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# SARS-COV-2 Transmission in México´s Dental Practice: Measures, Clinical Implications and Management

José R. Palma, Pedro J. Palma, Patricia N. Olivares, Olivia Macías

**ABSTRACT**

**The SARS-COV2 outbreak began as a zoonotic transmission, with Chinese horseshoe bats (Rhinolophus sinicus) and pangolins being the most likely origin of the infection. Once the patient has been infected, the virus is significantly present in the nasopharyngeal and salivary secretions. The professionals who are most directly exposed to the risk of contagion are dentists since the evolutionary process of virus infection occurs due to the inhalation of particles in the dental environment, the formation of aerosols during practice, and what is more important, in the expectorations emitted by the patients. Therefore, it is necessary to act diligently in professional practice, as well as take the necessary preventive measures to avoid the spread of the infection. The appearance of this new disease forces us to modify all the sanitary measures that have been taken concerning dental care by the professional, as well as auxiliary personnel and the protection of patients, requiring strict sanitary control by the authorities of health. In the university environment, the changes that must be made to allow an open channel of communication between students, teaching, administrative and hygiene personnel must continue to prevent this and future diseases. The aim of this article is to propose a protocol for dental clinical care, considering the real conditions and needs that prevail in our practice, highlighting the risk and preventive measures that the dental professional must consider, as well as the management of patients.**

**Keywords:** SARS-COV2, Dental care, Public Health, Professional Practice, COVID 19, Pandemics, Dental Practice Management.

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**José R Palma**
Department of Endodontics, Faculty of Dentistry, Universidad Nacional Autónoma de México, CDMX, México.
(josepalma2888@gmail.com)
**Pedro J Palma**
Department of Endodontics, Faculty of Dentistry, Universidad Intercontinental, CDMX, México.
(pp_palma@hotmail.com)
**Patricia N Olivares ***
Postgradute Program in Dentistry, Estacio de Sá University, Rio de Janeiro, RJ, Brazil.
(pat.olivares@hotmail.com)
**Olivia Macías**
Department of Endodontics, Faculty of Dentistry, Universidad Nacional Autónoma de México, CDMX, México.
(endoli67@gmail.com)

***Corresponding Author***

## I. INTRODUCTION

The first cases of SARS-COV2 (severe acute respiratory syndrome), popularly known as COVID-19 or coronavirus were reported in Hubei, China, in early December 2019, quickly turning into a worldwide health crisis. On January 30, 2020, the World Health Organization (WHO) declared that this virus was responsible for a public health emergency, reporting the mortality of up to 3.4% of affected patients, especially in people over 60 years with a history of systemic diseases, so far, the number of confirmed patients has exceeded 563948 in México, with approximately 60480 deaths as of the end date of this article [1].

This virus is formed by a genomic single-stranded RNA envelope with a helical nucleocapsid of variable size (26 to 32 Kilo bases) (kb), being one of the largest viruses investigated to date. It has been reported that approximately 80% of infected patients will present mild symptoms, 20% will require hospital care, and 5% will have to be in the intensive care unit and could lose their lives due to severe progressive alveolar damage and failure respiratory [2], [3]. It is our commitment as dentists and to be part of the health sector, to know the pathophysiology and preventive measures, as well the clinical implications and the treatment of patients with SARS-COV2 to reduce the spread of the virus [4].

Based on the literature, we know that there are currently four different genera of coronavirus: α-CoV, β-CoV, γ-CoV, and δ-CoV. Most coronaviruses can cause infectious diseases in humans and vertebrates. The α-CoV and β-CoV genera are those that affect the respiratory, gastrointestinal, and central nervous systems of mammals and can generate infections, while the γ-CoV and δ-CoV genres affect mainly on birds. The 2019-nCoV virus-scanned in Wuhan belongs to the β-CoV genus [5].

A suggested hypothesis is that SARS-COV2 virons can bind to host cell membranes and replicate in respiratory and intestinal epithelial cells causing cytopathic abnormalities [6].

