

Dentistry and COVID-19 Patient safety and practice management

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Abstract

The 2019 novel corona virus or severe acute respiratory syndrome (SARS-CoV-2) has become a public health emergency that has gripped the entire world. The virus derives its origin from Wuhan in the Hubei province in China in December 2019. The disease is air borne and usually transmitted when droplets from an infected individual come in contact with an uninfected person primarily through the eyes, nose and mouth. The incubation period ranges from 2 to 14 days. The symptoms can range from fever, sore throat, breathlessness, fatigue, malaise and loss of smell or taste. These symptoms can even progress to pneumonia, acute respiratory distress syndrome (ARDS) and multi organ dysfunction and can be fatal in elderly people and people

with comorbidities. Dental professionals may encounter patients with suspected or confirmed SARS-CoV-2 infection. Transmission in the dental operator can occur through direct and indirect exposures, inhalation and mucosal contact. This can be avoided by following strict protocols. Dentists will have to act diligently not only to provide care but also a safe environment to the patients. This article aims to provide a brief overview of the relation of COVID-19 to dentistry, its transmission in the dental operator and the methods to prevent the transmission in the dental office.

Keywords: Covid-19, Corona Virus, Dentistry, Dental office, Protocol

Introduction

Severe acute respiratory syndrome corona virus (SARS-CoV)-2 is a novel RNA corona virus from the Corona viridae family, the same family as SARS-CoV and Middle East respiratory syndrome corona virus (MERS-CoV). It was identified in early January 2020 as the cause of a pneumonia epidemic affecting the city of Wuhan, the capital of Hubei province, from where it rapidly spread across China and eventually spread across the globe.¹⁻³

Coronaviruses are pleomorphic RNA viruses and characteristically contain crown-shape peplomers which are 80-160 nM in size and have a positive polarity of 27-32 kb. (Figure 1) With its high mutation rate, corona viruses are zoonotic pathogens present in humans and various animals. They present with a wide range of clinical features from asymptomatic course and may even require hospitalization; causing infections in respiratory, gastrointestinal, hepatic and neurologic systems.³⁻⁶

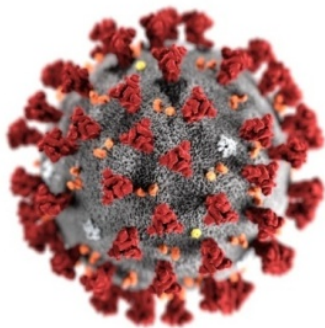


Figure 1 : Structure of corona virus

The novel corona virus (COVID-19) outbreak has been declared a global pandemic by the World Health Organization (WHO) on March 11, 2020. As on date a total of 11,955,847 cases have been reported with a total of 546,737 deaths and 6,902,486 recovered cases around the globe.⁷

Clinical Signs

The clinical features of COVID-19 are varied and they can range over a period of 2-14 days. They can manifest from

an asymptomatic state to acute respiratory distress syndrome and multi organ dysfunction. The usual clinical features include fever, sore throat and cough. Other features include fatigue, headache, new loss of taste or smell, myalgia and breathlessness. (Figure 2) They are indistinguishable from other respiratory infections. In a subset of patients, by the end of the first week the disease can progress to pneumonia, respiratory failure and death.⁸

Know the symptoms of COVID-19, which can include the following:

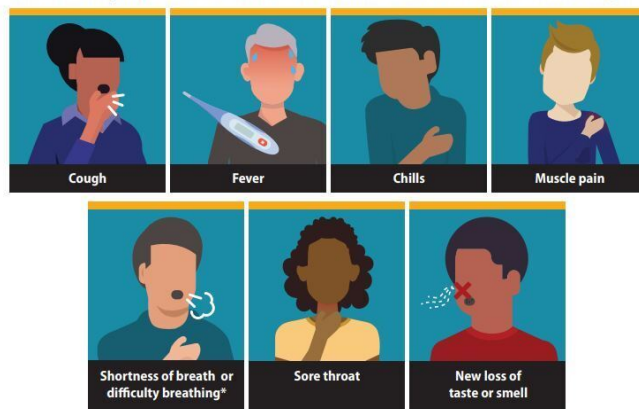


Figure 2: Commonly seen symptoms of COVID-19

Mode of Transmission

The transmission by and large occurs through close contact. The transmission primarily transpires when an infected person sneezes and the respiratory droplets are produced. These droplets can eventually settle in the mouth or nasal mucosa and lungs of people with inhaled air. It still remains unclear whether a person can be infected by COVID-19 by touching an infected object or surface and then touching their mouth, nose, or possibly eyes.⁹

