

## Review Article

# COVID-19: Implications on dental profession and precautionary guidelines

Rajashree Dhananjay Jadhav<sup>1</sup>, Arti Rajaram Gachake<sup>1</sup>, Vasanthi V. Swami<sup>1</sup>, Abhishek Dhananjay Jadhav<sup>2</sup>

<sup>1</sup>Department of Prosthodontic and Crown and Bridge, Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital,

<sup>2</sup>Bharati Vidyapeeth (Deemed to be university) Engineering college, Pune, Maharashtra, India

## ABSTRACT

The current global spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and its associated coronavirus disease (COVID-19), has grasped the attention of entire international community and has caused widespread public health concerns. All the efforts taken globally to curtail the novel COVID-19; the outbreak is still on a rise owing to the community spread pattern of this infection. COVID-19 is a zoonotic infection that, like other coronavirus infections, is believed to have been originated in bats and pangolins, and later transmitted to humans. Once in the human body, this coronavirus (SARS-CoV-2) is abundantly present in nasopharyngeal and salivary secretions of affected patients and its spread is predominantly thought to be respiratory droplet in nature. Dental professionals may soon encounter patients with suspected or confirmed SARS-CoV-2 infection and will have to act carefully not only to provide care but at the same time prevent spread of infection. Thus, the aim of this article is to provide a brief overview of the epidemiology, symptoms and routes of spread of the novel COVID-19 infection. In addition to this, specific recommendations for dental practice are prescribed for patient screening, infection control strategies, and patient management protocol.

**Key Words:** Coronavirus, coronavirus disease, dental professional, dentistry, infection control, pandemic, severe acute respiratory syndrome.

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### Address for correspondence:

Dr. Rajashree Dhananjay Jadhav,  
Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital,  
Katraj-Dhankwadi  
Educational Complex, Pune  
Satara Road, Pune - 411 043,  
Maharashtra, India.  
E-mail: rajashreedjadhav@gmail.com

## INTRODUCTION

The initial spread of coronavirus disease (COVID-19) in the city of Wuhan, China, in December 2019 has evolved majorly into a public health crisis and has spread exponentially to other parts of the world.<sup>[1]</sup> Coronaviruses are a family of viruses that can produce diseases such as the common cold, Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS). In 2019, a new coronavirus was identified as the cause of a disease outbreak that originated in China. The novel coronavirus belongs to a family of single-stranded

RNA viruses *Coronaviridae*. This virus is round, sometimes, pleiomorphic with 80–120 nm diameter. This family of viruses is zoonotic (transmitted from animals to humans). SARS-coronavirus (COV) was first identified in 2002 complying with the MERS-CoV which was first identified in 2012.<sup>[2]</sup> Evidence suggests that this novel coronavirus has similarity to coronavirus species found in bats and pangolins, this thus confirms the zoonotic nature of this new cross-species viral-propagated disease.<sup>[3]</sup>

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## SYMPTOMS

The general clinical symptoms of the patients afflicted from the novel viral pneumonia were fever, cough, and myalgia or fatigue with abnormal chest computed tomography, and some rare symptoms were sputum production, headache, hemoptysis, and diarrhea.<sup>[4]</sup> Eighty percent of these patients have only mild symptoms that resemble flu-like symptoms and seasonal allergies. This is what leads to an increased number of unidentified cases. The incubation period is between 2 and 10 days; therefore, transmission can take place prior to the occurrence of any symptoms.<sup>[5,6]</sup> Severe affliction is seen in patients having compromised immunity and other diseases such as diabetes and asthma. The higher risk-prone patient's manifest symptoms such as pneumonia or acute respiratory distress syndrome.<sup>[7]</sup> SARS-Cov-2 infections generally spread through respiratory droplets or by casual contact. Thus, coughing/sneezing by an infected person can render SARS-CoV-2 airborne, potentially infecting individuals in a 6ft radius. Another widespread route of transmission is if droplets of SARS-CoV-2 land on inanimate objects located nearby an infected person and are subsequently touched by other people. A recent report suggests that the virus remains alive for up to 9 days when it is on a hard surface like plastic/metal.<sup>[8]</sup> This calls for a diligent handling of dental instruments.