Increased humidity as well as increased temperatures are believed to significantly decrease transmission of SARS-COV2. Relative humidity increase of 1% and a temperature increase of 1ºC can reduce the effective reproductive number. This effect is the same as in influenza, which is why it is thought that the arrival of summer and the rainy season in the northern hemisphere will drastically reduce the transmission

of SARS-COV2 [7].

So far the mortality data for SARS-COV2 is approximately 0.39% to 4.05% with differences depending on the country, being lower than SARS (Severe Acute Respiratory Syndrome) <10% and MERS (Middle East Respiratory Syndrome) < 34%, however, is higher than that of seasonal influenza, 0.01% to 0.17%, this according to data reported by the US Centers for Disease Control and Prevention, [8].

The information that is currently available allows us to know that anyone is susceptible to contracting this new disease, however, there are groups made up of adults over 60 years of age, people who are in contact with confirmed patients with both symptomatic and SARS-COV2 asymptomatic, healthcare workers and other hospitalized patients who represent the highest risk [9].

It is important to mention that there are risk groups such as patients who have systemic conditions: cardiovascular diseases, diabetes or cancer (especially lung), COPD (Chronic Obstructive Pulmonary Disease) and hypertension, which increase the risk factor significantly, and maybe aggravated in patients with harmful habits such as smoking since exposure to tobacco smoke is the cause of bronchopulmonary inflammation, increased permeability of respiratory epithelial cells, and overproduction of mucus [10].

## II. Source Of Transmission

-Direct transmission (by coughing and inhalation or aspiration of droplets).

-Transmission by contact (through contact with the nasal, oral, ocular mucosa, and feces through contaminated environmental surfaces) [7], [8].

Respiratory viruses are more contagious in symptomatic patients, can also be transmitted through asymptomatic patients and may occur in the incubation period between 2 and 10 days, presenting the same viral load [5], [6], [11].

Due to the high potential of transmission of the virus, a social distancing has been recommended to avoid the spread of the disease since it is estimated that direct transmission can infect different people within an approximate radius of 1.8 meters [12], in the same way we must emphasize the importance of cleaning surfaces or objects that could be contaminated and that are subsequently touched by other people, this recommendation is strengthened taking into account that the frequency of making contact with the face is approximately 23 times per hour, being the oral and nasal mucosa the most frequently touched [12].

## III. Incubation Period

The average incubation period for SARS-COV2 has been projected to be 5 to 6 days, but there is evidence that it can last from 14 to 24 days according to other authors. However, the widely accepted duration for medical screening and the quarantine of potentially exposed individuals is 14 days, with a variable latency period and may have viability of 3 hours in aerosols until survival of several days on inanimate surfaces [7], [12], [13].

## IV. Sign And Symptoms

Within the prodromal phase we can find primary specific symptoms of the infection such as fever 98% and dry cough 76% dyspnea 55% and myalgia or fatigue 44% [6].

Some other symptoms that accompany the disease are muscle pain, diarrhea and vomiting. The onset of the disease can cause progressive respiratory failure due to alveolar deficiency and in severe cases can quickly lead to death [8], [6], [14].

It is frequent that patients present olfactory and gustatory disorders, so SARS-COV2 positive patients who present alterations in smell and taste should not be considered as the primary etiology, however patients who present dysgeusia and / or ageusia without presenting olfactory disorders should not be ruled out as this could be the first data of any oral manifestation associated with SARS-COV2 [15].

## V. Diagnosis

SARS-COV2 can be diagnosed through a combination of epidemiological information, such as travel history to an affected area, signs, and symptoms, findings using computed tomography (CT) [16], imaging, and laboratory tests such as Polymerase Chain Reaction with reverse transcriptase (RT-PCR), it should be mentioned that a negative result in the RT-PCR test of suspected patients does not mean that you are free of infection [8].

The WHO and Centers for Disease Control and Prevention (CDC) of the United States recommend, for outpatients and patients with more critical conditions, rapid collection and nucleic acid amplification tests of respiratory samples, for the detection of disease [6], [17].

The differential diagnosis includes other viral respiratory infections caused by the SARS virus, influenza virus, parainfluenza virus, adenovirus, respiratory syncytial virus and human metapneumovirus (HmPV), parainfluenza, respiratory syncytial virus (RSV), rhinovirus [9].

