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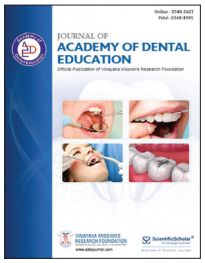

Review Article

Coronavirus disease 2019 safety strategies to be included during dental practice

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ABSTRACT

Coronavirus disease 2019 is caused by SARS-CoV-2 that leads to severe acute respiratory disease. It was first identified in Wuhan City, China, in December 2019 and has resulted in an ongoing pandemic. As of September 15, 2020, more than 26.5 million cases have been reported across the world, with more than 873,000 deaths. As SARS-CoV-2 is highly infective through air-borne contamination, the risk of infection in the dental setting is a serious problem for dental professionals as well as patients. The article provides information on this virus transmission and emphasizes the safety protocols to be followed before, during and after dental treatment.

Keywords: SARS-CoV-2, Coronavirus disease 2019, Dental procedures, Infection control, Teledentistry

INTRODUCTION

Wuhan City, China, first started showing cases of pulmonary disease, with unknown etiology, by the end of 2019. The World Health Organization declared it as a pandemic on March 11, 2020 as the disease started spreading worldwide. The pandemic, coronavirus disease 2019 (COVID-19) caused by SARS-CoV-2, has created a massive crisis among global healthcare and economic welfare.[1] As SARS-CoV-2 is highly infective through air-borne contamination, the risk of infection in the dental setting is a serious problem for both practitioners as well as patients.[2] As the concern of COVID-19 rises, it is very important to practice safety protocols and sterilization methods to keep everyone from the impact of the disease. This article provides a description on the mode of transmission of SARS-CoV-2 virus and the safety measures to be followed.

TRANSMISSION

The possible mode of transmission of SARS-CoV-2 virus is between people who are in close contact with another (around 6 feet) through respiratory droplets released when the infected one coughs, sneezes, or talks.[3] The other routes of transmissions, including the possibility of air-borne transmission, are only being studied since COVID-19 is a new disease. SARS-CoV-2 causes respiratory illness ranging from mild disease to severe disease and death, and there are cases where virus-infected people never develop symptoms.[4] Due to exposure with micro-organisms derived from the oral cavity and saliva, dental health care professionals and patients are at high risk of cross infections.[2] Moreover, the use of rotary and surgical instruments produces a visible spray with droplets of water, saliva, blood,

micro-organisms, and other debris that can overcome the protection produced by surgical masks.[3] The highest levels of contaminants can be found within 60 cm from the patient's head, mainly on the right-hand side of dentists, their masks, around the nose and eyes, says the study done on a mannequin fitted with phantom jaw and seated on a dental chair [Figure 1].[2,5] Furthermore, an *in vitro* study showed that the viability of SARS-CoV-2 virus in the air is for minimum 3 h and half-life for about 1 h. All surfaces and instruments should be considered as a potential source of virus transmission due to the great adherence of viruses to these for a maximum of 9 days.[2]

There are people who are not aware that they are affected by the virus, people who purposefully conceal the presence of infection and some not aware of the complexity of the pandemic. This emphasizes the importance to have a series of safety protocols to be followed this time of pandemic.

INFECTION PREVENTION AND CONTROL PRACTICES

Pre-procedure

Teledentistry

Teledentistry can be of great help in the current pandemic situation. It is a combination of telecommunications and dentistry that includes dental consultation and treatment planning over information-based technologies and communication systems.[6] Telephone screening and triage of all patients should be done before the appointment. After considering the signs and symptoms of the patient, a decision should be made by the dentist regarding the emergency of the situation and whether it is necessary for the patient to visit the clinic or not.[7] Appropriate pharmaceuticals, along with home care instructions, should be provided by means of teledentistry if it is not an emergency.[7]

Given below is a table based on the information provided by the American Dental Association (ADA) that helps to decide what constitutes a dental emergency [Table 1].[8]

Waiting room

Dental health care providers should try to limit the number of patients at a time to one and all patients should wear facemasks. Social distancing must be maintained and physical barriers must be introduced. Instructions about hand hygiene and respiratory hygiene must be put up as visual alerts at different places of the clinic, like the entrance. Instructions about how and when to perform hand hygiene, how to use and dispose off the tissues and other contaminated items into respective waste bins, after coughing or sneezing, etc., should also be included.[7] Supplies such as alcohol-based hand rub containing at least 60% alcohol, tissues, etc., must be kept for patients to use. Toys, magazines, and other frequently touched objects must be removed from the waiting room since it is tedious and impossible to keep them sanitized at all times.[3]

