



Dentistry Amid COVID-19 Pandemic: Embracing the 'New normal'

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Abstract

The current novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS CoV 2), better known as COVID 19, has gripped the entire international community and caused widespread public health concern. It is zoonotic, with Chinese horseshoe bats being the origin with pangolins as a probable intermediate host. The first reported patient was probably in a wet market in Wuhan, Hubei province, China. Following this single animal to human transmission, the COVID 19 has been spread by human to human contact. It is a novel virus which is distinct from SARS-CoV and MERS-CoV, primarily transmitted through droplet spread or contact routes. Due to the inherent characteristics of dental settings and aerosol involvement, dentists, auxiliaries, and patients undergoing dental procedures are at high risk of cross-infection. Most dental procedures require close contact with the patient's oral cavity, saliva, blood, and respiratory tract secretions. 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.

The aim of the present article is to provide a brief overview of the structure, epidemiology, and clinical manifestations of the novel coronavirus. In addition, specific recommendations for the dental practice are suggested for patient screening, infection control strategies, emergency dental care, and patient management protocol to control the spread of the disease and ensure the safety of the dental health care professionals, their team as well as the patients during the current ongoing pandemic.

Keywords: Covid 19, dental care, pandemic, personal protective equipment (PPE), SARS-CoV

Introduction

The present outbreak of COVID-19 (Coronavirus disease 2019) is a global concern constituting public health emergency. First, it was reported in the wet markets of Wuhan, China, in December 2019, which has then

spread globally.[1] Human coronaviruses were discovered in the late 1960s.[2] There are about six species of human coronaviruses identified so far in which one species is subdivided into two different strains making seven strains of coronaviruses. Out of these seven strains, three strains are meant to produce potentially



severe symptoms in humans, and they are severe acute respiratory syndrome coronavirus (SARS-CoV) reported in 2003, the Middle East respiratory syndrome-related coronavirus (MERS-CoV) in 2012, and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in 2019.[2]

COVID-19 has seen a violent and fast-spreading virus around the world, which led to the declaration of a pandemic outbreak of coronavirus by WHO in March 2020. As the exact nature of the disease is still not known clearly, it is believed to spread through direct/indirect human to human transmission or through body fluids, including saliva.[3]

COVID-19

Coronaviruses are a group of RNA viruses that cause diseases in mammals and birds. In humans, these viruses cause respiratory tract infections that can range from the common cold to SARS, MERS, COVID-19. They are enveloped viruses with positive-sense single-stranded RNA genome with helical symmetry in nucleocapsid.[4] The genome size of these viruses ranges from 26 to 32 kilobases, and they have club-shaped spikes on their surfaces, which give the impression of the solar corona from which their name derives.[5]

Since December 2019, various unexplained cases of pneumonia-like symptoms were reported in China. This SARS-CoV-2 is called as COVID-19 (Coronavirus disease 2019) by WHO in February 2020.[6] The virus was suspected to begin its spread from the Huanan seafood wholesale market of Wuhan, China, with the possibility that an animal carrying the virus was brought and sold into the market. However, the most likely possibility is that virus originated from bats.[7]

Epidemiology

Globally, more than 14 million people are confirmed with cases of COVID-19 so far. As the first case was reported in Wuhan, a city in Hubei Province of China on 18 December 2019, till the end of 2019, all the continents were affected by this disease except Antarctica.[8]

In India, the first confirmed case was reported on 30 January 2020. India has the largest number of confirmed cases in Asia and the third largest in the world after the USA and Brazil, with more than one million cases reported till 18 July 2020.[9]

Clinical Manifestations

It has been seen that symptoms of SARS-CoV-2 are seen after an incubation period of approximately 5.2 days.[10] The period from onset of disease symptoms to

death ranges from 6 days to 42 days with a median of 14 days.[11] This period depends on the patient's age, past medical history and immune status. The most common symptoms seen in this disease are fever, cough, fatigue, while the patient can also present with cough, headache, diarrhea, lymphopenia and dyspnea.[11] According to a recent study by Paules et al[12], temperature detection is not sufficient to detect the COVID-19 disease as only 46% of cases could be detected through it. It has been seen that it generally affects males than females, and younger patients are experiencing less severe symptoms.[6]

COVID-19 Transmission Risks in Dental Practice

Due to the inherent characteristics of dental settings and aerosol involvement in the dental procedures, the risk of cross infection could be high between dental practitioners and patients. Indeed, dental professionals appear at high risk of contagion due to exposure to saliva, blood, and aerosol/droplet production during the majority of dental procedures.[13-16] SARS-CoV-2 transmission during dental procedures can happen through inhalation of aerosol/droplets from an infected individual or direct contact with mucous membranes, oral fluids, and contaminated instruments and surfaces as well as through indirect contact.[17-19] Given the exposure risk for various working categories, dental practitioners, face the most significant coronavirus risk. This poses a great challenge for dental clinicians to continue their practices in these hard times. This would lead to various changes in dentistry that would mark a permanent change in dental practice.

