

## Corona Virus Disease - 2019 (COVID-19) - Planning for Emergency Dental Practice and Dental Education

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### Abstract

The substantial knowledge of virology related to the epidemiologic characteristics, clinical spectrum, and treatment has made it possible for the dental healthcare personnel, to continue working safely by implementing efficient strategies to prevent, control and stop the spread of COVID-19. Despite this, the current COVID-19 outbreak necessitates we must be constantly aware of infectious threats that may challenge our infection control regimen in the dental settings, our preparedness for the provision of dental health care services and dental teaching and education. The infection prevention and control strategies to be adopted must have an evidence base and should follow the recommendations from the local and international centers for disease control and infection prevention and control according to the epidemic situation. The current epidemic outbreak emphasizes the need for improving the infection prevention and control strategies in the dental settings, adoption of alternative learning strategies for students and the need for further research on the ways for responding to such future contagious diseases.

**Keywords:** COVID-19; Emergency Dental Practice; Dental Education

### Introduction

During the past few months of the outbreak of the COVID-19, a tremendous opportunity for learning has been acquired about its nature, etiology, mode and sources of its transmission, incubation period and its fatality rate [1-13]. Our understanding has also reached a level whereby it is clear who are at high risk of the COVID-19 infection [14], what are its clinical manifestation [15-17], its severity and clinical implications [14,17-19]. Similarly, the diagnosis of the COVID-19 has also been understood [4,7,14,17].

So far, the COVID-19 outbreak has presented unique challenges to many involved in the medical and dental education and training and healthcare services. Specifically, those in the dental teaching, education and the provision of dental healthcare sector are asking how to respond effectively to these challenges. Obviously, this requires answers to several issues related to; minimizing risks of nosocomial infection in the dental setting; adoption of effective infection control protocols as related to dental setting; and adoption of recommended measures during this outbreak. Fortunately, standard guidelines are already available for implementing in the dental setting including those for the control of infection in case of treating patients with virus-inflected respiratory ailments. However,

as the COVID-19 outbreak being very unique with its start from Wuhan in China, it will be of relevance to elaborate upon the approaches that were used in response to the challenges faced by the Wuhan University Dental School and Hospital [20].

A great concern currently is about treating dental patients who cough, sneeze, and or even those not having these symptoms and yet receiving dental treatment requiring the use of a high-speed dental hand-piece or ultrasonic instruments. All these make the secretions, saliva, or blood aerosolize to the surroundings. Also, dental apparatus and working place become contaminated with various pathogenic microorganisms after use. As a result, when proper precautions are not taken, infections can occur through the puncture of sharp instruments or direct contact between mucous membranes and contaminated hands [21]. Due to the unique characteristics of dental procedures, generating a large number of droplets and aerosols, 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; unaware of their infected status; or who choose to conceal their infection. In such cases an effective infection control protocols must consider the following:

1. Hand hygiene and thorough disinfection of all surfaces within the dental clinic are the critical measures for reducing the risk of transmitting microorganism to patients and protection of dental care professionals. It has been found that severe acute respiratory syndrome coronavirus-2 (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 [22]. Thus, it is important on the part of dental healthcare professionals to reinforce the need for good hand hygiene and the importance of thorough disinfection of all surfaces within the dental clinic.
2. It is also recommended to use personal protective equipment (PPE), including masks, gloves, gowns, and goggles or face shields as these can protect skin and mucosa from (potentially) infected blood or secretion.
3. As respiratory droplets are the main route of SARS-CoV-2 transmission, particulate respirators (e.g. N-95 surgical masks authenticated by the National Institute for Occupational Safety and Health (NIOSH) or dust mask or FFP2-standard masks set by the European Union) are recommended for routine dental practice.
4. COVID-19 has been added to the category of group B infectious diseases, which includes SARS and highly pathogenic avian influenza. However, it further suggested that all healthcare workers use protection measures similar to those indicated for group A infections - a category reserved for extremely infectious pathogens, such as cholera and plague.
5. Dental clinics should restrict care for only dental emergency cases under strict implementation of infection prevention and control measures.
6. Routine dental practices should be discontinued until further notification according to the situation of epidemics.
7. Dental care personnel are further advised to keep themselves aware of and to follow the guidelines provided by the local health departments, dentistry-related quality control centers and professional dental associations as related to dental services during the COVID-19 outbreak. These supplementary measures have been already advised and considered helpful in ensuring the quality of infection control [23].

### Response to COVID-19 Outbreak of the Wuhan University Dental School and Hospital (School and Hospital of Stomatology, Wuhan University, PRC)

As the outbreak initially started in China with its epicenter in the Wuhan city, it will be good to have an idea how the dental school and hospital responded to it. In recent publication by Ming, *et al.* [20] the faculty in the Wuhan University Dental School and Hospital share these with the dental fraternity in large. According to them, the School and Hospital of Stomatology, Wuhan University provided dental care (including oral and maxillofacial surgery) to around 890,000 patients in the year 2019 with the dental school and hospital having 1,098 staff and 828 students. They neither have a fever clinic nor the hospital designated for care of patients with COVID-19. Therefore, in response to the outbreak, the hospital adopted the policy of advising all staff to undergo a medical examination in a designated hospital and restricted the working of any staff member with fever, cough, sneezing, or COVID-19-related symptoms. This work-restriction policy also applies to a staff whose close family member have been confirmed with the infection.