Preliminary evaluation of patient

COVID-19 patients have a wide range of symptoms, such as fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headache, new

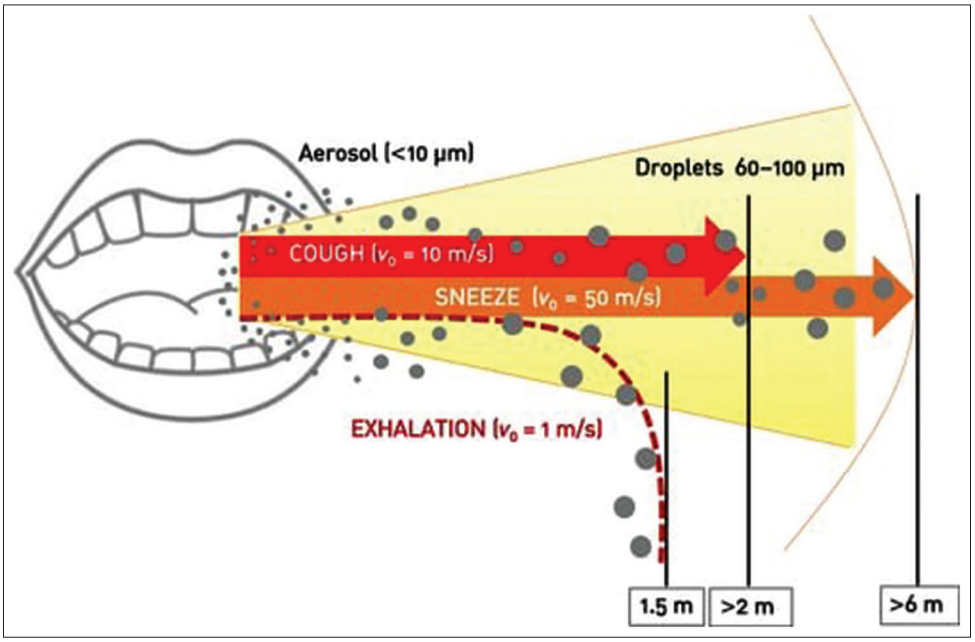

Figure 1: Exhalation distances of aerosol microparticles and large droplets (original picture with data taken from Xie *et al.*).

loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, and diarrhea.

These symptoms should be included in a questionnaire which is to be asked to the patient.

- The patient's temperature also should be taken using non-contact forehead thermometer or with cameras having infrared thermal sensors[9]
- Patients answering "yes" to any of the survey questions and whose body temperature is >37.5 °C (99.5 °F) should be confined to their home or hospitalized[2]
- Patients answering "yes" to any of the survey questions to the survey and whose body temperature is <37.5 °C (99.5 °F) should not be treated for at least 14 days[2]
- Patients who have recovered from COVID-19 can be treated 30 days after symptom remission[2]
- Patients answering "no" to the survey questions and whose body temperature is <37.5 °C(99.5°F) can be treated, but procedures involving aerosol must be avoided.[2]
    - Given below is a flowchart depicting treatment to be followed after assessment of severity of the condition of patient

DURING THE DENTAL PROCEDURES

Hand hygiene[10]

Hand hygiene should be practiced during key procedures, that is, before and after each treatment session, before and after removal of personal protective equipment (PPE), following the washing of dental instruments, before coming in contact with steam sterilized instruments, and also after cleaning and maintaining decontamination devices used on dental instruments.

This can be achieved by use of mild soaps. Proper drying of hands should be done after washing. The use of disposable towels and tissues is encouraged to prevent recontamination. Skin care with water-based hand cream can be used to avoid cracking of skin. Clean, short, and smooth fingernails should be maintained. Avoid using rings, bracelets, and wristwatches while carrying out dental procedures.

How to use PPE

Impervious gown, facemask, eye protection, and disposable cap constitute PPE.[11] Regardless of emergency/urgency patients do not proceed with any dental treatment without the use of basic PPE and surgical masks.[10]

