

SARS-COV-2 (Severe Acute Respiratory Syndrome Coronavirus 2): The new normal in the perspective of a Pediatric Dentist

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Abstract

In late December 2019, novel coronavirus disease 2019 (COVID-19), caused a major outbreak of severe pneumonia in Wuhan (Huanan seafood market) and then, across China. The World Health Organization announced that the outbreaks of the novel coronavirus have constituted a public health emergency of international concern. It is distinct from SARS-CoV and MERS-CoV, with Chinese horseshoe bats being the most probable origin. Once in the human body, this Corona virus (SARS-CoV-2) is abundantly present in nasopharyngeal and salivary secretions of affected patients and its spread is predominantly thought to be respiratory droplet/contact in nature. Transmission occurs primarily through droplet spread or contact routes. COVID-19 is a new challenge in

modern dentistry because Sars-CoV-2 is highly infective through airborne contamination possess high infection risk in the dental environment. Dental professionals may encounter patients with suspected or confirmed SARS-CoV-2 infection and will have to act diligently not only to provide care but at the same time prevent nosocomial spread of infection. Thus, the aim of this article is to provide a brief overview of the epidemiology, symptoms, and routes of transmission of this novel infection. In addition, specific recommendations for dental practice are suggested for patient screening, infection control strategies, and patient management protocol.

Keywords: COVID-19, MERS-CoV, World Health Organisation (WHO), Angiotensin-converting enzyme

2(ACE-2), Occupational Safety and Health Administration (OSHA), Dental health care personnel (DHCP), National Institute for Occupational Safety and Health, Ultraviolet germicidal irradiation (UVGI)

Introduction

Recent outbreak of SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2) has infected global population and has caused serious public health concerns. The S protein from coronavirus can bind to the receptors of the host to facilitate viral entry into target cells.^[1] The most common receptor involved in the virus–cell interaction is angiotensin-converting enzyme 2(ACE-2), which is present at high concentrations in lungs, myocardial cells and kidney, as well as on oral mucosa (especially of the salivary glands and tongue).^[2,3] These findings indicate that the oral mucosa could represent an important vehicle for the 2019-nCov transmission. Saliva can be delivered through cough, “droplets” and normal breathing.^[4] Therefore, viruses can be easily vehiculated by the aerosol generation of dental procedures. The population with higher expression of ACE2 are more susceptible to 2019-nCoV due to high affinity with ACE2. A lower incidence has been reported in children which might be due to immature ACE 2 (Angiotensin Converting Enzyme 2) receptors, presence of antibodies to different viruses and a developing immune system which reacts differently to virus as postulated by Dong Y et al.^[5] Healthcare providers are at an increased risk of contracting the infection and becoming potential carriers of the disease. According to Occupational Safety and Health Administration (OSHA), dental health care personnel (DHCP) are placed in very high exposure risk category as dentists work in close proximity to the patient’s oral cavity.^[6] Dental procedures involve the use of rotary instruments such as handpieces and scalers, which generate aerosols. Universal precautions should be

routinely followed in dental clinics. They are critical for avoiding the transmission of SARS-CoV-2 virus to children as well as transmission from infected children to healthcare professionals. This review presents evidence-based patient management practice and protocols from the available literature to help formulate a contingency plan with recommendations, for the dental practices prior to patients’ visit, during in-office dental treatment, and post-treatment, during the pandemic and after.

Symptoms

Patients with COVID-19 usually present with clinical symptoms of fever, dry cough, myalgia, sore throat and breathlessness. In addition, less obvious symptoms such as nausea, diarrhea, vomiting, and reduced sense of smell (hyposmia) have also been reported.^[7] Dentists must be cognizant of oral findings and features, such as dysgeusia/ ageusia, xerostomia, and exanthematous lesions like ulcers or blisters which might be early symptoms of COVID-19 and present before other typical clinical symptoms. Computed tomographic findings shows ground-glass opacities in the chest.^[8] Children present similar symptoms as adults but in milder form. The asymptomatic patients can act as “carriers” and also serve as reservoir for re-emergence of infection.

