

# Coronavirus (COVID-19): A Dental Surgeon's Approach

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## Abstract

In the past many years, different viruses have created an atmosphere of menace, all over the world. In 2003, severe acute respiratory syndrome epidemic, 2009 H1N1 influenza pandemic, 2014 Middle East respiratory syndrome epidemic, and recently to join the list is the deadly novel coronavirus, COVID-19. It is a global health emergency with implications for all the sections of the society, including health-care professionals. In the current scenario of panic, the health-care professionals, including dental surgeons have to play a pivotal role in the prevention of the future spread of COVID-19. Dental practice being a major route of aerosols, dentists definitely will have to contribute handsomely toward this end. This article attempts to draw the attention of dental surgeons toward the etiology, transmission, and prevention of COVID-19 infection, with special emphasis on infection control measures as they relate to COVID-19 infection.

**Keywords:** COVID-19, dental surgeon, dentistry, prevention

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## INTRODUCTION

In December 2019, a cluster of patients with pneumonia of unknown cause was linked to a seafood wholesale market in Wuhan, China, and has spread exponentially to other parts of the world. A formerly unspecified beta coronavirus (CoV) was discovered through the use of unbiased sequencing in samples from patients with pneumonia.<sup>[1]</sup> Human airway epithelial cells were accustomed to obscure a very unique CoV, named 2019-nCoV, which formed another clade within the subgenus sarbecovirus, Orthocoronavirinae subfamily. Distinct from both Middle East respiratory syndrome (MERS)-CoV and severe acute respiratory syndrome (SARS)-CoV, 2019-nCoV is that the seventh member of the family of CoVs that is transmitted to humans.<sup>[1]</sup> CoVs, enveloped positive-sense RNA viruses, are characterized by club-like spikes that project from their surface, an unusually large RNA genome, and a singular replication strategy. CoVs cause a miscellany of diseases in mammals and birds which vary from enteritis in cows and pigs and upper respiratory disease in chickens to potentially fatal human respiratory infections.<sup>[2]</sup> Given the widespread transmission of SARS-CoV-2 and reports of its spread to health-care providers, dental professionals are at high risk for nosocomial infection and may become potential carriers of the disease.<sup>[3]</sup> These risks are often attributed to the unique nature of dental interventions,

which include aerosol generation, handling of sharps, and proximity of the provider to the patient's oropharyngeal region. Moreover, if adequate precautions are not taken, the dental clinics and hospitals can potentially expose patients to cross contamination. As the understanding of this novel disease is developing, tooth doctors should be better prepared to spot a possible COVID-19 infection and refer patients with suspected, confirmed, or a history of COVID-19 infection to appropriate treatment centers.<sup>[4]</sup>

## CREDIBLE ROUTE OF TRANSMISSION OF COVID-19

The coronavirus is believed to spread mainly from human to human. The persons who are in close proximity with each other, it is advisable to take care of a minimum of a distance of 6 feet. It can be transmitted through respiratory droplets produced when an infected person coughs, sneezes, or talks.<sup>[5]</sup> The droplets can come down within the mouth or nose of individuals who are nearby or possibly be inhaled into the lungs. Various new studies have suggested that COVID-19

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could also be spread by people that do not seem to be showing symptoms. It may be possible that an individual can get infected by touching a surface or object that has the virus on that and then touching their own mouth, nose, or possibly their eyes.<sup>[5]</sup> Although patients with symptomatic COVID-19 are the main source of transmission, recent observations suggest that asymptomatic patients and patients in their period are carriers of SARS-CoV-2.<sup>[6]</sup> Hence, there is a possible risk for transmission of COVID-19 through aerosol, fomites, or the fecal-oral route which will contribute to nosocomial spread within the dental clinics and hospitals.<sup>[7]</sup>

## CREDIBLE ROUTE OF TRANSMISSION OF COVID-19 IN DENTAL SETTING

Since COVID-19 can be passed directly from person to person by respiratory droplets, emerging evidence suggests that it may also be transmitted through contact and fomites.<sup>[5]</sup> To *et al.*<sup>[8]</sup> in their study concluded that live viruses were present in the saliva of infected individuals. The positive viral culture indicated that saliva contains live viruses which can allow transmission.<sup>[8]</sup> Dental patients and professionals can be exposed to pathogenic microorganisms, including viruses and bacteria that infect the oral cavity and respiratory tract. Dental care settings invariably carry the risk of COVID-19 infection due to the specificity of its procedures, which involves face-to-face communication with patients, and frequent exposure to saliva, blood, and other body fluids, and the handling of sharp instruments. The pathogenic microorganisms can be transmitted in dental settings through inhalation of airborne microorganisms that can remain suspended in the air for longer periods. Direct contact with blood, oral fluids, or other patient materials, contact of conjunctival, nasal, or oral mucosa with droplets, and aerosols containing microorganisms generated from an infected individual are propelled at a shorter distance by coughing and talking without a mask and indirect contact with contaminated instruments or environmental surfaces. Infections could be present through any of these conditions involved in an infected individual in dental clinics and hospitals, especially during the outbreak of 2019-CoV.<sup>[7]</sup>

