

REVIEW ARTICLE

# Endodontic treatment approaches in the era of coronavirus disease 2019, recommended protocols and procedures: a systemic literature review

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## ABSTRACT

Coronavirus is an enormous community of viruses that cause infections ranging from moderate to major serious illnesses, as well as extreme acute respiratory syndrome. The endodontic procedure, or treatment with the passage, treats the supple tissue of the pulp between the teeth. A dentist is a specialist who specializes in preserving teeth. The advent of the coronavirus disease 2019 (COVID-19) pandemic was an essential international matter. As dental care physicians, each dental community and our patients are faced with a tremendous duty to restrict contact with the virus. Accordingly, intensive procedures and protocols should be tailor-made, as well as the handling of dental cases, especially emergency cases, in order to protect the lives of the sufferers, to reduce the risk of contamination, and to try and control the contamination between them. Due to the COVID-19 pandemic, the selection of proper recommended procedures and protocols for handling is required. The majority of the amended agreement papers, protocols, and proposals from entirely different societies and institutes have stressed the importance of offering the best possible treatment for procedures. At the same time, the management of COVID-19 cases, or suspected cases considered to be COVID-19 or alleged to be, is carried out by minimizing direct communication, enabling web messaging and dispensing of drugs, reducing direct contact with emergency dental cases and, finally, applying the very best degree of sanitization to either the equipment or the person. Finally, dealing with endodontic issues during the COVID-19 pandemic allows the dentist to take the highest degree of precautions, either by direct contact with patients or in the handling of devices and equipment; good collaboration between all partners would help with safety.

**Keywords:** COVID-19, endodontic, safety, sanitization, transmission, protocols.

## Introduction

Coronavirus (CoV) is an enormous circle of relative viruses resulting in contamination ranging from mild to extreme illnesses and severe acute respiratory syndrome. Symptoms of coronavirus disease 2019 (COVID-19) consist of fever, cough, shortness of breath, and pneumonia [1]. It is also expected to cause severe headaches. People with immunodeficiency, older adults, and people with persistent diseases, as well as cancer, polygenic disease, and respiratory organs, are very much at risk of infection. COVID-19 presentations range from asymptomatic/light symptoms to severe contamination and mortality. Symptoms can be prolonged from 2 days to 2 weeks after the incubation period [4].

There are many symptoms of COVID-19, including fever or cold, cough, shortness of breath or trouble breathing, weakness, muscle fatigue, headache, loss of taste and smell, sore throat, congestion or runny nose, nausea or

vomiting, and diarrhea [5]. Among the major routes of COVID-19 transmission, the most common is respiratory droplets that are generative. Any individual who is in close contact with a person who has signs of infection (sneezing and coughing) is at risk of being exposed to the virus.

Droplets can also land on surfaces where the virus may continue to be viable; thus, the immediate surroundings

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of an infected person may act as a transmission route (touch). Approximately 2%-10% of the cases of diarrhea-associated COVID-19 disorder have been reported; however, reviews of fecal-oral transmission of the COVID-19 virus have not been carried out [6].

Endodontics is the branch of dental pulp and tissue medicine that includes the roots of a tooth. "Endo" is the Greek word for "inside", and "odont" is the Greek word for "tooth" [2,7]. The endodontic procedure, or treatment of passage, treats the supple tissue of the pulp within the tooth. A dentist is a specialist who specializes in saving teeth [8]. The advent of the COVID-19 pandemic is a big international matter. As dental care specialists, we are faced with tremendous obligations for the dental community and our patients to reduce the contact with the virus. Due to the nature of our job, the community is at a high risk of contracting the virus and transmitting the virus unquestionably [8].

One of the most effective ways to curb this pandemic is by introducing total social distancing. However, as providers of dental care, we are faced with the dual mission of shielding ourselves and our patients from the transmission of the network and, at the same time, ensuring that patients have access to emergency dental care [8].