Transmission

Infected patients, whether symptomatic or asymptomatic, are the main sources of transmission of the infection. Virus transmission is likely to be person to person transmission mainly via direct transmission (cough, sneeze, and droplet inhalation transmission) and contact transmission (contact with oral, nasal, and eye mucous membranes also via contact and fomites. In dental setup the key concern is transmission of infection through droplets and aerosol. Use of high-speed handpiece or ultrasonic instruments may cause the secretions, saliva, or blood of the patients to aerosolize the virus into the

surroundings. In dental clinics, surfaces also act as an important tool for spreading bacteria. Corona viruses can keep their virulence active at room temperature from 2 h to 9 days. Thus, keeping a clean and dry environment in the dental office would help decrease the persistence of 2019- nCoV.

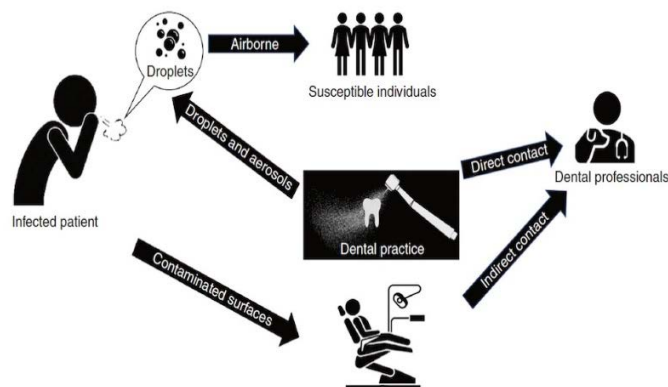


Figure taken from “Transmission routes of 2019-nCoV and controls in dental practice” – Peng et al. 2020

Pre-Visit Preparation- Telephone screening to identify patients with suspected or potential COVID19 infection may be done prior to scheduling appointments. Most important initial screening questions includes: previous reference to a person with a confirmed or suspected COVID-19 diagnosis, recent history of travel to any region of elevated COVID-19 occurrence or any symptoms like respiratory illness, fever and/or cough.^[9]

An affirmative response to any of the 3 questions should cause doubt, and elective dental treatment should be avoided for at least 2 weeks. Teleconsultation via a live video is helpful in sharing health information such as radiographs and photographs to evaluate the patient’s condition or provide virtual health service following an informed consent for the same. If needed, patients can be prescribed analgesics or topical agents via a tele dentistry appointment itself.

Patient screening for dental management- Dentists should take a thorough medical history from each patient and confirm the health status at each recall visit. Child’s

body temperature should be measured using a noncontact forehead thermometer or with cameras having infrared thermal sensors. Patients who present with fever (100.4_F 5 38_C) and/or respiratory disease symptoms should have elective dental care deferred for at least 2 weeks. The symptoms of fever and fatigue could be caused by acute dental infection should also be noted. Patients should be requested to wear a surgical mask and follow proper respiratory hygiene. Only one guardian per child should be permitted during dental procedure. Physical distance upto 6 feet should be maintained in the waiting area. No magazines or toys should be present in the waiting area. As per the Centers for Disease Control and Prevention guidelines, individuals with suspected COVID-19 infection should be seated in a separate, well-ventilated waiting area at least 6 ft from unaffected patients seeking care.^[10]

Infection control in dental practice- Only urgent and emergency care should be given, concentrating on relief of acute pain and infection, using limited AGP.

Some common examples of dental emergency:^[11]

- Acute dental pain
- Uncontrolled bleeding
- Dental abscess, where potential for airway compromise is deemed to be present
- Dental trauma and facial trauma
- Replacing lost temporary filling on endodontic access cavity
- Snipping or adjusting orthodontic wires causing ulceration of oral mucosa.
- Medically compromised patients with dental problems, which may compromise their systemic disease.
- Managing dental concerns of patients referred by medical colleagues for medically necessary dental

care, e.g., patients about to undergo cardiac valve replacement or head and neck radiotherapy

In pediatric dental practice, effective infection control measures for the prevention or minimization of viral infection transmission can be implemented by a) controlling the gag or cough reflex; b) reducing aerosol/splatter generation; c) managing contaminated air and; d) improving personal protection.