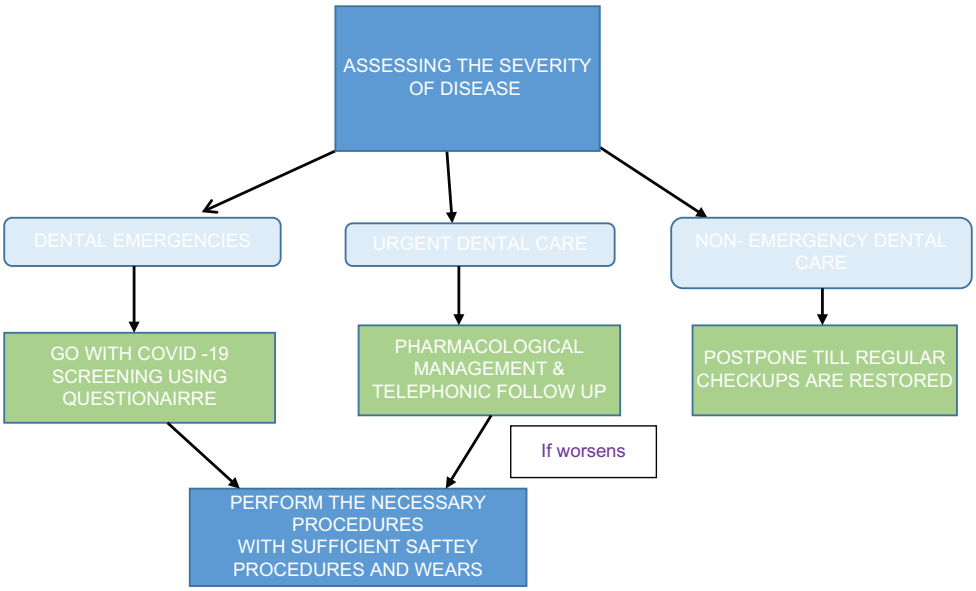

Table 1: Classification of Dental Emergencies

Dental emergencies	Urgent dental care	Non-emergency dental procedures
• Uncontrolled bleeding • Cellulitis • Trauma involving facial	• Severe dental pain • Pain in the third molar • Osteitis succeeding surgical procedure • Localized abscess • Tooth fracture which causes pain or soft tissue trauma • Dental trauma with avulsion or luxation	• Initial or periodic oral examination • Routine dental cleaning • Aesthetic dental procedures • Extraction of symptomatic teeth • Treatment of asymptomatic carious lesions • Orthodontic procedures other than those to address acute issues like pain, infection, trauma

Figure 2: Sequence for putting on personal protective equipment (original taken from CDC).

Table 2: COVID-19 questionnaire.

COVID-19 questionnaire	Yes	No
Do you have a history of fever over the past 14 days?		
Do you have a history of respiratory diseases (e.g.: Cough and breathlessness) over the past 1 month?		
Do you have a history of traveling outside district/ state/country over the past 1 month?		
Do you have a history of contact with large crowd/ gathering over the past 1 month?		
Do you have a history of contact with COVID-19-positive or a positive suspected person over the past 1 month?		

1. Sequences recommended for dental professional to use PPE before entering the patient treatment area [Figure 2][12]
   - Perform hand hygiene
   - Skin should be protected with protected clothing and gown
   - Surgical mask or respirator should be used
   - Eye protection goggles or face shield is used
   - Use of clean sterile gloves
   - Enter patient treatment area.[3]
2. After completion of dental procedures [Figures 3 and 4][12]
   - Gloves are to be removed first
   - Protective clothing or gown is removed