Antigen detection in the nasal and oral cavity should be performed to differentiate SARS-COV2 from common respiratory pathogens and other non-infectious conditions [18].

The Infection Prevention standards of the Coordinating Commission of National Institutes of Health and High Specialty Hospitals of the Government of Mexico consider as suspected cases: People of any age who present with acute respiratory disease and who have a history of travel or stay in China or have been in contact with a confirmed or investigated case up to 14 days before the onset of symptoms (Fig. 1). Confirmed cases: Person who meets the operational definition of a suspected case and who has a laboratory-confirmed diagnosis issued by InDRE. https://coronavirus.gob.mx/covid-19/ [19].

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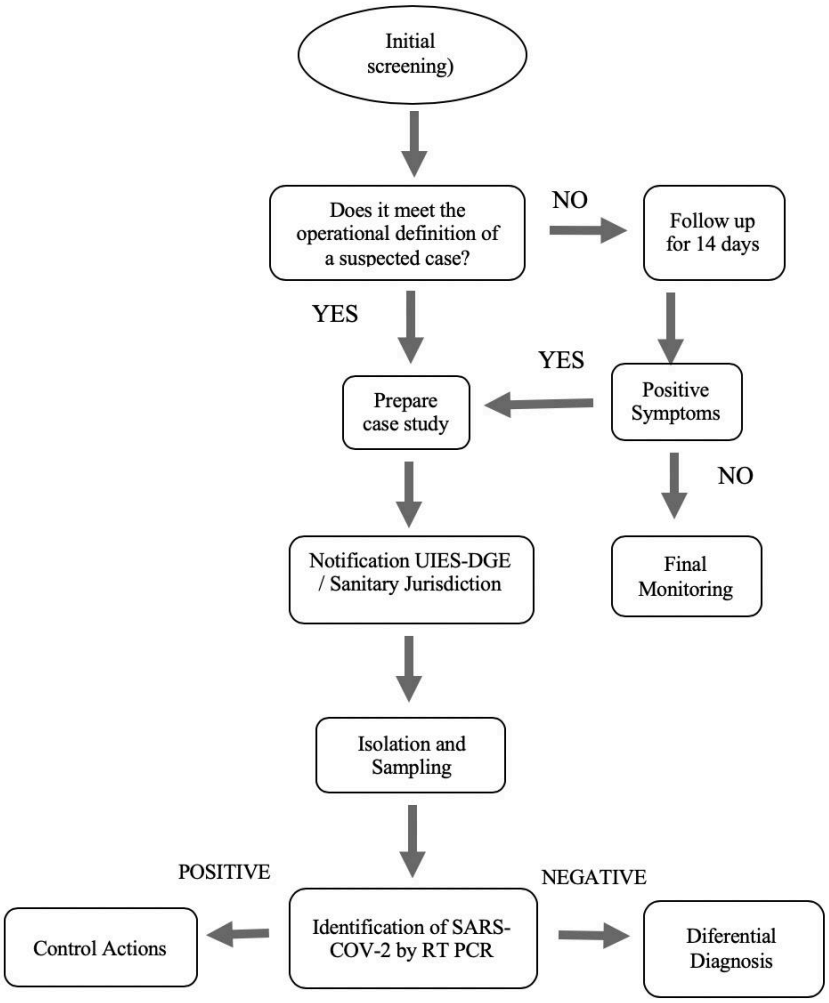


Fig. 1. An overview of patient screening for SARS-COV-2.

## VI. Treatment

So far there is no evidence from randomized controlled trials to recommend an effective treatment against SARS-COV2. At this time, the strategy to control the source of infection is using infection prevention and control measures The average incubation period for SARS-COV2 has been projected to be 5 to 6 days, but there Within the prodromal phase we can find primary specific to reduce the risk of transmission, providing early diagnosis, as well as isolation and supportive care for affected patients [8]. The first-line treatment for patients with fever includes antipyretic therapy with paracetamol, while expectorants can be used as a treatment for non-productive cough [20].

