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REVIEW ARTICLE

Coronavirus Disease 2019 (COVID-19): A future challenge for dental practice

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***ABSTRACT*:**
Different viruses have been posing threat to world from time to time and recently in this category a Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus and is causing havoc all over the world. It is a global health emergency with implications to all people who are constantly getting infected. As for all healthcare professionals including Dental Surgeons should help to prevent transmission of the deadly virus. It's a virus affecting both human and non human primates and human-to-human transmission is associated with direct contact with body fluids or tissues or from an infected subject or contaminated objects. This review article highlights the clinical features, aetiology, transmission COVID-19 and the various methods to control its spread and necessary preventive precautions in Dental setups and hospitals.
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INTRODUCTION:
Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Structurally virus is Spherical or pleomorphic enveloped particles containing single-stranded (positive-sense) RNA associated with a nucleoprotein within a capsid comprised of matrix protein. The envelope bears club-shaped glycoprotein projections. Coronaviruses are found in avian and mammalian species. They resemble each other in morphology and chemical structure: for example, the coronaviruses of humans and cattle are antigenically related. There is no evidence, however, that human coronaviruses can be transmitted by animals. In animals, various coronaviruses invade many different tissues and cause a variety of diseases, but in humans they are only proved to cause mild upper respiratory infections, i.e. common colds. Transmission is usually via airborne droplets to the nasal mucosa.

The recent study by Wang Q, et al supported a bat origin for MERS-CoV and showed that a bat coronavirus has a similar hCD26-biding mode to MERS-CoV. The hCD26 are the human binding site that initiates the processes of viral entry into human cells[1]. On January 8, 2020, a novel coronavirus was officially announced as the causative pathogen of COVID-19 by the Chinese Center for Disease Control and Prevention[2]. On January 30, 2020, the World Health Organization (WHO) announced that this outbreak had constituted a public health emergency of international concern[3]. Due to the characteristics of dental settings, the risk of cross infection may be high between dental practitioners and patients. For dental practices and hospitals in countries/regions that are (potentially) affected with COVID-19, strict and effective infection control protocols are urgently needed. This article, based on our experience and relevant guidelines and research, introduces the

essential knowledge about COVID-19 and nosocomial Infection in dental settings and provides recommended management protocols for dental practitioners and students in potentially affected areas.

Mode of Transmission:
Based on findings of genetic and epidemiologic research, it appears that the COVID-19 outbreak started with a single animal-to-human transmission, followed by sustained human-to-human spread[4, 5]. It is now believed that its interpersonal transmission occurs mainly via respiratory droplets and contact transmission (The Chinese Preventive Medicine Association 2020). In addition, there may be risk of fecal-oral transmission, as researchers have identified SARS-CoV-2 in the stool of patients from China and the United States.[6]

Incubation Period:
The incubation period of COVID-19 has been estimated at 5 to 6 days on average, but there is evidence that it could be as long as 14 days, which is now the commonly adopted duration for medical observation and quarantine of (potentially) exposed persons.[2,7]

Clinical Manifestations:
The majority of patients experienced fever and dry cough, while some also had shortness of breath, fatigue, and other atypical symptoms, such as muscle pain, confusion, headache, sore throat, diarrhea, and vomiting.[8,9] Among patients who underwent chest computed tomography (CT), most showed bilateral pneumonia, with ground-glass opacity and bilateral patchy shadows being the most common patterns.[9,10] Among hospitalized patients in Wuhan, around one-fourth to one-third developed serious complications, such as acute respiratory distress syndrome, arrhythmia, and shock, and were therefore transferred to the intensive care unit.[10-12] In general, older age and the existence of underlying comorbidities (e.g., diabetes, hypertension, and cardiovascular disease) were associated with poorer prognosis.[1,13,14]

Diagnosis and Treatment:
The diagnosis of COVID-19 can be based on a combination of epidemiologic information (e.g., a history of travel to or residence in affected region 14 d prior to symptom onset), clinical symptoms, CT imaging findings, and laboratory tests (e.g., reverse transcriptase polymerase chain reaction [RT-PCR] tests on respiratory tract specimens) according to standards of either the WHO (2020a) or the National Health Commission of China (2020a). It should be mentioned that a single negative RT-PCR test result from suspected patients does not exclude infection.
Clinically, we should be alert of patients with an epidemiologic history, COVID-19–related symptoms, and/or positive CT imaging results. So far, there has been no evidence from randomized controlled trials to recommend any specific anti-nCoV treatment, so the management of COVID-19 has been largely supportive (WHO 2020a). Currently, the approach to COVID-19 is to control the source of infection; use infection prevention and control measures to lower the risk of transmission; and provide early diagnosis, isolation, and supportive care for affected patients.