Thus, disinfection of objects and hand washing is essential for containing the spread of this disease. Statistically considering that people touch their face approximately 23 times per hour, with 44% of these incidents involving the mucous membranes of mouth and/or nose. Medical and dental auxiliaries should be familiar with how COVID-19 is spread, how to recognize patients with Covid-19 infection, and the protocols to be followed should regarding dental practice in the current epidemic, in order to prevent the transmission of COVID-19.<sup>[9]</sup>

## PROTOCOLS FOR EFFECTIVE INFECTION CONTROL

From the previous SARS-CoV experience and information available on SARS-CoV-2 and the present associated disease (COVID-19), certain measures are discussed below for dental patient management in the current pandemic.

### Video-screening and triaging

Initial screening through video-calling to identify patients with suspected or possible COVID-19 infection to be performed remotely at the appointment scheduling time. The two most important questions for initial screening should include (1) travel history to COVID-19 affected areas and (2) the presence of any febrile respiratory illness symptoms such as fever, cough and shortness of breath. To identify high risk areas, global tracking of reported cases can be done using the dashboard made accessible by the Centre for Systems Science and Engineering at the John Hopkins University. Patients should be encouraged to be in self-quarantine particularly if they have been to areas considered at high risk for infections.<sup>[10]</sup>

### Patient evaluation and risk assessment

Patients should fill-up a detailed medical history form, COVID-19 screening questionnaire. Patients, who have disease signs and symptoms, should have an elective dental care rescheduled for at least 24 days.

Center for Disease Control and Prevention guidelines suggest individuals with suspected COVID-19 infection should be seated in isolated and ventilated waiting area and maintain at least 3.9 m distance from the unaffected patients seeking care. Masks and tissues should be made mandatory.

### Pharmacologic assessment

In cases of suspected or confirmed COVID-19 infections, patients requiring critical dental care for ailments such as tooth pain and/or swelling, appropriate medicines must be provided.<sup>[10]</sup> This approach may present symptomatic aid and will provide dental professionals time to devise a plan to deliver dental care with all suitable measures in place to prevent the propagation of infection. The World Health Organization (WHO) has established that there is no evidence at this time of adverse events in COVID-19 patients taking nonsteroidal anti-inflammatory drugs (NSAIDs), or effects as a result of the use of NSAIDs on acute healthcare utilization, long-term survival, or quality of life in patients with COVID-19. The National Institute for Health and Care Excellence in the United Kingdom has updated its guidance to recommend paracetamol for the treatment of fever.

Note that on March 17, 2020, the British Medical Journal suggested not to use ibuprofen in treating COVID-19 infected patients, as ibuprofen may

interfere with immune function.<sup>[11]</sup> This proposal was endorsed by the WHO on March 18, 2020.

### Regular hand hygiene

Oral transmission has been stated for 2019-nCoV, which highlights the importance of hand disinfection for dental practice. Even though appropriate hand hygiene is a routine prerequisite for dental practice, hand-cleansing observance is relatively low, which imposes a great challenge to the infection control through the epidemic period of 2019-nCoV transmission. Emphasis on a strong hand hygiene is important.

The oral professionals should wash their hands prior-to patient examination, before dental procedures, postdental procedures, after touching the surroundings and equipment without disinfection, and after touching the oral mucosa, damaged skin or wound, blood. Caution should be taken by dental professionals and should therefore avoid touching their face.<sup>[10]</sup>

### Protective methods for dental professionals

Currently, there are no specific standards for the protection of dentists and dental auxiliaries from 2019-nCoV infection in the dental clinics and hospitals. Even though no dental professional has been reported to acquire 2019-nCoV virus to the date the paper was drafted, the previous experience with the SARS coronavirus has shown numbers of acquired infection of medical professionals in hospitals.<sup>[10]</sup>

Airborne droplet transmission of infection is considered as the main route of its propagation, mainly in dental clinics and hospitals, barrier-protection equipment, including protective eyewear, masks, gloves, caps, face shields, and protective outwear, is strongly endorsed for all healthcare givers in the clinic/hospital settings during this period.<sup>[12-15]</sup>

