

# Coronavirus Disease 2019 - Emerging and Future Challenges for Oral Health Care Professionals

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## ABSTRACT

The coronavirus disease 2019 (COVID-19) which originated as an epidemic in the province of Wuhan, China, has become a major public health challenge and the World Health Organization has announced the outbreaks of the COVID-19 as a public health emergency of international concern. The dental health care professional's role in the prevention of transmission of the coronavirus among the public is critical while carrying out major dental emergencies and procedures with proper personal protective measures. Due to the characteristics of dental settings, the risk of coronavirus crossinfection may be high and hence the dental professionals play a prime role in aiding the medical community by the organization of emergency dental and clinical support.

**KEYWORDS:** *Coronavirus, coronavirus disease 2019, dental professional, personal protection*

## INTRODUCTION

The name "coronavirus," coined in 1968, is derived from the "corona"-like or crown-like morphology observed for these viruses in the electron microscope.<sup>[1]</sup> The epidemic of the coronavirus disease 2019 (COVID-19) originated in Wuhan, China, and the World Health Organization announced that the outbreaks of the novel coronavirus have constituted a public health emergency of international concern.<sup>[2]</sup> The coronavirus (COVID-19) has occurred as a global pandemic and has revolutionized the health systems with various implications and complications. The role of dental professionals in preventing the transmission of COVID-19 is critically important. Hence, dental practices and dental hospitals are potentially affected, and hence effective infection protocols have to be ensured.

The coronavirus exhibits human-to-human spread through direct contact and respiratory droplets. The vertical transmission from fecaloral transmission and mother to newborns is under research. The main source of infection is symptomatic patients and asymptomatic patients at their incubation period are also considered to be carriers. The incubation period is estimated to be 5–6 days.<sup>[2]</sup> The common symptoms include fever,

dry cough, myalgia, nausea, diarrhea, and fatigue. The patients might show lymphopenia, thrombocytopenia, extended activated thromboplastin time, and increases c-reactive protein.<sup>[3]</sup> Serious complications include arrhythmia, shock, and acute respiratory distress syndrome. Oral manifestation includes altered gestation and olfaction. Irregular oral ulcers and inflammation of the papilla could be an inaugural symptom.<sup>[4]</sup>

The diagnosis of COVID-19 can be confirmed can be based on a combination of epidemiologic information, clinical symptoms, computed tomographic imaging findings, and laboratory tests by positive real-time polymerase chain reaction assay using respiratory or blood samples or by viral gene sequencing of respiratory or blood samples that are highly homologous with COVID-19. A nasopharyngeal swab or an oropharyngeal or nasal mid-turbinate swab or an anterior nares (nasal swab) specimen; or nasopharyngeal wash/aspirate or nasal wash/aspirate specimen are acceptable swabs for the specimen collection. Chest radiography or computed

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tomography can be made to interpret consolidation, pleural effusions, and white lung.<sup>[5]</sup>

The current measure is to prevent the source of infection and to lower the risk of transmission. The drugs used in the treatment regimen are hydroxychloroquine sulfate, azithromycin, amoxicillin, and paracetamol. A series of clinical research and trial is being carried out to investigate the interventional modalities such as lopinavir, remdesivir, interferons, and ribavirin.<sup>[2]</sup> The vaccine trial is still under research and hence a strong public health surveillance system coupled quarantine when necessary.

The Chamber of dental/Otolaryngology doctors/Ophthalmology doctors is profiled under moderate risk by the Ministry of Health and Family Welfare Directorate General of Health Services.<sup>[6]</sup> Due to the variant characteristics of the dental procedures which includes a large number of droplets and aerosols contamination, the standard protective measures for COVID-19 in the daily clinical work of a dental health care professional is not effective enough to prevent the spread of COVID-19, especially when patients are in the incubation period, are unaware they are infected or choose to conceal their infection.<sup>[2]</sup>