Transmission is likely to occur by direct contact with the respiratory membrane or conjunctivae loosely through breathing droplets and secretion, each with the assistance of immediate victimization packaging or by touching contaminated surfaces. Currently, the latest proof would not support mobile transmission, in addition to all aerosol-producing techniques.

These techniques include intubation, suction, bronchoscopy, tracheostomy, resuscitation of the thick membrane, and most common dental techniques [9]. Intensive procedures and protocols should also be addressed at the same time as dealing with dental cases, especially emergency cases, in order to protect the lives of the sufferers and to minimize the possibility of contamination, as well as timely assistance in handling the contamination between them.

The current study aimed to highlight the challenges while handling dental methods at intervals during the COVID-19 pandemic and to supply and enforce infection management methods throughout the management of dental emergency instances during this situation.

## Materials and Methods

The current systemic literature evaluated the available published articles and protocols within the scope of endodontists and COVID-19 from various sources, including PubMed, ResearchGate, Scopus, and Google Scholar.

Data from various studies were collected, and comparable tips and techniques were then accumulated and cited. Keywords used within the knowledge assortment analysis engines included recommendations, protocol,

and procedures. While regarding dental medicine care throughout the COVID-19 period, we had collected knowledge from totally different angles and purpose of reading across the world and domestically in the Kingdom of Saudi Arabia.

## *Patients' treatment protocols*

### *Dental triage protocol*

Patients would be handled remotely through telephone call sorting and treated for acute conditions whenever possible based on advice, physiological state, and antimicrobials. If the clinician, via telephone triage, finds the situation to require face-to-face consultation and some treatment, the patient would need urgent dental care. Any treatment would have the purpose of minimizing or eliminating aerosol-producing procedure unless necessary [11].

Strategies to minimize face-to-face contact for initial screening are frequently carried out over the phone whenever a patient calls a dental facility to make an appointment. Oral telephone communication should include the majority of the questions that may be addressed below. If there is a satisfactory (i.e., yes) response to all of the items, a pharmacological pain or infection prevention prescription should be provided [10].

In particular circumstances of need, a screenshot of the location of the complaint shall be submitted to the team by the route determined by the dental staff [9].

### *Patient triage form*

Telephone triage by an expert through diligent questioning of signs and symptoms, despite best efforts, does not prioritize the risk that antibiotics and analgesics may be provided to people who may not need them or are offered conditions that might not be successful.

In this scenario, an emergency care visit could well be necessary; as a result, a patient sorting form with entirely different questionnaires would be needed to assure security. There are different types of queries, which mostly are answered by yes or no; these questions included details like:

1. If the patient is currently experiencing any of the following symptoms: fever, persistent cough, trouble breathing, mucus development, and flu-like symptoms?
2. If the patient already has COVID-19 or is he waiting for a test to be confirmed?
  - The test center
  - The general medical practitioner
  - A hospital
  - Has the patient been infected with CoV?
  - Has the patient traveled from any country in the last 14 days?
  - Has the patient suggested that he is shielded?
  - Does he have any of the following chronic conditions: heart disease, respiratory organ

disease (including asthma), liver disease, excretory organ disease, and diabetes, immune system?

- Has the patient had a toothache after the lockdown?

Upon addressing these questions, healthcare professionals would have a clear vision of the patient's condition and would have additional comfort in offering assistance and help.

### ***Emergency management***

Emergency/urgent treatment is carried out inside the dental facility if all questions are replied to with no, or there are no clear signs and symptoms of metabolic process complications, or if the vital movement is below 38°C (100.4°F). Patients and accompanying individuals who are permitted to access the clinic should wear an ID bracelet, which allows them to work inside the building [9].

At this stage of the pandemic, all patients (adults/children) are likely to be contagious so it is suggested to limit the involvement of unwanted people in the dental clinic. Dentists should exercise qualified judgment, think about the risks of disease transmission promptly, and refer the risks to the patient, the healthcare staff, and even the community against any tangible benefits.