## AIRBORNE SPREAD

By reviewing the airborne spread of infectious agents, Weber and Stilianakis found that contact, large droplets, and tiny droplets (aerosols) transmission are all potentially important modes of transmission for the influenza virus.<sup>[9,10]</sup> Hence, as in dental settings, aerosol production is obvious, the dentists must avoid the generation of the aerosol. In addition to the infected patient's cough and breathing, dental devices such as high-speed dental handpiece uses high-speed gas to drive the turbine to rotate at high speed and work with running water. The dental devices work in the patient's mouth, an oversized amount of aerosol and droplets get mixed with the patient's saliva or perhaps blood. Particles of droplets and aerosols are sufficiently little to remain airborne for an extended period

before they settle on environmental surfaces or can enter the respiratory tract. Thus, the 2019-nCoV has the potential to spread through droplets and aerosols from infected individuals in dental clinics and hospitals [Figure 1].<sup>[7]</sup>

## CONTACT AND CONTAMINATED SURFACES SPREAD

COVID-19 virus can remain infectious on inanimate surfaces from 2 h for up to 9 days. At a temperature of 30°C or more, the duration of persistence is shorter. Contamination of frequent touch surfaces in health-care settings is therefore a possible source of viral transmission.<sup>[11]</sup> The management practice of the operating area should be quite almost like to the one practiced for other patients affected by infectious and highly contagious diseases. As often as possible, the staff should work on an adequate distance from patients; furthermore, handpieces must be equipped with antireflux devices to avoid contaminations, improving the chance of cross infections.<sup>[12]</sup> Finally, during the operating sessions, the dentist should prefer procedures reducing the amount of aerosol produced within the environment.

## DIAGNOSIS AND TREATMENT

The diagnosis of COVID-19 may be supported a mixture of epidemiologic information (e.g., a history of travel or residence in the affected region 14 days before symptom onset), clinical symptoms, computed tomography (CT) imaging findings, and laboratory tests (e.g., reverse transcriptase polymerase chain reaction tests on respiratory tract specimens) consistent with standards of either the WHO (2020a) or the National Health Commission of China (2020a).<sup>[13]</sup>

The diagnosis of COVID-19 can theoretically be performed using salivary diagnosis platforms. Some virus strains are detected in saliva as long as 29 days after infection indicating that a noninvasive platform to rapidly differentiate the biomarkers using saliva could enhance disease detection.<sup>[14]</sup> Currently, the approach to COVID-19 is to regulate the source of infection; use infection prevention and control measures to lower the chance of transmission; and provide early diagnosis, isolation, and supportive take care of affected patients.<sup>[15]</sup> A series of clinical trials are being administered to analyze interventions that are potentially more effective (e.g., lopinavir, remdesivir;



**Figure 1:** Transmission routes of 2019-nCoV and controls in dental practice. Peng *et al.*

Del rio and Malani 2020).<sup>[16]</sup> Based on the experience gained from the previous outbreak of SARS-CoV and its associated disease (COVID-19), Ather *et al.* promoted specific measures for dental management of COVID-19 patients [Figure 2].<sup>[4]</sup> Further studies are needed to analyze the potential diagnostic of COVID-19 in saliva and its impact on the transmission of this virus, which is crucial to enhance effective strategies for prevention, especially for dentists and health-care professionals that perform aerosol-generating procedures.

## INFECTION CONTROL

On patient arrival in dental practice, patients should complete a close case history. Dental professionals should measure the patient's body temperature employing a noncontact forehead thermometer or with cameras having infrared thermal sensors. As per the Centers for Disease Control and Prevention guidelines, individuals with suspected COVID-19 infection should be seated in a very separate, well-ventilated room a minimum of 6 feet from unaffected patients seeking care.<sup>[17]</sup> Patients should be requested to wear a surgical mask and follow proper respiratory hygiene, such as covering the mouth and nose with a tissue before coughing and sneezing and so discarding the tissue.<sup>[17]</sup> After informing the patients to self-quarantine themselves, dentists should instruct the patients to contact their physician to rule out the chance of COVID-19.<sup>[4]</sup> Normally, a patient with COVID-19 who is within the acute febrile phase of the disease is not recommended to go to the dental clinic. If this does occur, the dental professional should be ready to identify the patient with suspected 2019-nCoV infection and may not treat the patient within the dental clinic, but immediately quarantine the patient and report back to the infection control department as soon as possible; dentists should follow the standard, contact, and airborne precautions including the acceptable use of personal protective equipment and hand hygiene practices.<sup>[17]</sup> Preprocedural mouth rinse

is suggested; formerly studies have shown that SARS-CoV and MERS-CoV were highly vulnerable to povidone mouth rinse.<sup>[18]</sup> Hence, preprocedural mouth rinse with 0.2% povidone-iodine might reduce the load of coronaviruses in saliva.<sup>[7]</sup> The use of disposable (single-use) devices such as mouth mirror, syringes, and blood pressure cuff to stop cross contamination is inspired.<sup>[4]</sup> Radiographs: extraoral imaging such as panoramic radiography or cone-beam CT imaging should be accustomed to avoid gag or cough reflex that will occur with intraoral imaging. When intraoral imaging is mandated, sensors should be double barriered to stop perforation and cross contamination.<sup>[19]</sup> Dentists should minimize the utilization of ultrasonic instruments, high-speed handpieces, and three-way syringes to cut back the chance of generating contaminated aerosols.<sup>[4]</sup> The utilization of rubber dams can significantly minimize the production of saliva- and blood-contaminated aerosol or spatter, particularly in cases when high-speed handpieces and dental ultrasonic devices are used. It has been reported that the employment of a rubber dam could significantly reduce airborne particles in ~ 3-foot diameter of the operational field by 70%.<sup>[20]</sup>

