<sup>3</sup>

Dental plaque is the main etiologic factor in the pathogenesis of periodontal diseases. Several other aspects including genetic, host and environmental factors modulate the course of periodontal infections. Advances in research have also led to the development of equipment and modifications in treatment protocols.

However, the basic approach to periodontal infections has always been and remains the removal of supra and subgingival bacterial deposits by scaling and root planning. Nonsurgical mechanical periodontal treatment is the cornerstone of periodontal therapy and the first recommended approach to the control of periodontal infections. Many clinical studies conducted in the past few decades have confirmed the effectiveness of the nonsurgical approach in periodontal infections.<sup>4</sup>

The fluids in the mouth are grossly contaminated with bacteria and viruses. Dental plaque, both supragingival and subgingival in the periodontal pocket, is a major source of these organisms. It should not, however, be overlooked that the mouth also is part of the oronasal pharynx. As part of this complex, the mouth harbors bacteria and viruses from the nose,

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throat and respiratory tract. These may include various pathogenic viruses and bacteria that are present in the saliva and oral fluids.

Any dental procedure that has the potential to aerosolize saliva will cause airborne contamination with organisms from some or all of these sources.<sup>5,6,7</sup>

Conventional non-surgical periodontal therapy consists of mechanical supra and sub gingival tooth debridement and instruction in self-administered oral health care measures. These measures are directed towards reducing the bacterial load and altering the microbial composition towards a flora more associated with health.<sup>8</sup>

Debridement of the root surface by scaling and root debridement came into relatively common use in the first half of the past century and has become the central feature held in common by all currently used forms of periodontal therapy.<sup>9</sup>

Many routine dental procedures produce aerosol and splatter composed of various combinations of water like organic particles, such as tissue and tooth dust; and organic fluids, such as blood and saliva.<sup>10</sup>

They also contain bacteria, protozoa, fungi and blood borne viruses.<sup>9,10</sup> The terminology, “*aerosol and splatters*” in dental environment was proposed by Micik and colleagues in their pioneering work on aerobiology. They defined aerosol “*as suspensions of liquid and/or solid particles in the air generated by coughing, sneezing, or any other act that expels oral fluids into the air (particle size is 50 micrometers)*”.<sup>11-15</sup>

Mechanical debridement consisting of scaling and root planing is an important procedure in the treatment of periodontal diseases. Scalers can be divided into manual, power driven and other types. There are also other instruments mounted on air turbines or microengines. Rotosonic scalers are mounted on air turbine. A hexagon pyramid shaped bur on the air turbine removes calculus with rotational movement. Diamond points with fine diamond particles are also used.<sup>16</sup>

Most periodontal procedures that use mechanical instrumentation will produce airborne particles from the site where the instrument is used. Dental hand pieces, ultrasonic scalers, air polishers and air abrasion units produce the most visible aerosols. Each of these instruments removes material from the operative site that becomes aerosolized by the action of the rotary instrument, ultrasonic vibrations or the combined action of water sprays and compressed air.

The water spray usually is the portion of the aerosol that is most visible to the naked eye and is noticed by the patient and dental personnel.<sup>13</sup>

### Periodontics is a risk branch

The virus responsible for coronavirus disease 2019 (COVID-19) was recently identified in saliva of infected patients. Saliva can have a pivotal role in the human-to-human transmission. Periodontists and other healthcare professionals that perform aerosol-generating procedures may be unknowingly providing direct care for infected but not yet diagnosed patients with COVID-19, or those considered to be suspected cases for surveillance.

Inhalation of airborne particles and aerosols produced during periodontal procedures on patients with COVID-19 can be a high-risk procedure in which periodontists and the dental assistants are directly and closely exposed to this virus. Therefore, it is crucial for practitioner to refine preventive strategies to avoid COVID-19 by focusing on patient placement, hand hygiene and all personal protective equipment.<sup>17</sup>

Due to the characteristics of dental settings, the risk of cross infections may be high between periodontists and patients strict and effective infection control protocols are urgently needed. Due to the unique characteristics of periodontal procedures where a large number of droplets and aerosols could be generated, the standard protective measures in daily clinical work are not effective enough to prevent the spread of COVID-19, especially when patients are in the incubation period, are unaware they are infected or choose to conceal their infection.<sup>18-20</sup>

### General aerosol particle transmission

Particles are classified based on size: coarse particles are 2.5–10 microns, fine particles are less than 2.5 microns, and ultrafine particles are less than 0.1 micron. The nose typically filters air particles above 10 microns. If a particle is less than 10 microns, it can enter the respiratory system. If it is less than 2.5 microns, it can enter the alveoli.