On the prospect of the spread of 2019-nCoV infection, three-level protective methods of the dental professionals are recommended for situations. Using disposable working cap, disposable surgical mask, using protective goggle or face shield, and disposable latex gloves or nitrile gloves if necessary. Wearing disposable doctor cap, disposable surgical mask, protective goggles, face shield, and working clothes (white coat) with disposable isolation clothing or surgical clothes outside, and disposable latex gloves. Although a patient with 2019-nCoV infection is not expected to be treated in the dental clinic, in the unlikely event that this does occur, and the dental professional cannot avoid close contact, special

protective outwear is needed. If protective outwear is not available, working clothes (white coat) with extra disposable protective clothing outside should be worn. In addition, disposable doctor cap, protective goggles, face shield, disposable surgical mask, latex gloves, and an impermeable shoe cover should be sported.<sup>[12]</sup>

### Rubber dam usage wherever required

The use of rubber dams can significantly minimize the secretion of saliva - and blood -contaminated aerosol or spatter, specifically in cases where high-speed handpieces and dental ultrasonic equipment are used.<sup>[10]</sup> Reportedly, the use of rubber dam could reduce airborne particles in a 3-foot diameter of the operational field by approximately 70%.<sup>[16]</sup> The procedures should be done in combination with suction.<sup>[17]</sup> The four-hand operation is an option.

Do not use the air rotors to avoid aerosol. Air rotors could be used only if the patient's COVID-19 test is negative. The use of air rotors will be considered in future once we are clear with COVID-19 clinical understanding. If we need to use air rotors for access cavity, use electrical/surgical air rotor handpiece without water. Use slow speed micromotor with diamond bur to open the access cavity. It may be a time-consuming procedure, but it is worth it. Avoid use of three-way syringe in any procedure. The use of high vacuum and low vacuum suction simultaneously is mandatory.

### Use of anti-retraction handpiece

High-speed dental handpiece without anti-retraction valves would extract and expel the debris and fluids during the dental procedure. The microbes, including bacteria and virus, will further contaminate the air and water tubes within the dental unit, and thus can cause cross-infection. Anti-retraction high-speed dental handpiece can decrease the backflow of oral bacteria and hepatitis B virus into the tubes of the handpiece and dental unit.<sup>[18]</sup> Therefore, the use of dental handpieces without anti-retraction function should be banned in the epidemic period of COVID-19. Anti-retraction dental handpiece with anti-retractive valves or other anti-reflux designs are strongly advocated preventive measures for cross-infection.

### Clinic setting disinfection

Medical and dental institutions are advised to take effective and strict disinfection measures in both clinic settings and waiting area. Clinic settings should be properly sanitized/disinfected in compliance with the Protocol for the Management of Surface Cleaning and

Disinfection of Medical Environment (WS/T 512-2016) endorsed by China's national health commission. Waiting areas and appliances should also be regularly cleaned and disinfected. The elevator should be disinfected consistently.

### Quest for less toxic cleaning and disinfecting, including green cleaners

Antimicrobial products used to destroy or suppress the growth of harmful microorganisms such as bacteria, viruses, or fungi, on inanimate objects and surfaces. These products contain different active ingredients and are marketed in several formulations such as sprays, liquids, concentrated powders, and gases.

Case reports on work-related asthma associated with exposure to cleaning agents and disinfectants.<sup>[19-22]</sup> Surveillance systems in many countries have observed an increased incidence of work-related asthma among both cleaners and health care persons,<sup>[23-26]</sup> and these reports were associated with exposure to cleaning chemicals. Studies have stated that chemicals used for cleaning associated with respiratory disorders<sup>[27-29]</sup> as well as skin disorders.

Although some green cleaning products shows fewer health hazards and they are mostly environment friendly but there are less quantitative assessments of green cleaning products. Green cleaning infection preventive products are the need of the day and safety of nonchemical alternatives for cleaning and disinfecting (steam cleaning, ultraviolet light, antimicrobial surfaces for bench tops and other surfaces). Medical and dental professionals should opt for gloves, goggles, face shields, aprons based on the type of cleaning products, technologies, and methods used. Thus, selection of personal protective equipment (PPE) for cleaning and disinfecting is challenging task for healthcare professionals. There is a need for comprehensive guidance for PPE for environmental services workers and other workers who are exposed to cleaning and disinfecting.<sup>[30]</sup>

### Medical and dental waste management

The reusable instrument and items should be pretreated, sterilized, and safely stored in accord with *the Protocol for the Disinfection and Sterilization of Dental Instrument (WS 506-2016)* as prescribed by the National Health Commission of the People's Republic of China. Double-layer yellow color medical waste package bags and "gooseneck" ligation must be used.