Those patients who present severe acute respiratory infection, shortness of breath, hypoxemia or shock that require the administration of immediate oxygen therapy [11].

During the course of the pandemic, chloroquine and hydroxychloroquine have attracted much attention due to their use in the treatment of SARS-COV2. Several countries have announced the use of this drug in trials for the eradication of the disease since scientists have stated that this drug inhibited the viral replication of SARS-COV2 *in vitro* and the clinical application in humans indicated an apparent efficacy [21].

However, clinical trials conducted so far are limited, calling into question the reported results [22].

Vaccination would represent the most reliable form of prevention and monitoring for SARS-COV2 positive patients. Various clinical trials have been carried out in search of the production of vaccines that help to eradicate this disease, without currently having proven success in the research and development of any of them [23].

Despite this, the first human clinical trial reported in the literature of a SARS-COV2 vaccine was recently published, with promising results. In this clinical trial 108 patients underwent low (36), medium (36) and high (36) doses, the results revealed a significant increase in antibodies at 14 and 28 days, despite the existence of adverse effects such as fever, pain muscle and headache, these did not persist more than 48 hours after inoculation [24].

## VII. Dental Practice

Among the recommendations are given by the Mexican government, priority emergency care will be given as of

March 21, 2020, postponing dental appointment and treatments until further notice.

In recent months, the area of dentistry has had various concerns about the care that should be given to the patient, since the risk of SARS-COV2 infection to which health professionals are exposed has been reported by publications and the media [25], being the dentists the ones that present the highest percentage, even higher than the doctors and nurses [26].

This situation has given rise to a series of questions regarding the protocol to follow for the care of patients suspected or confirmed by SARS-COV2, generating anxiety and the environment for most dentists [27].

Dental professionals have a high risk of contagion due to close face-to-face contact with the patient, being able to classify transmission routes through four main routes [28], [29].

- Direct exposure of mouth and respiratory secretions (saliva and blood).
- Direct contact with contaminated surfaces / instruments.
- Inhalation of airborne pathogenic microorganisms.
- Mucosal contact (nasal, oral and conjunctiva).

In order to better understand the explanation of direct contagion, it is important to mention that the SARS-COV2 uses the angiotensin-converting enzyme receptor 2 (ACE2) that is located in the respiratory tract, transmitted through fluid drops that spread when coughing, sneeze or through saliva. The distance and duration in which the particles are suspended is determined by their size and speed as well as humidity and air flow. Particles >5 μm in diameter can extend up to 1 meter, in contrast, particles <5 μm have a greater extension capacity [8], [30].

As an initial filter, patients requesting dental care should be asked a questionnaire to evaluate those suspected or positive of SARS-COV2 before being treated. Likewise, it must be remembered that under the ethical principles of good practice, efficiency and justice that govern the practice, it is important to mention that by deferring or suspending treatments we are protecting our patients and our community [31], [32].

### *A. Patient Evaluation. Identification of suspected cases of SARS-COV2.*

You should do a detailed medical history, as well as to inquire about your history of travel to risk areas or if you have been in contact with suspected or confirmed SARS-COV-2, take the temperature with a thermometer on your forehead that does not make contact with the skin for measurement [5].

For dental care, the following classification of patients according to the treatment they require has been suggested [28]:

a) Emergency treatments that require hospital care.

b) Emergencies that can be attended with minimally invasive procedures without the generation of aerosols.

c) Emergencies that require attention to invasive procedures that generate aerosols.

d) Non-urgent procedures.

e) Elective procedures.

It is recommended that a patient suffering from the acute febrile phase of the disease does not attend a dental consultation, in case the patient comes in these conditions, the professional should not provide care and will have to inform the corresponding infection control department to isolation and monitoring [28].

Only treatments that represent real urgency will be carried out, so the following flow chart is suggested for patient care (Fig. 2).

### *B. Hand Washing.*

Despite being a routine prerequisite, compliance with it is relatively low, so the emphasis is placed on reinforcing its mandatory compliance before any procedure as well as after contact with surfaces without disinfection, oral mucosa and body fluids, likewise, the emphasis is placed on avoiding touching eyes, mouth or nose, protocols involving 5 hand washes (2 before and 3 after treatment) have been proposed [5], [30].