Dentists should follow a specific infection control procedure guide for all emergency dental patients [9]. Scaling questions should be given to the healthcare provider by the patient to gauge the severity of the situation.

This form includes a diversity of questions like scaling the absolute patient threshold from 0 to 10, where 0 is no pain and 10 is the worst pain; estimating the duration of pain, since when it occurred; at this point, if patients are feeling hurt and cannot withstand further pain, then it will be taken into consideration, and evaluation of the symptom of the oral process is or is not added to the time of swallowing in the mouth, estimating the versatility of swallowing and the distance in the mouth.

Decisions on corporate care should be taken with the consent of the relevant patient or parent. Also, if patient follow-up is required, the dentist can contact the patient remotely to minimize contact with the patient (as necessary) [9].

The risk of dental practitioners being optimistic for COVID-19 and likely to infect patients attending emergency dental services must not be underestimated. Also, all dentists who have had unregulated inadequate exposure or suggestive signs that do not survive exposure should immediately cease to perform their duties [9].

### ***Specific protocols and procedures ought to be taken into account while dealing endodontically with emergency cases***

#### ***Preoperative***

Patients are asked to administer oral wash using hydroxy peroxide, which has been shown to minimize the loading

of saliva infective agents. Also, patients' lips should be washed using povidone-iodine, and a povidone iodine (PVP-I) nasal spray for patients and staff should be recommended.

#### ***Intra-operative***

It is strongly recommended to use a single-use system for the duration of the procedure to reduce the risk of infection and to eliminate the need for the use of radiographs, rubber dam insulation should also be used to minimize saliva-induced contamination.

Microscopes and endodontic loops in dental medicine should be minimized. Since stress during care includes the use of simple and minimally invasive procedures, the use of these instruments in a too specially fitted operating condition for COVID-19 patients is also contraindicated.

Also, microscopes may be incompatible with the personal protective equipment (PPE) due to the increased distance from the PPE lenses. Increased space may lead to an inability to provide adequate and helpful views. Also, loops can be used as long as there are a face shield and an applicable mask. There is an urgent need to develop techniques and microscopes that are compatible with complete PPE safety.

Moreover, for all these methods, any of the disinfectants, such as PVP-I or chemical element peroxide, should also be scrubbed in isolated teeth. It has also been shown to reduce the use of water and instead use an oral wash.

If the pulp has been accessed, the inflamed tissue within the pulp chamber is extracted by pulpotomy. Next, 5% of germicide can be used to fully dissolve any organic tissue at the most superficial dose level and reduce the need for irrigation and reirrigation.

Also, it is recommended to use a single open passageway to complete several operations instead of several visits to an equivalent location, which could minimize the number of hospital visits that could reduce the risk of infection.

#### ***Post-operative***

The patient will be informed that the care given is not definitive and will require follow-up. Practical advice should be made on delays in care in the current circumstances. This can affect the patient's dental treatment outcomes, with additional pain flare-ups, a greater risk of dental fracture, and a lack of temporary restoration.

### ***Infection prevention and management protocol in the dental clinic***

#### ***Hand hygiene***

The fecal-oral transmission has been recorded for COVID-19, which underlines the value of hand hygiene for dental practitioners. Dental professionals should practice hand hygiene as recommended by the World Health Organization - my five moments for hand hygiene.

This kind of hand hygiene should be carried out before putting on PPE, removing it, and removing gloves. Also, after some interaction with a suspected or confirmed COVID-19 virus, their waste or metabolic process secretions. Additional care should be taken for dental practitioners to avoid touching their own eyes, mouth, and nose [12].

Proper hand hygiene, and comprehensive disinfection of all clinical and body surfaces between dental clinics in addition to the treatment area, appropriate sterilization processes using chemical indicators, and the proper waste disposal should be a routine and reinforced [9].