Due to distinctive characteristics of dental procedures where a large number of droplets and bioaerosols are generated,[20] standard protective measures in our day-to-day clinical work are not successful enough to prevent the spread of COVID-19, especially when a patient is in the incubation period, or is unaware that he is infected or choose to conceal his/her infection.

Like all other professions, COVID has described a 'new normal' for dental professionals as well. Dental health care workers are therefore required to update their knowledge and skills regarding new patient management approaches and infection control measures in their dental practice and follow the protocols recommended by relevant authorities in order to prevent or reduce the risk of transmission of infection.

The present article discusses certain specific measures and approaches for patients' dental management in this epidemic era of COVID-19.

Evaluation of Patients

1. Telescreening and triaging:

Initial screening should be done via telephone to identify patients with suspected or possible COVID infection before scheduling his appointment. Three most pertinent questions for screening are exposure to any suspected or confirmed COVID-19 patient, recent travel history, or any symptoms of febrile respiratory illness. A positive response to any of the three questions should raise concern. Elective dental treatment for such patients should be deferred and they should be encouraged to self-quarantine for 14 days.[21] Moreover, the dentist should instruct them to be in contact with their primary care physician to rule out the possibility of COVID infection.

If the patient has arrived in the dental clinic, he/she should complete a detailed medical history form, along with a COVID-19 screening questionnaire and assessment of a true dental emergency questionnaire. Also, pre-check triage areas should be established in the dental clinics to measure every staff and patient's temperature as a routine procedure.[15,22] The dentists should perform careful assessment and evaluation of the filled questionnaires to identify COVID-19 suspected patients or patients with any signs/symptoms, and routine dental treatment should be deferred or postponed for them until appropriate.

2. Waiting area:

Appointments should be scheduled in such a way that social distancing can be maintained in the waiting room. The Indian Dental Association recommends posting visual alert icons such as signs and posters at the entrance and in judicious places to provide patients with instructions (in appropriate languages) for hand hygiene, respiratory hygiene, and cough etiquette. As per CDC guidelines, suspected COVID-19 patients should be seated in a separated, well-ventilated room with more than 6 feet distance from an uninfected patient.[20,23] Each patient is advised to wear mask and follow proper respiratory guidelines like covering the nose and mouth during sneezing, coughing, and properly disposing off the tissue paper.[23]

3. Dental operatories:

To minimize the spread of infection, dental operatories should be well ventilated, and sufficient wait time should be given after disinfection before calling the next patient.[24] Personnel present on the front desk, dental auxiliaries all are recommended to wear N95 masks or similar respirators. Heating, ventilation, and air-conditioning

systems generally have HEPA (High-Efficiency Particulate Air), which improves ventilation and remove aerosols from the dental office.[25] OSHA (Occupational Safety and Health Administration) advises that if possible, one of the closed-door should be equipped with negative pressure ventilation or air purifier to prevent cross-contamination by removing aerosols.[26]

4. Specific dental care recommendations:

Based on the patients' dental/oral signs and symptoms, a decision is to be made to determine whether the patient is in a need to be seen in the dental clinic. The American Dental Association (ADA) has provided recommendations that help to decide what constitutes a dental emergency.[27] This information along with the professional judgment of dental clinician helps in determining a patient's need for urgent or emergency care.

During Treatment

1. Personal Protective Equipment (PPE):

The dentists should follow a standard, contact, and airborne precautions, including the appropriate and judicious use of personal protective equipment and hand hygiene practices.[28] The use of a highest level of PPE including gloves, gown, head cover, shoe cover, eye protection including goggles or a disposable/reusable face shield that covers the front and sides of the face, and a N954 or higher level respirator has been recommended during dental procedures. The Centers for Disease Control and Prevention (CDC) has provided guidelines for putting on and removing personal protective equipment.[29] [Figs. 1, 2]

2. Hand hygiene:

Hand hygiene is one of the most critical measures to reduce the risk of COVID-19 transmission as soap and detergent cut the virus's fatty layer and is very effective.[30] Even SARS-COV-2 can persist on the surface for hours to days, depending on the type of surface, temperature, humidity in the environment.[31] This supports the need for good hand hygiene as well as thorough disinfection of the surfaces in the dental clinic for preventing skin and mucosa from getting infected.