### *C. Protective measures for Dentist, Support Staff and Patient.*

Among the measures to prevent the spread of infection, the use of a waterproof gown or apron, a cap, sterile gloves, surgical mask, mouth covers, lenses, and surface protection. They should be used during care and discarded after each patient in the infectious waste bin. They should be used while having direct contact with the patient [5].

Gowns should be closed at the back, surface protectors should cover critical areas, areas or surfaces of support of the instruments, especially the regions of difficult cleaning to avoid direct contamination and ensure the protection of the patient and the operator.

Protective materials such as hats, disposable gowns, and shoe covers must be 30-gram polypropylene. In cases of performing surgical procedures, it is necessary to perform surgical decontamination of the hands with 2% chlorhexidine-based antiseptics and dry with a sterile towel.

The use of face shields is necessary during dental care where there is direct contact with the patient and removed immediately aftercare once the patient has withdrawn. The physical workspace must be disinfected between each consultation. N95 protectors are recommended for procedures where aerosols are generated (airway manipulation, invasive exams) and must be changed after each care [5].

Surgical masks should be used in all patients suspected or confirmed by SARS-COV2, it is recommended to complement with face shields. The masks can be used a maximum of 4-5 times in exceptional situations, it is recommended after use to place them in a ventilated container before their next use and there should be no contact with the outside of the mask.

Within the dental practice, we must consider the protection of auxiliary personnel who are also in the percentage of the high risk of contagion. It is important that their healthcare work is carried out remotely within a radius of 1m from the patients and when they perform the previous evaluation of the patient as a preventive measure, use sterile gloves as well as to discard any handkerchief that the patient uses. Support staff must use the same protective measures and equipment as the dentist, which must be discarded immediately after finishing the treatment and placed in the dedicated waste container [5].

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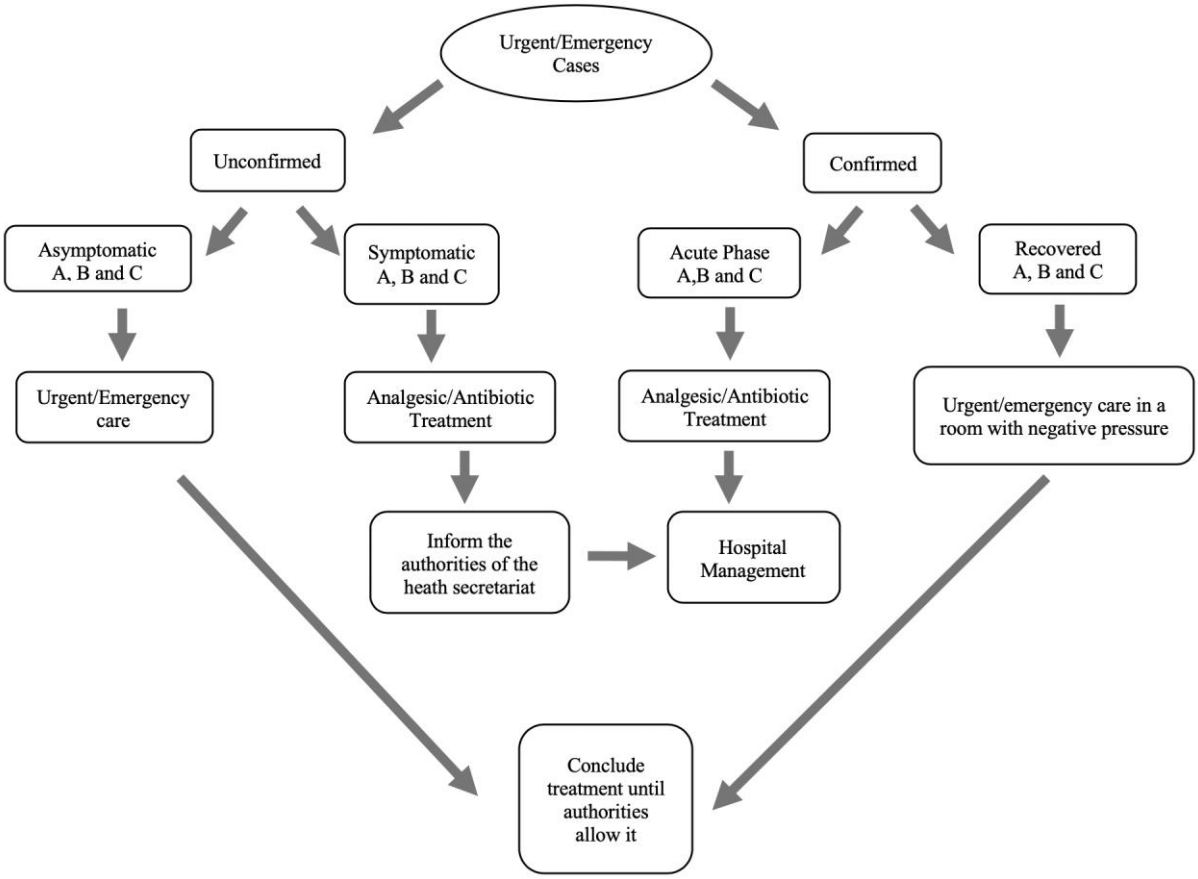