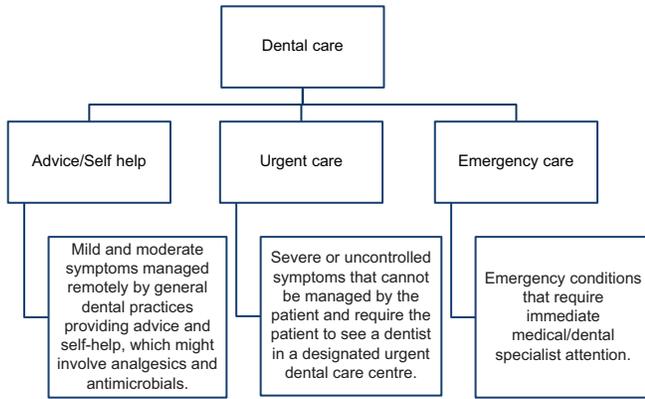
Precheck triages must be established to record the basic information, history of contact or travel, measure, and record the temperature. Assessment of patients should take account of patient and staff safety, the best interests of the patient, professional judgment, local urgent dental care center arrangements, and prioritization of the most urgent care needs.<sup>[7]</sup> The basic examination protocol must include a triple-layer medical mask, goggles, and latex examination gloves. Proper hand hygiene with alcohol-based hand rubs or using 60%–80% ethanol, 2% chlorhexidine gluconate can be used.<sup>[8]</sup> The face shield N-95 respirator mask, surgical gloves, and personal protective equipment (PPE) must be used for the aerosol-generating procedure. Use a dental handpiece with anti-retraction function, high volume saliva ejectors, four-handed technique, and a rubber dam when appropriate to decrease possible exposure to infectious agents and the handpiece must be sterilized. Proper donning, doffing, and disposal of the PPE must be present along with maintenance of respiratory hygiene.

Preoperative dental procedures must include the antimicrobial mouth rinse (1.5% hydrogen peroxide, 0.2% povidone, or 0.2% chlorhexidine before each appointment) could reduce the number of microbes in the oral cavity.<sup>[2,9]</sup> The mouth rinses used to reduce bacterial loads in dental setting aerosols procedures include chlorhexidine gluconate, cetylpyridinium chloride, povidone-iodine,

and essential oils and which are been recommended with the objective of reducing the viral load during the COVID-19. Hydrogen peroxide and povidone-iodine are oxidizing agents, SARS-CoV-2 is susceptible to oxidation and hence they are effective in reducing the viral load in saliva.<sup>[10]</sup> If rubber dam isolation is not possible in some cases, manual devices, such as Carisolv and hand scaler, are recommended for caries removal and periodontal scaling, to minimize the generation of aerosol as much as possible. Anti-retraction dental headpiece with specially designed anti-retractive valves or other antireflux designs is strongly recommended as an extra preventive measure for cross-infection.<sup>[11]</sup>

To help prevent airborne infections, adequate ventilation in healthcare facilities in all patient-care areas is necessary; (ii) For natural ventilation, the following minimum hourly averaged ventilation rates should be provided: (a) 160 l/s/patient (hourly average ventilation rate) for airborne precaution rooms (with a minimum of 80 l/s/patient for new health care facilities and major renovations); and (b) 2.5 l/s/m<sup>3</sup> for corridors and other transient spaces without a fixed number of patients and high-efficiency particulate air filter must be used.<sup>[12,13]</sup> Consider the use of upper-room ultraviolet germicidal irradiation as an adjunct to higher ventilation and air cleaning rates.<sup>[13]</sup> Open communication among dental students, clinicians, and professionals about the viral features, epidemiology, pathogenesis, and treatment strategies about COVID-19 would enhance mutual trust and facilitate adequate cooperation.<sup>[14,15]</sup> The dental health care must include the management of the acute problems and it can be classified into three as: [Figure 1]

Antibiotics can be prescribed for acute apical abscess and acute periodontal abscess/perio-endo lesions. Chlorhexidine mouthwash/gel or warm saltwater mouthwash can be used for acute pericoronitis and antibiotics if there are signs of systemic infection necrotising ulcerative gingivitis/periodontitis can be treated with chlorhexidine or hydrogen peroxide mouthwash and antibiotics. Dry socket can be treated with warm saltwater mouthwash and antibiotics, if there are signs of spreading infection, systemic infection, or an immunocompromised patient. Postextraction hemorrhage can be treated with mouth rinse once with warm water to wash out excess blood. Oral ulceration (ulceration <3 weeks) can be treated with chlorhexidine mouthwash, optimal analgesia, including topical analgesics (e.g., benzydamine oromucosal spray). Dentoalveolar injuries can be treated by cleaning the affected area by rinsing gently with mild antiseptic and if foreign objects are present in the mouth, remove them; refer immediately for emergency care.<sup>[7]</sup>



**Figure 1:** General principles of dental care during COVID-19. Scottish Dental Clinical Effectiveness Program (2020). NHS Education for Scotland. Management of Acute Dental Problems during COVID-19 Pandemic. Available from: <http://www.sdcep.org.uk/published-guidance/acute-dental-problems-covid-19/>

In radiology, the intraoral x-ray examination must be minimized to the COVID-19 positive patients according to the emergency needs as gag reflex occurs during the sensor/film placement and increase the aerosol contamination of the virus particle. PPE with disposable sleeves for the sensors of the radiovisuography can be used to minimize the contamination. Fumigations, sterilization, and disinfection must be done regularly according to the standard guidelines. Application of face masks, face shields, surgical cap, surgical glasses, long-sleeved water-resistant gown, and shoe cover as a personal protective measure is required for radiography [Figure 2].