It is considered to be the most contagious when people are symptomatic. However, cases infected from an asymptomatic person in the prodromal period of COVID-19 were also reported. Sufficient data is needed however to confirm this.¹⁰

Dynamics of Transmission in Dental Practice

Dental personnel are repeatedly exposed to respiratory tract secretions, blood, saliva, and other contaminated

body fluids due to close face-to-face contact with patients and frequent utilization of sharp devices and are always at risk for 2019-nCoV infection. The transmission of 2019-nCoV in a dental setting can occur through 4 major routes:

1. Direct exposure- This occurs due to direct contact with droplets, saliva, blood and other patient materials;
2. Indirect exposure-This occurs due to indirect contact with contaminated surfaces and/or instruments;
3. Inhalation- the suspended airborne viruses can be inhaled in the operator;
4. Mucosal contact- Occurs while coming in contact (nasal, oral and conjunctival) with infection-containing droplets and aerosols that are propelled by coughing and talking without a mask.(Figure 3)¹¹⁻¹⁵



Figure 3: Mode of transmission of COVID-19 in the dental office

How to keep the dental office safe?

Dental professionals should be able identify patients with 2019-nCoV infection, the modes of transmission of 2019-nCoV and the extra-protective measures which should be adopted during the practice to prevent the transmission of 2019-nCoV.¹⁶ The appropriate use of protective equipment like N95 respirators, masks, gowns and gloves are crucial to protect the health professionals.¹⁷

Dentists should follow extreme caution to avoid contact with their own mucosal surfaces including their eyes, mouth, and nose. Since transmission of airborne droplet is considered one of the main routes of infection spread, use of personal protective equipment like masks, protective

goggles, gowns, helmet, gloves, caps, face shields, and shoe covers should be strictly used for all health care personnel. In case if a Covid-19 positive patient has to be treated special protective clothing such as hazardous materials (hazmat) suits are required. If hazmat suits are not available, white coats, gowns, head caps, protective eyewear, face shields, masks, latex gloves, and virus-proof shoe covers should be used.¹⁶

Methods to prevent transmission in the dental office

1. Telescreening and Triage

Initial screening is performed via telephone to identify patients with suspected or possible COVID19 infection. This is done remotely at the time of scheduling appointments. The 3 most pertinent questions for initial screening should include any recent travel history to an area with high incidence of COVID-19 any exposure to a person with known or suspected COVID-19 presentation, presence of any symptoms of febrile respiratory illness such as fever or cough. A positive response to either of the 3 questions should raise a concern to the clinician, and elective dental care should be deferred for at least 2 weeks.

2. Patient selection

This is the most important step which helps in reducing the risk of exposure for the dentist and the uninfected patients. The dentist should attempt in reducing the number of patients in the waiting room by scheduling appointments beforehand. Before starting any treatment, the patients should be asked a few questions like: (a) In the past 14 days, have you had a fever ($> 37.5^{\circ}\text{C}$), cough, sore throat, or breathing problems? ; (b) Have you had close or family contact with a suspected or confirmed case of COVID-19 ?; (c) Does it come from areas with a higher risk of COVID-19 in the last 14 days? and the temperature of the patient should be recorded. Based on this preliminary examination patients should be categorized

into low, medium and high risk and accordingly different infection protocols should be followed.¹⁸

Upon patient arrival in dental practice, patients should also be requested to complete a detailed medical history form, COVID-19 screening questionnaire and assessment of a true emergency questionnaire.(Figure 4)

Assessment of a True Emergency
(Circle Patient's Response wherever appropriate)

1) Are you in pain?
Yes or No

2) What is your level of pain on a scale of 0-10?