Teledentistry will be of great assistance within the current pandemic situation. Newer technologies have not only enhanced the standard of management of dental patients but also made possible their partial or complete management at distances of miles far from health-care centers or dental clinics. The entire process of networking, sharing digital information, distant consultations, workup, and analysis is controlled by a segment of the science of telemedicine concerned with dentistry called "Teledentistry."<sup>[21]</sup> A dentist usually uses one appointment to take a case history, another appointment for dental treatment and yet another appointment to observe the evolution of symptoms.<sup>[22]</sup> Thus, rather than visiting the dentist 3 times for treatment, with the help and use of digital applications, just one visit would be made for the dental procedure.

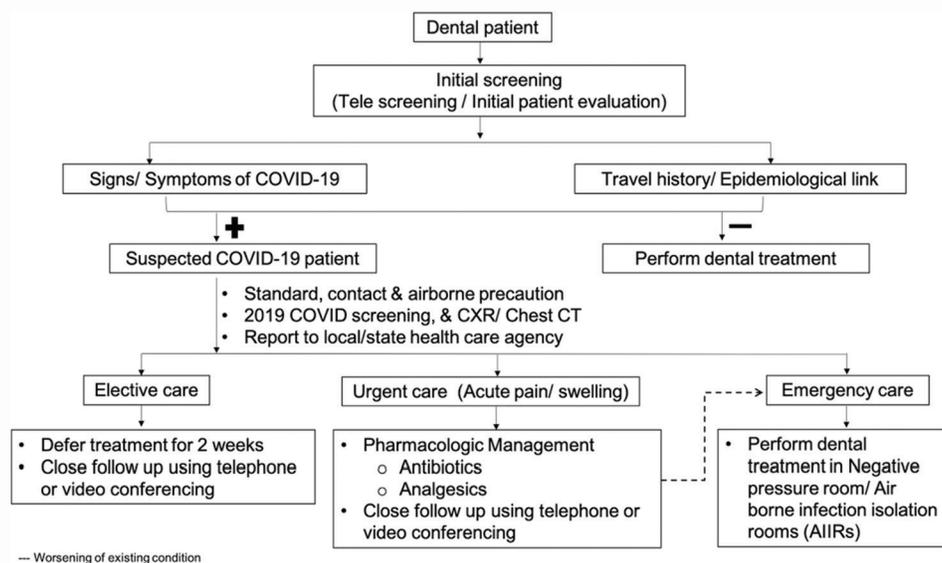


Figure 2: An overview of patient screening for COVID-19 and dental management. Ather A *et al.*

## RECOMMENDATIONS FOR DENTAL EDUCATION

Education-related challenges for medical and dental schools, moreover as their affiliated hospitals, are significant. It had been reported that open communication among students, clinical teachers, and administrative staff would enhance mutual trust and facilitate adequate cooperation.<sup>[23]</sup> With the increased knowledge of viral features, epidemiologic characteristics, clinical spectrum, and treatment, efficient strategies must be employed to stop and control the spread of COVID-19. The Indian Dental Association recommends posting visual alert icons such as signs and posters at the doorway and in strategic places to issue patients with instructions (in appropriate languages) about hand hygiene, respiratory hygiene, and cough etiquette. Instructions should include a way to use tissues to shield the nose and mouth when coughing or sneezing and to eliminate tissues and contaminated items in waste receptacles and how and when to perform hand hygiene.<sup>[24]</sup> The infection prevention and control strategies that should be adopted are determined by the disease control centers for infection prevention and control in keeping with the local epidemic situation.<sup>[13]</sup>

## CONCLUSION

The current scenario points to the safety of the patient, health-care workers, hygienists, attendants, and the dental surgeons. 2019-nCoV can be passed directly from person to person by respiratory droplets, and it may also be transmitted through contact and fomites. Dental health-care facilities invariably carry the risk of COVID-19 infection due to the specific nature of procedures that are performed in dental operatories. This time has given us an impediment to our regular/normal dental practice. In the light of the WHO declaring the COVID-19 infection as a pandemic, it is highly recommended that dental surgeons possess sound knowledge of etiology, mode of transmission, and all the methods of prevention of this viral infection. Since, as of now, we do not have complete knowledge of etiopathogenesis and management aspects of COVID-19 infection, it will always be prudent for the dental surgeon to stay updated regarding these aspects from the time to time advisories issued by health authorities and from authentic sources of scientific literature.

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## Conflicts of interest

There are no conflicts of interest.

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