The package bags should be marked and disposed according to the prerequisite for the management of medical waste.

### Treatment recommendations

Patients with respiratory illness will most likely not present themselves to dental practices however the below protocols must be followed.<sup>[10]</sup>

Standard, contact, and airborne precautions including the appropriate use of PPE and hand hygiene practices must be followed.

SARS and MERS were highly prone to povidone mouth rinse. Hence, preprocedural mouth rinse with 0.2% povidone-iodine might deflate the load of corona viruses in saliva.

The use of single use devices such as mouth mirror, syringes and blood pressure cuff to avert cross-contamination.

Extraoral imaging such as panoramic radiograph or cone-beam computed tomography should be used to avoid the gag reflex or cough that may ensue with intraoral imaging.<sup>[31]</sup> When intraoral imaging is mandated, sensors should be double barrier to prevent perforation and cross-contamination. Dentists should use a rubber dam to reduce splatter generation. It may be advantageous to place the rubber dam so that it covers the nose.

The actual method should minimize generation of aerosol. For example, ultrasonic instruments may impose a greater risk of generating contaminated aerosols. In addition, dentists should reduce the use of high-speed handpieces and three-way syringes.

Special precautions should be taken for treating suspected/confirmed patients of the novel COVID-19. This group of patients should be treated in special isolated rooms such as negative pressure rooms or airborne infection isolation rooms (AIIRs). Thus, anticipatory knowledge of health-care centers with provision for AIIRs would help dentists to provide emergent dental care if the need occurs.

Human coronavirus can subsist on inanimate surfaces up to 9 days at room temperature, with a greater inclination for humid conditions. Thus, clinic staff should make sure to disinfect inanimate surfaces using chemicals recently approved for COVID-19 and keep a dry environment to curb the spread of SARS-CoV-2.

## COLLAPSE

The epidemic of SARS-CoV-2 worldwide raises the likelihood that dental health care professionals will have to treat this division of the patients. Precautions are crucial to reduce the spread of this virus and its related disease. The latest update (March 16, 2020) by the American Dental Association proposes dentists nationwide suspend elective dental treatment for at least 24 days and pay heed only to emergency care. Dentist faces a unique challenge as they may be called upon for the management of severe odontogenic pain, swelling and dental alveolar trauma in suspected or detected COVID-19 patients. There is a good chance that dental practices might treat some of patients with asymptomatic COVID-19 infections since the incubation period can range between 2 and 10 days and most patients only develop mild symptoms.<sup>[32]</sup>

There might be a greater number of COVID-19 carriers who may not display strong symptoms of the novel coronavirus but may spray the dental setting with the COVID-19 virus.

It is the solemn duty of health-care professionals to protect the public and maintain high standards of care and disease control. If it follows the same evolutionary pattern of the other coronavirus infections (i.e., SARS-CoV and MERS-CoV) then it may be considered that it is here to stay. Health-care professionals have the task of leading the battle against this novel virus. Through education of SARS-CoV-2 in medical and dental schools, as well as their affiliated hospitals, are significant. It was reported that open communication among students, clinicians, academicians, and administrative staff.<sup>[33,34]</sup> would enhance mutual trust and facilitate adequate cooperation against COVID-19 virus by taking necessary precautions and educating the general public about them. We must implement infection control measures to prevent the spread of SARS-CoV-2. If we have enough knowledge about this novel virus and its outbreaks, the better we can fight for mankind and can implement efficient strategies to prevent, control, and stop the transmission of COVID-19.

Infection control measures such as cleaning and disinfecting are necessary to prevent the virus from further spreading and to help control the epidemic situation. Due to the characteristics of dental office settings, the risk of cross infection can be high between patients and dental professionals.<sup>[34]</sup> For

dental offices and hospitals in areas that are affected with COVID-19 effective infection control protocols are instantly needed.

There is a need to understand the effectiveness of cleaning and disinfecting products and procedures to reduce the incidence of infectious diseases and contamination in health care workers and patients.<sup>[34]</sup> There is a necessity for guidance on the effectiveness and safety of newer chemical disinfectants like nano silver, thymol, citric acid, accelerated hydrogen peroxide and alternative disinfecting technologies.<sup>[35]</sup>

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## Conflicts of interest

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