Infection Control in Dental Settings:

Risk of Nosocomial Infection in Dental Settings:
Dental patients who cough, sneeze, or receive dental treatment including the use of a high-speed handpiece or ultrasonic instruments make their secretions, saliva, or blood aerosolize to the surroundings. Dental apparatus could be contaminated with various pathogenic microorganisms after use or become exposed to a contaminated clinic environment. Thereafter, infections can occur through the puncture of sharp instruments or direct contact between mucous membranes and contaminated hands.[15] Due to the unique characteristics of dental procedures where a large number of droplets and aerosols could be generated, the standard protective measures in daily clinical work are 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.

Effective Infection Control Protocols:
Hand hygiene has been considered the most critical measure for reducing the risk of transmitting microorganism to patients.[16] SARS-CoV-2 can persist on surfaces for a few hours or up to several days, depending on the type of surface, the temperature, or the humidity of the environment (WHO 2020c). This reinforces the need for good hand hygiene and the importance of thorough disinfection of all surfaces within the dental clinic. The use of personal protective equipment, including masks, gloves, gowns, and goggles or faces shields, is recommended to protect skin and mucosa from (potentially) infected blood or secretion. As respiratory droplets are the main routes of SARS-CoV-2 transmission, particulate respirators (e.g., N-95 masks authenticated by the National Institute for Occupational Safety and Health or FFP2-standard masks set by the European Union) are recommended for routine dental practice.

Evaluation of Patients:
During the outbreak of COVID-19, dental clinics are recommended to establish pre-check triages to measure and record the temperature of every staff and patient as a routine procedure.

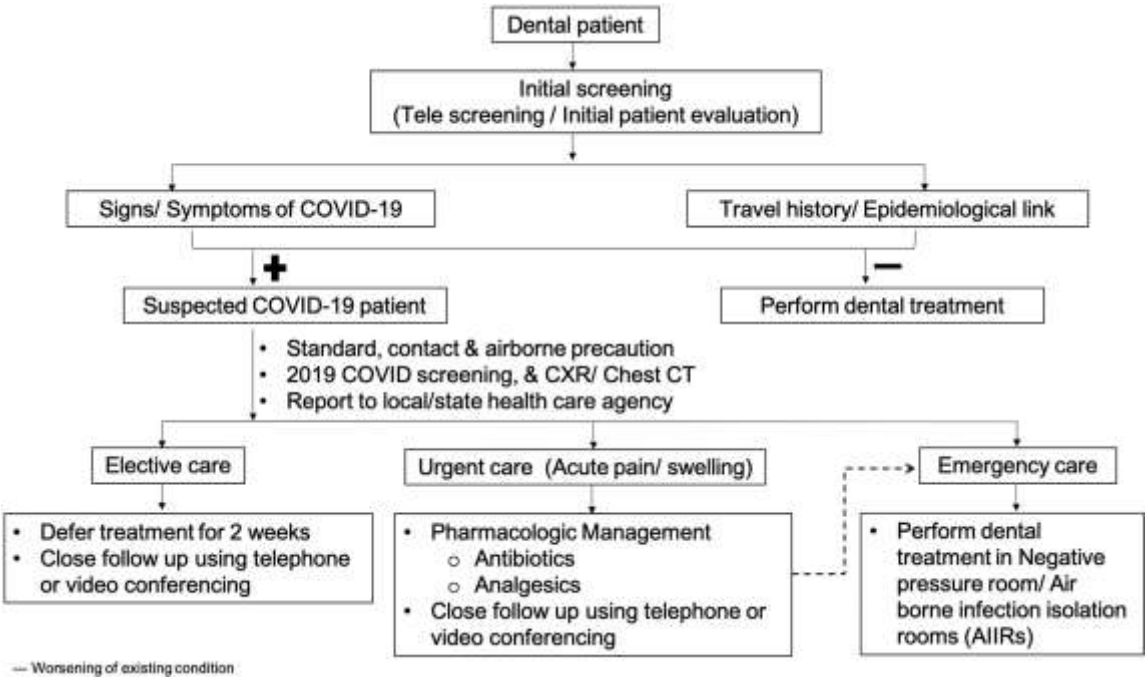

FIGURE 1: An overview of patient screening for COVID-19 and dental management.