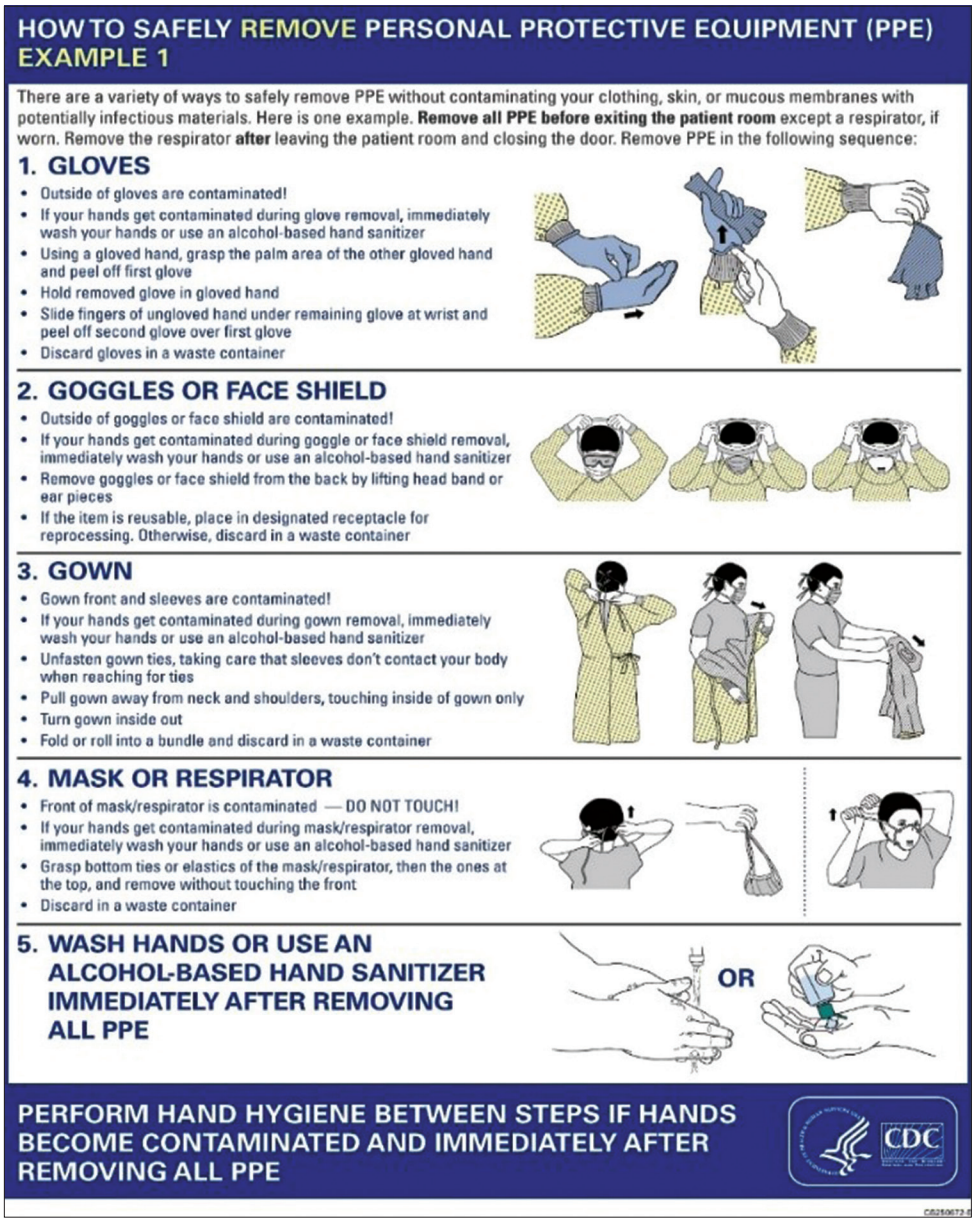

Figure 3: Sequence of safely removing personal protective equipment example 1 (originally taken from CDC).

Table 3: Safety gears during Dental Treatment

Well patients		**Patients with suspected or confirmed COVID-19**	
Dental procedures not involving aerosol-generating procedures	Dental procedures that may or are known to produce aerosols	Dental procedures not involving aerosol-generating procedures	Dental procedures that may or are known to generate aerosols
• Work clothing, such as scrubs, lab coat, and/or smock, or a gown • Gloves • Eye protection (e.g., goggles, face shield) • Face mask (e.g., surgical mask)	• Gloves • Gown • Eye protection (e.g., goggles, face shield) • National Institute for Occupational Safety and Health-certified, disposable N95 filtering facepiece respirator	• Gloves • Gown • Eye protection (e.g., goggles, face shield) • NIOSH-certified, disposable N95 filtering facepiece respirator	• Gloves • Gown • Eye protection (e.g., goggles, face shield) • NIOSH-certified, disposable N95 filtering facepiece respirator