Fig. 2. An overview of the detection of confirmed or suspected SARS-COV-2 patients during dental treatment.

### *D. Mouth Rinses.*

A wide variety of recommended solutions for oral hygiene contain antimicrobial substances with maintained antiseptic capacities, however, these may not be effective against SARS-COV2, for which agents such as hydrogen peroxide have been recommended, the use of povidone 0.2% for 1 minute followed by gargling to reduce the bacterial load present in the oral cavity, therefore a mouthwash is recommended beforeany procedure in cases where absolute isolation cannot be performed [33].

### *E. Rubber Dam.*

Within the dental practice, mainly in the endodontic area in adults and children as well as cases that require post-endodontic restoration or dental surgery, the use of rubber dam is considered a mandatory measure, however, its compliance does not it is always carried out.

As it is already known, the use of a rubber dam significantly reduces aerosols by up to 70%, also reducing the percentage of transmission to the dentist and support equipment as well as the contamination of inanimate objects. The use of suction devices is recommended during procedures as well as four-hand operation with adequate protection. In cases where absolute isolation cannot be carried out, an alternative is and exploration with dentin spoons in cases of dental surgery, and substances such as Carisolv can be used to minimize the production of aerosols [5].

### *F. Reduction of Aerosols.*

During dental treatments, high-speed parts generate aerosols, leaving microorganisms in the environment and water tubes inside the dental unit therefore, it is recommended to use high-speed handpieces with anti-retraction valves. Different studies have shown that these parts significantly reduce the return flow to the air tubes and the dental unit, avoiding cross infections [34].

### *G. Radiographs.*

The use of extraoral radiographs has been recommended as an auxiliary diagnostic method (orthopantomography or computed tomography), if the use of intraoral radiographs is essential, during treatment, double protection should be applied to digital sensors or radiographic films [7].

### *H. Desinfection of Surfaces.*

Disinfection measures must be effective both in dental care environments and in waiting areas. 0.1% NaOCl should be used for surfaces and 1% for blood spills [8].

### *I. Waste Management.*

All waste from dental procedures must be transported to the temporary storage area of the clinic or institution. The waste from suspected or confirmed patients should be treated as infectious waste and placed in double-layered yellow ligation bags. Instruments that are not disposable should be washed before sterilizing [5].

## VIII. URGENT CASES

Urgent dental care must adhere to the provisions of the Official Mexican Standard NOM-013-SSA2-2015 For the Prevention and Control of Oral Diseases [35].

One concern is that, with the suspension of routine dental care, more patients than usual may require admission for treatment of acute dental infections that threaten the airways and require intensive care [29].

In dental practice, it is common to observe a large number of patients requesting urgent care, generally presenting pain, inflammation, or infection that can occur independently or associated with each other. Most of the emergencies that come to the consultation are 90% of pulp or periapical origin, however, due to the pandemic, dentists must evaluate the patient's conditions to decide to provide or defer [12].