0	1	2	3	4	5	6	7	8	9	10
No Pain	Mild	Moderate	Severe	Very Severe	Worst Pain Possible					
0	1-3	4-6	7-9	10						

3) When did the pain begin?
.....

4) Do you have a dental abscess (Are your gums and/or face swollen)?
Yes or No

- If **Yes**, when did you first notice the swelling?
.....

5) Do you have a fever?
Yes or No

6) Are you having any trouble swallowing?
Yes or No

7) Are you having any trouble opening your mouth?
Yes or No

8) Did you experience any trauma?
Yes or No

- Please describe the trauma
.....

Figure 4: Questionnaire for assessment of true emergency

3. Pharmacologic Management

In suspected cases requiring urgent dental care, pharmacological management in form of analgesics and antibiotics should be prescribed to the patient.

Specific dental treatment recommendations

The clinician should assess the severity of the dental condition and take an informed decision to provide or defer dental care. In an unlikely event of providing dental care to suspected or confirmed cases of COVID-19 infection, dentists should adhere to the following recommendations:

1. Use appropriate personal protective equipment and follow hand hygiene: Centre of Disease Control (CDC) has recommended various guidelines for the judicious use of Personal Protective equipment. It is advisable to use them judiciously and adhere to the recommended guidelines.(Figures 5 and 6)



Figure 5: Sequence for putting on Personnel Protective Equipment

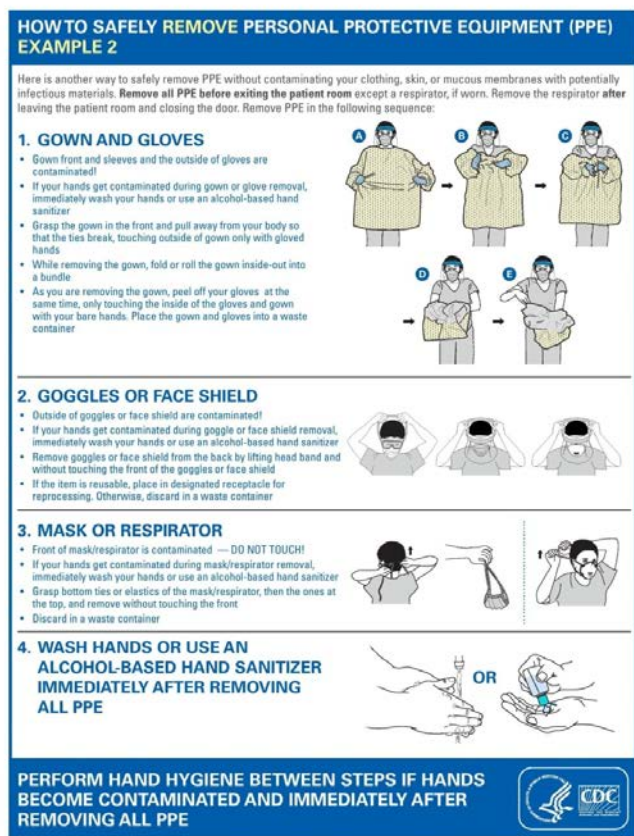


Figure 6: Sequence for removal of Personnel Protective Equipment

2. Pre-procedural mouth wash: Various studies have demonstrated that SARS-CoV and MERS-CoV are highly susceptible to povidone mouth rinse. So a pre-procedural rinse of 0.2% povidone iodine is recommended to reduce the load of corona virus.²² Alternatively, 0.5-1% hydrogen peroxide mouth rinse as it has non-specific virucidal activity against coronavirus.¹²
3. Use of single use devices: Dentists should utilize single use devices like mouth mirrors and syringes.
4. Use of rubber DAM: Using rubber dams judiciously can significantly minimize the production of saliva and blood contained splatters or aerosol while using high speed hand pieces and dental ultrasonic devices are used. Studies indicate that rubber dam can reduce the particles by 70% in an operational field of ~3 foot diameter.²¹ Regular

suction and Extra high-volume suction for aerosol and spatter should be used during the procedures.²²