3. Pre-procedural mouth rinse:

Pre-operative antimicrobial oral mouth rinses are recommended to reduce the microbial load in the oral cavity.[32] Oxidative agent containing mouth rinses with 1% hydrogen peroxide or 0.2% povidone-iodine is encouraged as it might reduce the load of corona virus in saliva.[23]



Figure 1. Sequence of donning/putting on personal protective equipment (PPE)



Figure 2. Sequence of doffing/taking off personal protective equipment (PPE)

4. Oral examination and procedure:

Various aerosol producing treatments should be delayed, and the use of such aerosol producing instruments like air rotors, three-way syringes should be minimized.[33] Use of hand instruments along with chemo-mechanical plaque removal should be prioritized. Extraoral X-rays like panoramic radiographs

and CBCT should be advised over intraoral X-rays as they tend to stimulate salivary secretion and coughing.[34]

Based on relevant guidelines and research, dentists should take various protection measures and avoid or minimize operations that can produce aerosols. The four-handed technique is beneficial for controlling

infection, and the use of saliva ejectors with low or high volume can reduce aerosols production.[35]

5. Treatment of emergency cases:

A dental emergency can occur in a short duration, and sometimes emergency treatment is required. Rubber dams, anti-retraction handpieces, and high volume ejectors capable of removing up to 100 cubic feet of air per minute to remove droplets in the oral cavity should be used to minimize aerosols spatter in dental settings.[36] Face shields and goggles are essential for high or low-speed drilling with water spray.[37] During an outbreak, if we have to treat the patient in an emergency, rubber dam isolation must be used as it creates a barrier in the oral cavity and effectively reduces the generation of saliva or blood by 70%.[38] Following rubber dam, high volume suction should be used to decrease aerosol chances further and spatter from spreading.[36] For emergency treatment, anti-retraction handpieces designed with anti-retractive valves are effective in preventing droplets and aerosols dispersion.[37] If an aerosol-generating procedure is being done, then operatory disinfection should be done either by High Efficiency Particulate Air (HEPA) 20-minute air filtration, UV Germicidal Irradiation, and Ventilation for 15 minutes, disinfectant and defogging for 45 minutes by hydrogen peroxide vapors or natural air ventilation for 60 minutes.[39]

Post Treatment

1. Rotate and reuse strategy:

Since coronaviruses lose their viability after 72 hours, rotate and reuse strategy has been promoted by many organizations which involves acquiring a set number of N95 masks (at least 5 according to CDC) and rotating their use each day after allowing them to dry long enough so that the viruses are no longer viable.[40] However, respirators soiled with blood/nasal/respiratory secretions/body fluids from patients should be discarded.[41]

2. Post operative disinfection of dental clinics:

1% sodium hypochlorite for mopping the floors and 0.01% sodium hypochlorite for disinfecting water lines can help reduce the risk of cross-infection.[42]

3. Management of medical waste:

Reused tools and equipment should be properly pre-treated, cleaned, and sterilized and stored for further use. Wastes like personal protective equipment (PPE) and disposable instruments should be disposed off in double-layered yellow package bags.

4. Tele health approach for post operative assessment:

Teledentistry can be used to assess and record the post-operative oral health status and attend the treatment needs of the patients thereby improving the delivery of overall oral health care without confrontation.[43]

Dental Education

In the current pandemic times, we are facing education-related challenges also for dental colleges. For this, online lectures, case studies, and problem-based learning tutorials should be adopted to avoid unnecessary gathering of people and to avoid potential risk.[41] Self-learning should be motivated for the students. In the current scenario, it is easy for students to engage in fear for this pandemic, so psychological services should be provided to students who need them.[44,45] Students should be educated about viral features, epidemiology, clinical spectrum and treatment. Schools of dental medicine should be encouraged to adopt various strategies to prevent and control infection.

Conclusion

Post-COVID era is going to be challenging for dental professionals as they are at a potentially greater risk of acquiring the infection than any other health care worker owing to the routes of transmission of the virus.

Dentists should be fully aware of the spreading modalities, be able to identify patients with infections, and provide self-protection against 2019-novel CoV. They should treat every patient as a potential carrier for the disease and should take high infection control measures to control the spread of the disease and ensure safety of themselves, their team as well as the patients.

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