Some of the coronavirus strains have been detected in saliva as long as 29 days after infection<sup>[16]</sup> and hence the salivary biomarkers could establish disease detection. Salivary swabs can be used to detect the sample as the salivary gland epithelial cells can be infected by a coronavirus, and hence saliva may aid in detection. Saliva can also play a pivotal role in human-to-human transmission, and salivary diagnostics may provide a convenient and cost-effective point-of-care platform for COVID-19 infection.<sup>[17]</sup> Hydroxychloroquine is currently used as the treatment for COVID-19 which is proved to inhibit the glandular cholinesterase activity and increase the salivary secretion.<sup>[18,19]</sup> Remdesivir, chloroquine, sarilumab, lopinavir, umifenovir, favipiravir, sirolimus oseltamivir, azithromycin, Vitamin C, methylprednisolone, tocilizumab, epoprostenol, nitric oxide, anakinra, and convalescent plasma are commonly used newer drugs.<sup>[19]</sup>

The production of SARS-CoV-specific secretory immunoglobulin A in the saliva has been seen in the animal models intranasally immunized.<sup>[20]</sup> SARS-CoV-2 has been detected in the saliva of confirmed patients with



**Figure 2:** List of personal protective equipments. Dental Council of India (2020). Covid-19 Guidelines for Dental Colleges, Dental Students and Dental Professionals by Dental Council of India. Available from: <http://dciindia.gov.in/Admin/NewsArchives/DCI%20Guidelines%20on%20COVID-19.pdf>

COVID-19, even up to the 11<sup>th</sup> day after hospitalization, in one of the cases.<sup>[21]</sup> The presence of the coronavirus in the salivary fluid can be from either salivary glands or gingival crevicular fluid or respiratory tract secretions.<sup>[15]</sup> The ACE2 epithelial cells of the salivary glands have been shown to be an initial target for the SARS-CoV.<sup>[22]</sup> Hence, saliva can be used as a sample for the diagnosis and modified Carlson Crittenden/Lashley cup for collection of the parotid ductal secretions as well as the submandibular and sublingual saliva collectors.<sup>[23]</sup> ACE2 is also found in epithelial cells of the tongue, buccal mucosa, and gingiva. Hence, gingival crevicular fluid may aid as a noninvasive diagnostic tool.<sup>[24]</sup> The presence of coronavirus in the saliva necessitates the dental treatment protocol to be accomplished with proper protective measures as the oropharyngeal secretions are the primary part of aerosol production in dental health care settings.

A study performed on a mannequin fitted with phantom jaws, revealed the highest levels of aerosol contaminants found within 60 cm from the patient's head, on their mask, mainly on the right arm of the dentist, and around their nose and eyes. The aerosol generated by the ultrasonic device can remain suspended in the air for 30 min.<sup>[25]</sup> Therefore, dental procedures can be considered as one of the most probable causes of Sars-CoV-2 infection because such procedures require close proximity to the patient's mouth, possess a risk of contact with saliva, blood, and other biological fluids and involve the use of instrumentation that creates large aerosols.<sup>[25,26]</sup> Treatment leads to significant risks for the practitioners and patients due to the intense production of aerosols during dental procedures and exposes the

dental workers to the risk of inhaling droplets. The aerosol procedures in the dental health care setting necessitated the use of N95 respirator or any other respirator that offers a higher level of protection like powered air-purifying respirators, disposable filtering facepiece respirators, or elastomeric respirators.<sup>[12]</sup>

The Indian Ministry of Health has been recently put forward telephonic screening to spot out the patient's suspected or possible COVID-19 infection during the time of scheduling appointments. Telephonic screening should include the three pertinent questions: any recent travel history to an area with a high incidence of COVID-19 or presence of any COVID 19 symptoms such as febrile respiratory illness.<sup>[12,27]</sup> Hence, this can be used as a preassessment part before treatment protocol in dental health care settings.

## CONCLUSION

The importance of infection control is, therefore, crucial in limiting the effects of virus diffusion as the transmission routes expose dental practitioners to a high risk of contagion. Treatments should follow the concept of reducing, as much as possible, droplets, aerosols, and contacts are then of utmost importance to highlight the critical contributory role of dentistry in this pandemic outburst in detecting patients with initial symptoms, clinically supporting the population even in these dire times, and working in a safe contagion-reduced environment.

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## Conflicts of interest

There are no conflicts of interest.

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