5. Use of anti-retraction handpieces: The use of any dental hand pieces that do not have an anti-retraction function should be avoided during these times, however, anti-retraction hand pieces designed with anti-retractive valves can play an effective role in preventing the diffusion and dispersion of droplets and aerosol.^{21,22}

6. Negative-pressure treatment rooms/ airborne infection isolation rooms (AIIRs): Patients suspected or confirmed with COVID-19 should not be treated in a routine dental practice. Health care centres with AIIRS would help dentists to provide emergency dental care if required.²³

7. Use of appropriate disinfectants: There is very little information regarding the vulnerability of 2019-nCoV to disinfectants however due to its genetic similarity to SARS-CoV. It can be assumed that the novel coronavirus can be vulnerable to disinfectants such as sodium hypochlorite (1000 ppm or 0.1% for surfaces and 10,000 ppm or 1% for blood spills), 0.5% hydrogen peroxide, 62–71% ethanol, and phenolic and quaternary ammonium compounds if utilized in accordance with the manufacturer’s instructions. In addition to the type of disinfectant, other factors such as the duration of use, dilution rate, and especially the expiration time following the preparation of the solution also plays an important role in the efficacy of the disinfectant.²⁴

8. Removal/filter of contaminated air: Several methods are advocated to filter contaminated air before, during and after treatment. The most commonly used devices include the high volume evacuator (HVE) and the high efficiency particulate arrestor (HEPA) filters.

HVE Filter: It is an inexpensive suction device that removes air at the rate of 2.83 m³ per minute. This is an easy way to remove dental aerosols and they can effectively reduce contamination in the operating site by

90% .²⁴ This device should be held at a distance of 6-15 mm from the active ultrasonic. This device is difficult to operate without an assistant as clinicians can face a difficulty in operating with a single hand. Some modifications of HVE are available in the market to combat this issue.

HEPA filter: This is an air filtration device and they can remove 99.97% of the particles which have a size of 0.3 µm in diameter. HEPA filter contains a complicated mix of fibers and filaments that carries a static charge and attracts microbes. When the droplets travel through the air filtration system, they are captured and retained by the filter.²⁵

However, no system has scientifically proven to filter the COVID-19 as it is a new virus and there is still research going on to verify the air purifier's ability to filter air borne viruses.

9. Management of medical waste: The medical waste should be timely removed and transported to a temporary storage area. The medical waste of a suspected or confirmed 2019-nCoV patient should be stored in a double layered yellow coloured waste packaging bag and these should be tied with a gooseneck ligation. The surfaces of these packaged bags should be marked and disposed in accordance to suggested protocols.²⁶

Other methods to reduce droplet generation in different dental disciplines

Other methods to reduce droplet generation in different dental disciplines are the following-

1. Endodontics- Rubber dam must be used for all endodontic procedures. To reduce the possibility of fomite transmission, minimize unnecessary hand contact with surfaces and equipment in the dental office.
2. Restorative dentistry and pediatric dentistry- Avoid the use of rotary instruments during cavity preparation. Use of

chemo-mechanical caries removal or atraumatic restorative techniques should also be considered.

3. Periodontics- Manual scaling preferred over ultrasonic instrumentation as both are equally effective in removing plaque and calculus deposits.

4. Prosthodontics- Rubber dam application should be done for fixed partial denture or single crown preparations. Impressions should be taken with salivary suction to avoid gagging. In highly sensitive patients, anaesthesia should be applied to the throat before taking impressions. After the removable partial denture or complete denture try in, do not touch any object in the dental office coming in contact with patient's saliva. After removal from patient's mouth, dental prosthesis, impressions, and other prosthodontics materials (e.g., bite registration) should be disinfected.

5. Oral-maxillofacial surgery- While performing simple extraction, the patient should be treated in a supine position to avoid working in the breath way of a patient.²⁷

Conclusion

The spread of SARS-CoV-2 worldwide has increased the chances that dental health professions would likely encounter suspected or confirmed COVID-19 infected cases. The dentist should do the initial screen over the phone and restrict treatment only for emergency cases. As mentioned above, certain necessary precautions need to be taken to avoid risk of contamination both to the dentist as well as the uninfected patient.

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