Suspension of urgent care can progress to acute infectious processes that threaten the airways. Patients with significant swelling can progress to life-threatening emergencies, which can increase risks in the context of reduced availability of medical care. For patients with substantial inflammation that could progress to an emergency, tooth extraction should be prioritized over restoration [29].

Therefore, it is of utmost importance to carry out a questionnaire on the problems referred by the patient (Fig. 3).

What is the level of pain

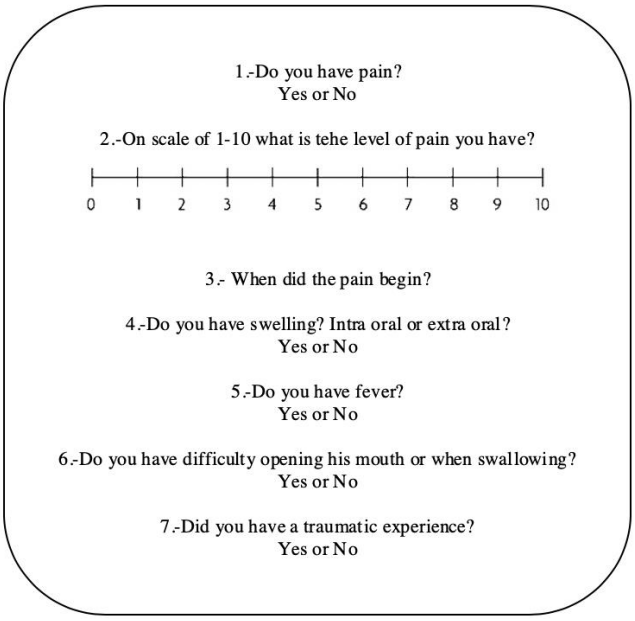


Fig. 3. Dental emergency questionnaire.

To help dentists have a clear idea of what constitutes emergency conditions, refer to the ADA recommendations. (ADA, Develops Guidance on Dental Emergency, Nonemergency Care 2020) [36].

Where cases that present continuous bleeding, serious infections, cellulitis, or intra or extra-oral inflammation that compromises the patient's airways, as well as trauma involving facial bones that likewise involve the airways.

### *A. Pharmacology.*

For patients suspected or positive of SARS-COV2 who require emergency treatment for inflammation or severe pain, pharmacological therapy with acetaminophen as an analgesic has been recommended instead of ibuprofen since it could alter the functions of the immune system and in the case of antibiotics amoxicillin or clindamycin in patients allergic to penicillins [22].

The endodontic area represents a unique situation, since doctors most often face treatments that involve pain and inflammation, in these situations the doctor must limit himself to performing emergency procedures, reducing or eliminating the bacterial etiology and preventing secondary infection [37].

It is worth mentioning that patients diagnosed with an acute alveolar abscess may have a fever and palpable lymph nodes, making it of utmost importance to establish a differential diagnosis to determine the cause of the feverish state.

In the case of dental trauma, it is necessary to assess the severity of the trauma, the development of the root, and the time elapsed since the trauma, the absorbable suture is recommended in cases that require it, as well as rinsing the traumatic area, severe cases require hospital treatment (Table I).

Because orthodontic treatment is a long, continuous process, many patients who were already undergoing treatment were affected by SARS-COV2 infection. However, there are considered non-true emergencies that represent problems that cause pain or inflammation due to problems with the devices. Several studies have published certain recommendations for solving these problems. It is recommended to suspend any orthodontic treatment until the health regulatory authorities allow it [31], [38].

## IX. CONCLUSION

The worldwide appearance of this new disease forces to modify all sanitary and preventive measures in the transmission of diseases that had been taken so far, regarding dental care by the professional, as well as auxiliary personnel and in the protection of patients to avoid contagion.

Based on the articles and magazines analyzed, we can consider it as an endemic disease since it has all the characteristics to be classified as such, significantly affecting the lives of millions of people, having far-reaching economic, social and cultural consequences that will cause changes in daily life.