Pre-check staff should ask patients questions about the health status and history of contact or travel (WHO 2020a). Patients and their accompanying persons are provided with medical masks and temperature measurement once they enter our hospital. Patients with fever should be registered and referred to designated hospitals. If a patient has been to epidemic regions within the past 14 d, quarantine for at least 14 d is suggested. In areas where COVID-19 spreads, nonemergency dental practices should be postponed.[15,17,18]

Oral Examination:

Preoperative antimicrobial mouth rinse could reduce the number of microbes in the oral cavity [15]. Procedures that are likely to induce coughing should be avoided (if possible) or performed cautiously (WHO 2020). Aerosol-generating procedures, such as the use of a 3-way syringe, should be minimized as much as possible. Intraoral x-ray examination is the most common radiographic technique in dental imaging; however, it can stimulate saliva secretion and coughing.[19] Therefore, extraoral dental radiographies, such as panoramic radiography and cone beam CT, are appropriate alternatives during the outbreak of COVID-19

Treatment of Emergency Cases:

Dental emergencies can occur and exacerbate in a short period and therefore need immediate treatment. Rubber dams and high-volume saliva ejectors can help minimize aerosol or spatter in dental procedures. Furthermore, face shields and goggles are essential with use of high or low-speed drilling with water spray.[20] According to our clinic experience during the outbreak, if a carious tooth is diagnosed with symptomatic irreversible pulpitis, pulp exposure could be made with chemomechanical caries removal under rubber dam isolation and a high-volume saliva ejector after local anesthesia; then, pulp devitalization can be performed to reduce the pain. The filling material can be replaced gently without a devitalizing agent later according to the manufacturer's recommendation. We also met a patient who had a spontaneous toothache because of a cracked tooth without dental decay, and a high-speed handpiece had to be used to access cavity preparation. Given that the patient wanted to retain the tooth, she was scheduled as the last patient in the day to decrease the risk of nosocomial infection. After treatment, environmental cleaning and disinfection procedures were followed. Alternatively, patients could be treated in an isolated and well-ventilated room (Fig. 3) or negatively pressured rooms if available for suspected cases with COVID-19. The treatment planning of tooth fracture, luxation, or avulsion is dependent on the age, the traumatic severity of dental tissue, the development of the apex, and the duration of tooth avulsion.[21-23] If the tooth needs to be extracted, absorbable suture is preferred. For patients with facial soft tissue contusion, debridement and suturing should be performed. It is recommended to rinse the wound slowly and use the saliva ejector to avoid spraying. Life-threatening cases

with oral and maxillofacial compound injuries should be admitted to the hospital immediately, and chest CT should be prescribed if available to exclude suspected infection because the RT-PCR test, besides time-consuming, needs a laboratory with pan-coronavirus or specific SARS-CoV-2 detection capacity.

FIGURE 2: Centers for Disease Control and Prevention recommendations for putting on and removing personal protective equipment for treating COVID-19 patients

Minimize Chance for Exposures:

- **Post a sign at the entrance to the dental practice** which instructs patients having symptoms of a respiratory infection (e.g., cough, sore throat, fever, sneezing, or shortness of breath) to please reschedule their dental appointment and call their physician. The same thing applies if they have had any of these symptoms in the last 48 hours.
- **Reschedule appointments** if your patients have traveled outside India in the last two weeks to an area affected by the coronavirus disease. This includes China, Hong Kong, Iran, Italy, France, Spain, Germany, Japan, Singapore, South Korea, Taiwan, Thailand, Vietnam or any other COVID19 affected country.
- **Take a detailed travel and health history** when confirming and scheduling patients. Do not provide non-emergent or cosmetic treatment to the above patients and report them to the health department immediately. Screen patients for travel and signs and symptoms of infection when they update their medical histories.
- **Incorporate questions about new onset of respiratory symptoms** into daily assessments of all patients.
- **Take temperature readings** as part of the routine assessment of patients before performing dental procedures.
- **Take the contact details and address of all patients treated.**
- **Install physical barriers (e.g., glass or plastic windows)** at reception areas to limit close contact with potentially infectious patients. Make sure the **personal protective equipment** being used is appropriate for the procedures being performed.
- **Use a rubber dam** when appropriate to decrease possible exposure to infectious agents.
- **Use high-speed evacuation** for dental procedures producing an aerosol.
- **Autoclave hand-pieces** after each patient.
- Have **patients rinse with a 1% hydrogen peroxide** solution before each appointment.
- **Clean and disinfect public areas** frequently, including door handles, chairs and bathrooms.

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