20-30 second mouth rinse has been shown to reduce the microbial load within the oral cavity before dental procedures. Because Sars-CoV-2 is sensitive to oxidation, mouth rinses containing 1% hydrogen peroxide or 0.2% povidone-iodine have been proposed. Orthopantomography (OPG) or cone beam computed tomography (CBCT) are preferred because periapical X-rays could provoke hypersalivation, coughing or vomiting. High-speed saliva ejectors or surgical ejectors may be used for considerable reduction of droplet spread during dental procedures.^[12]

When handpieces or ultrasonic devices must be used, the use of a rubber dam is indicated as this significantly reduces the amount of aerosol containing saliva and/or blood, providing a 70% reduction of droplets around the surgical field. Handpieces without an anti-retraction system should be avoided during the COVID-19 pandemic to avoid cross infection as they effectively reduce the return of bacteria and viruses into the tubing system.^[13]

Minimal Intervention Dentistry (MID) may be utilized to prevent or reduce aerosol and splatter generation. These techniques involve sealants, resin infiltration, silver diamine fluoride (SDF) application, the Hall Technique, Atraumatic Restorative Technique (ART), and chemo-mechanical caries removal. They are indicated in asymptomatic dentine carious lesions and in teeth with no clinical or radiographic signs of irreversible pulpitis, dental infection, pulp exposure, or pathology.^[14]

The use of personal protective equipment, including masks, gloves, gowns, and goggles or face shields are recommended to protect skin and mucosa from (potentially) infected blood or secretions during routine dental practice. The WHO recommended in its interim guideline on COVID-19 the use of NIOSH-certified N95, European Union (EU) FFP2, or equivalent masks, when aerosol-generating procedures are performed.

The WHO guideline 2009 on natural ventilation for infection control in healthcare settings recommended an hourly average ventilation rate of 160 l/s/patient for airborne precaution rooms. Ultraviolet germicidal irradiation (UVGI) for disinfection of air for 30mins is commonly used to control airborne virus transmission.^[15]

Use of disposable (single-use devices) which includes mouth mirror, syringes and blood pressure cuff to prevent cross contamination. Critical or semi-critical dental instruments and materials can be sterilized with high pressure steam (autoclave), chemical steam (formaldehyde), and dry heat (for example, 320°F for 2 hours. Protective barrier covers (eg, clear plastic wrap) can be used for the clinical contact surfaces, particularly those that are difficult to clean. Protected surfaces should be disinfected at the end of each day or if contamination is evident and not protected by barriers, these surfaces should be disinfected between patients. Most clean surfaces should be cleaned only with water and detergent. For superficial and non-critical disinfection of patient care equipment, a 1: 100 dilution of chlorine and water is currently being used. Another alternative for the dental chair is to use a soft cloth dampened in disinfectant that contains 2000 mg/L chlorine or 75% ethanol.

The clinical waste must be stored in a safe temporary storage area, and all reusable instruments and items should be pre-treated, cleaned, sterilized and properly stored in accordance with the local protocols. The clinical waste

generated after treatment of COVID-19 positive patients must be regarded as infectious clinical waste and stored in clinical waste bags within a designated area. The surface of the package bags should be marked and disposed according to the local regulations and requirement for the management of medical waste.

Conclusion

In conclusions, considering the unique work environment of dentists, which involves close patient contact and aerosol production, the risk of Covid-19 transmission from an infected patient is high. As the number of Covid-19 cases may increase in future, pediatric dentists should be well informed and educated about not only the signs and symptoms of the condition but also how to follow stringent infection control measures in these cases.

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