### ***Personal protecting measures for dental professionals***

Barrier security devices, as well as protective eyewear, masks, gloves, caps, eye protection (face shields or goggles), and clothing, are highly recommended for all dental professionals, especially during the whole pandemic situation of COVID-19. Also, it is advised to wear respiratory protection (N95 or higher respiratory protection) for aerosol-generating procedures; if a respirator is not available, use a mixture of a surgical mask and a protective shield [9].

The use of disposable (single-use) equipment, such as mouth mirrors, syringes, and blood pressure cuffs to avoid cross-contamination, is strongly recommended if necessary and if PPE, as well as surgical face masks, are not available.

Disposable breathers, disposable eye protection, disposable clothing, and surgical masks should be removed and discarded before leaving the dental clinic/room.

Reusable eye protection must be washed and disinfected in compliance with the manufacturer's reprocessing instructions before re-use. Adjust the dress if it gets soiled. Remove and discard the clothes in the waste or linen tub before leaving the dental clinic/room [12].

### ***Removal of PPE***

The level of care in handling associate in handling and removal of PPE when procedures are not less necessary than swinging on equipment as the transmission of infection continues to be present, taking full protocol of precautions to manage this used PPE is of crucial importance, including the handling of gloves, gowns, masks, and goggles.

#### ***Gloves***

We should take into account that outside the gloves are dirty; if the hands get contaminated throughout the removal of the gloves, wash hands at once or use an alcohol-based hand sanitizer, use a gloved hand, grab the palm space of the opposite gloved hand and peel off the first gloved hand. Hold gloves removed from the gloved hand and then slide fingers of the ungloved hand below the remaining carpus gloves [12].

#### ***Face protection***

It is suggested to detach glasses or face shield from the back by raising the headband or earpieces; if the object is reusable, put it in the selected receptacle for reprocessing. If the hands are dirty throughout while face shield removal, wash hands at once or use an alcohol-based hand sanitizer [12].

#### ***Gown***

Unfasten dress ties by taking care that the sleeves do not touch the body, then draw the dress away from the neck and shoulders, touching the inside of the dress only, then turn the dress inside out, eventually fold it or roll it into the bundle and discard it in a waste bin.

Take special care when handling gowns; if in any situation it is purchased recently and comes in direct contact with forehead or sleeves, immediately do not touch the eyes and face, then sanitize our hands with alcohol-based hand sanitizer [12].

#### ***Mask***

Grasp the bottom links or elastics of the mask/respirator, then those at the top, and remove it by not reaching the front and dump it in a waste container [12].

### ***Clinical setting control***

Public areas and equipment should also be washed and disinfected, as well as door handles, chairs, and desks. The elevator should be disinfected regularly. Individuals taking elevators should wear masks correctly and avoid direct contact with buttons and objects. Its worth noting that patients with suspected or confirmed infection with COVID-19 should not be treated in average practice settings. Instead, these patients should be treated in unfavorable pressure rooms or in negative pressure treatment rooms/airborne infection isolation rooms only.

Clinical workers should also ensure that the chemical exploitation of inanimate surfaces is washed and a dry atmosphere is preserved to curb the transmission of the virus.

### ***Conclusion***

With regard to dental treatment during COVID-19, the state of affairs wants us treat our patients in a much more confined way, due to a much higher degree of protection for healthcare providers than for patients. Applying rigorous safety measurements for dominant infection contamination between patients and Healthcare providers (HCPs) is a cornerstone in dental care settings.

Restricting visits to clinic, operations only for emergency, and vital situations would have a significant impact on reducing the risk of infection and contamination between people. At the same time, implementing the quality of

care guidelines for infectious control would be a crucial step in ensuring a healthy passage of this duration.

#### List of Abbreviations

HCPs Healthcare providers  
 PPE Personal Protective Equipment's  
 PVP-I povidone iodine

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