A particle less than 0.1 micron, or an ultrafine particle like SARS-CoV-2, can enter the bloodstream and target organs such as the heart and brain. The current scientific consensus is that most transmission via respiratory secretions happens in the form of large respiratory droplets rather than small aerosols.

Droplets are often heavy enough that they do not travel very far; instead, they fall from the air after traveling up to six feet (1.8 m).<sup>21</sup>

## Periodontal aerosolization

Periodontists, who treat patients using aerosolization are at an extremely dangerous risk of inoculation of themselves, their dental assistants, other office staff members, and reinoculation of the patients. Most risk occurs from splatter and droplet transmission to the midface of the operator and assistant, as well as the nasal area of the patient.<sup>7,8</sup> periodontal treatment has a much higher incidence of droplet transmission than prosthetic treatment.<sup>22</sup> Ultrasonic and sonic transmission during nonsurgical procedures had the highest incidence of particle transmission, followed by air polishing, air/water syringe, and high-speed hand piece aerosolization.<sup>23</sup>

One study found that ultrasonic instrumentation can transmit 100,000 microbes per cubic foot (~28 L) with aerosolization of up to six feet (1.8m), and, if improper air current is present, microbes can last anywhere from 35 minutes to 17 hours.<sup>24</sup>

## Personal and general protective measures during periodontal management

Dental professionals should be familiar with how COVID-19 is transmitted, how to evaluate and identify patients with COVID-19, and what extra-protective measures should be adopted during the practice, in order to prevent the transmission of COVID-19.<sup>24</sup> The body temperature of the patient should be measured in the first place. A contact-free forehead thermometer is strongly recommended for the screening.<sup>25</sup>

A questionnaire should be used to screen patients with potential infection by SARS-CoV-2 before they could be led to the dental chair-side. These questions should include the following:

- 1) Do you have fever or experience fever within the past 14 days?
- 2) Have you experienced a recent onset of respiratory problems, such as a cough or difficulty in breathing within the past 14 days?
- 3) Have you, within the past 14 days, travelled to Wuhan city and its surrounding areas, or visited the neighbourhood with documented SARS-CoV-2 transmission?
- 4) Have you come into contact with a patient with confirmed COVID 19 within the past 14 days?
- 5) Have you come into contact with people who come from Wuhan city and its surrounding areas, or people from the neighbourhood with recent documented fever or respiratory problems within the past 14 days?
- 6) Are there at least two people with documented

experience of fever or respiratory problems within the last 14 days having close contact with you?

7) Have you recently participated in any gathering, meetings, or had close contact with many unacquainted people?

Masks; Ordinary surgical masks have pores of about 2-10 microns, while the N95 has pores of about 0.3 microns, gloves, gowns and goggles or face shields are recommended to protect skin and mucosa from infected blood or saliva.

As respiratory droplets are the main routes of virus transmission, particulate respirators.

## Implement Workplace Controls

The management practice of the operating area should be quite similar to what happens with other patients affected by infectious and highly contagious diseases. A preoperational antimicrobial mouth rinse is generally believed to reduce the number of oral microbes.

However, as instructed by the Guideline for the Diagnosis and Treatment of Novel Coronavirus Pneumonia (the 5<sup>th</sup> edition) released by the National Health Commission of the People's Republic of China, chlorhexidine, which is commonly used as mouth rinse in periodontal management, may not be effective to kill COVID-19.

Since COVID-19 is vulnerable to oxidation, pre-procedural mouth rinse containing oxidative agents such as 1% hydrogen peroxide or 0.2% povidone is recommended, for the purpose of reducing the salivary load of oral microbes, including potential COVID-19 carriage. As often as possible, the staff should work at an adequate distance from patients; to avoid contaminations, improving the risk of cross-infections. Periodontists should take strict personal protection measures and avoid or minimize operations that can produce droplets or aerosols.

The 4-handed technique is beneficial for controlling infection. The use of saliva ejectors and suckers with low or high volume can reduce the production of droplets and aerosols.<sup>22,26,27</sup>

## Relationship between good oral hygiene and COVID-19

Currently there is no evidence to suggest that COVID-19 can be prevented by engaging in good oral hygiene. However, we do know that practicing good oral hygiene can reduce periodontal disease and maintaining good oral health positively impacts our overall health.

To help prevent the spread of COVID-19, the CDC recommends practicing good general hygiene, such as washing hands regularly, social distancing, and not touching the face.

Normally, toothbrush can harbor bacteria, blood, and saliva. Not only does improper toothbrush care result in poor oral hygiene over time, but it can also spread

contagious diseases, such as COVID-19.

The coronavirus can stay on surfaces for up to three days, and this does include toothbrushes. However toothbrush can be disinfected daily by rinsing it in 0.5 percent hydrogen peroxide for up to 15 minutes.

This solution can kill COVID-19 bacteria in about one minute.

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