It will require a major change in attitude and the way of performing dental practice in all its specialties, since new and greater strategies for care, prevention and protection must be considered that allow us to continue offering professional services without compromising their quality.

It is important to highlight that in these conditions, the fact of facing a new infectious-contagious disease requires strict control by the health authorities, as well as the dissemination of the great responsibility of raising awareness in the general population regarding the problem to prevent its spread, highlighting the preventive role that accurate and timely information occupies and insisting on respecting measures of social distancing, frequent hand washing, surface disinfection and radical change of sanitary attitudes to contain the ways of transmission.

In the dental practice environment, we must highlight the revision and updating of the care protocols, taking care of all the aspects that represent the changes that allow a safe practice since, as is known, transmission can occur through saliva, in the formation of aerosols produced by different dental procedures and in the possibility of care for asymptomatic patients if they are not properly cared for, representing an important route in the chain of transmission.

Carrying out the evaluation of the patient's health conditions before care through questionnaires, taking temperature and constant disinfection of the work areas will represent an important step in the prevention of this and future diseases.

An updated review of new disease outbreaks is recommended, through timely diagnoses that can give guidelines for marking sanitary fences as well as advances in its prevention or cure, supported by general and timely information based on consultations of real cases with scientific evidence. of qualified programs and health records that provide figures on the actual state of the disease.

For all this, it is necessary to highlight the role of prevention, to educate and inform to avoid fear or panic caused by this disease, where dentists participate importantly in the interruption of the transmission chain if the way of propagation and management of patients with this infection, recognizing cases that represent a true emergency such as those with pain, inflammation or infection and that require effective and immediate care, delaying those that can be carried out routinely when the peak of the disease has been contained, controlled or at least decreased.

TABLE I: RECOMMENDATIONS FOR DENTAL EMERGENCY MANAGEMENT DURING SARS-COV-2 OUTBREAK

| Diagnosis | Treatment<br>* Analgesic therapy. Acetaminophen 325-500mg. ** Antibiotic therapy. Amoxicillin 750mg. Clindamizine 300mg. |
|---|---|
| Pulpal Pain<br>1.- Symptomatic Irreversible Pulpitis<br>2.-Symptomatic apical periodontitis<br>3.-Acute intraoral apical abscess<br>4.-Extraoral acute apical abscess | 1.- Pulpotomy, intrachannel medication and provisional restoration. * analgesic therapy.<br>2.- Mechanical chemical preparation with irrigation, abundant 2.5%. NaOCl, intracanal medication and provisional restoration. * analgesic therapy.<br>3.- Incision and drainage. ** antibiotic therapy.<br>4.-Referral to the oral and maxillofacial surgery department. |
| Periodontal Pain<br>1.- Gingival abscess<br>2.- Periodontal Abscess<br>3.- Third molar pericoronitis | 1.- Incision and drainage, irrigation with saline or chlorhexidine 0.2%. * analgesic therapy.<br>2.- Establish drainage, tooth extraction if necessary. ** antibiotic therapy.<br>3.- Anesthesia, operculum irrigation or excision if necessary. * analgesic therapy. |
| Dental trauma<br>1.- Extrusion<br>2.- Complicated coronal fracture<br>3.- Root fracture<br>4.- Alveolar fracture<br>5.- Avulsion | 1.- Replacement and flexible splint 3 weeks.<br>2.- Pulpotomy (open apex). Pulp capping.<br>3.- Reposition and flexible splint 4 weeks (horizontal). Extraction (vertical).<br>4.- Reposition and rigid slint 4 weeks.<br>5.- Reposition and rigid slint 2 weeks. |

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**Dr. José R Palma.**
28-11-1988.
DDS, UNAM, Mexico.
MSc Estacio de Sá University, Brazil.

**Dr Pedro J Palma.**
21-07-1957.
DDS, UNAM, México.
MSc UNAM, México.

**Dra Patricia N Olivares.**
03-05-1984.
DDS, UANL, México.
MSc UAG, Mexico.
PhD Estacio de Sá University, Brazil.

**Dra Olivia Macías.**
16-10-1967.
DDS Universidad Latinoamericana Mexico.
MSc UNAM México.