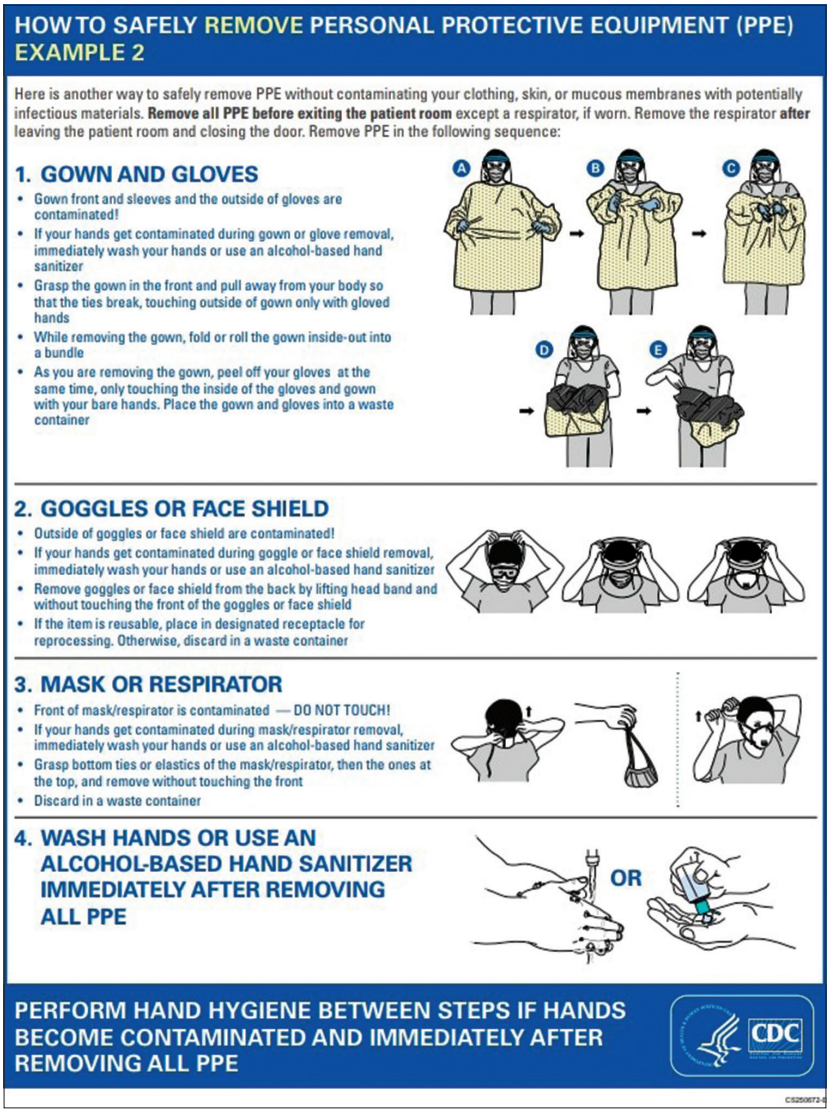

Figure 4: Sequence of safely removing personal protective equipment example 2 (originally taken from CDC).

- Exit patient treatment area
- Hand hygiene practice is done
- Remove eye protection
- Surgical mask or respirator is removed
- Follow hand hygiene.

As per occupational safety and health administration, during COVID-19 pandemic, following PPE should be used in dentistry.[13]

Rinsing mouth before procedures

The use of virudical mouth rinse such as 1% hydrogen peroxide or 0.2% povidone-iodine before the dental procedure may reduce the pathogenicity of the organism inside mouth.[11]

Safe injection practices

Injections are to be followed in the aseptic area and disinfection of rubber septum with alcohol before piercing is important. One can also use single-use vials.[14]

Radiographs

Practice extraoral radiographs rather than intraoral, as the later may cause stimulate salivation and cough. If a diagnostic intraoral radiograph is a must, most experienced member should take the radiographs.[11]

Role of suction

High volume evacuation suction capable of removing up to 100 cubic feet of air per minute is recommended by ADA,

as it removes droplets at the site of oral cavity and reduces aerosolization of particles.[11]

Rubber dam

To reduce aerosol production and particle spread, dental rubber dams can be used with much effect.[11]

Rotary instruments

High-speed dental handpiece with an anti-retraction valve should be used.[11] If commonly employed air-water syringe is used, a Powered Air Purifying Respirator should be best choice or a full face shield with N95 or similar respirator should be followed.[11]

Use of air purifiers

High-efficiency particulate air filters (HEPA, H12 class) are very much effective and protective when compared to air purifiers with fine filters. F6 class filter air purifier is also effective to some extent.[15]

POST-PROCEDURE

Rotation and reuse strategy are being used in many organizations since the coronaviruses tend to lose their viability significantly after 72 h. It involves acquiring a set number of N95 masks (at least 5 as per the CDC), and rotate their use each day, allowing them to dry for long enough that the virus is no longer viable.[7] However, if the masks get contaminated with blood, respiratory, or nasal secretions, they should be discarded.[7]

Floor should be cleaned with 1% sodium hypochlorite and waterlines should be disinfected with 0.01% sodium hypochlorite to reduce the risk of cross infection[7] all biomedical waste that is being generated should be carefully disposed of from time to time through an authorized biomedical disposal agency.[7]

CONCLUSION

Safety measures to be followed during this pandemic are of utmost importance. This article aids in giving information on this aspect. As the research advances and more studies being done, many changes can be done in these safety protocols.

Declaration of patient consent

Patient's consent not required as there are no patients in this study.

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Conflicts of interest

There are no conflicts of interest.

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