As a result of this policy implementation during the outbreak, so far nine colleagues (3-doctors, 3-nurses, 2-admin staff and 1-postgraduate student) had been confirmed to have COVID-19. Since these diagnoses, there have been no further cases among colleagues or patients who had close contact with them. Epidemiologic investigation and medical history has shown that all these cases were without obvious aggregation, except 2 nurses from the same department, and hence taken as cases unlikely to have resulted from cross infection. The infection was perhaps prevented from transmission or spread because medical masks and gloves were worn during routine clinic work by dental care personnel [20].

Despite the increasing number of confirmed cases during this period in Wuhan, the 169 staff involved in duty of dental emergency, treated > 700 patients requiring emergency dental care under the premise of adequate protection measures. All the dental procedures were recorded daily, and patients and their accompanying persons were requested to provide their phone number and home address in the case that either staff or patients are suspected or confirmed with COVID-19 in the future. The hospital staff have also provided consultations to > 1,600 patients on the online platform. No further COVID-19 infection has been reported among the staff, which confirmed the effectiveness of the hospital infection control measures in COVID-19 prevention within dental settings. Following the governmental directives, all students, including those in Wu-

han dental school, had been instructed to not return to school until further notification and till the Chinese spring Festival. They have been supported to learn online [20].

#### Evidence based recommendations for dental practice

Interim guidance on infection prevention and control during healthcare provision is recommended when COVID-19 infection is suspected [22]. Up to now, there has been no consensus on the provision of dental services during the epidemic of COVID-19. On the basis of experience and relevant guidelines and research, dentists should take strict personal protection measures and avoid or minimize operations that can produce droplets or aerosols. The 4-handed technique including hand-washing, wearing facemask and Gown and ensuring disinfection of working instrument and surfaces is beneficial for controlling infection. The use of saliva ejectors with low or high volume can reduce the production of droplets and aerosols [21,24,25].

#### Patients evaluation

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. Pre-check staff should ask patients questions about the health status and history of contact or travel [22]. Patients and their accompanying persons be provided with medical masks and temperature measurement once they enter the hospital. Patients with fever should be registered and referred to designated hospitals. If a patient has been to epidemic regions within the past 14 days, quarantine for at least 14 days is suggested. This applies also to staff working in the dental clinics. In areas where COVID-19 spreads, non-emergency dental practices should be postponed [21,24,25]. It has been reported to postpone dental practice for at least 1 month for convalescing patients with SARS [25]. However, it is yet to be known whether the same also applies for patients with COVID-19.

#### Clinical examination

Preoperative antimicrobial mouth rinse could reduce the number of microbes in the oral cavity [21,26]. Procedures that are likely to induce coughing should be avoided (if possible) or performed cautiously [22]. 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 [27]. Therefore, extraoral dental radiographies, such as panoramic radiography and cone beam CT, are appropriate alternatives during the outbreak of COVID-19.

#### Treatment of dental emergency cases including those suspected of COVID-19

Because of occurrence and the likelihood of exacerbation of the dental emergencies, need immediate treatment. In such cases, 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 [28].

According to Wuhan Dental Hospital clinic experience during the outbreak, if a carious tooth is diagnosed with symptomatic irreversible pulpitis, pulp exposure could be made with chemo-mechanical 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. For patients coming with a spontaneous toothache because of a cracked tooth without dental decay, or dental procedures requiring the use of high-speed handpiece to access cavity preparation and when a patient wishing to retain the tooth, they have to be scheduled as the last patient in the day to decrease the risk of nosocomial infection. After treatment, environmental cleaning and disinfection procedures should be followed.

Alternatively, patients could be treated in an isolated and well-ventilated room 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 [29-31]. In case 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 [29-31].

#### Recommendations for dental education and teaching during the COVID-19 outbreak

Education-related challenges for medical and dental schools, as well as their affiliated hospitals, are significant [32-33]. It has been reported that open communication among students, clinical teachers, and administrative staff could enhance mutual trust and facili-

tate adequate cooperation [34]. On the basis of past experience with SARS and relevant highly pathogenic infectious disease, the following few basic recommendations for dental education during an outbreak may be adopted [32-36]:

1. Firstly, during the outbreak period, online lectures, case studies, and problem-based learning tutorials should be adopted to avoid unnecessary aggregation of people and associated risk of infection [32-33]. Existing smart devices and online learning and meeting platforms and applications have already made it possible for students to listen, learn, and interact as well as to be assessed for the learning made.
2. Secondly, students should be encouraged to do self-learning, make full use of online resources, and learn about the latest academic developments [32-35].
3. Thirdly, during this period, it is easy for students to be affected by disease-associated fear and pressure, and dental schools should be prepared to provide psychological services to those who need them [36].

## Conclusion

1. With the increased knowledge of viral features, epidemiologic characteristics, clinical spectrum, and treatment, it is possible for the dental healthcare personnel, to continue working safely by implementing efficient strategies to prevent, control, and stop the spread of COVID-19.
2. Despite this, the current COVID-19 outbreak has certainly necessitated that we must be constantly aware of infectious threats that may challenge our infection control regimen in the dental settings, our preparedness for the provision of dental health care services and dental teaching and education.
3. The infection prevention and control strategies to be adopted must have an evidence base and should follow the recommendations from the local and international centers for disease control and infection prevention and control according to the epidemic situation.

The current epidemic outbreak emphasizes the need for improving the infection prevention and control strategies in the dental settings to ensure the dental practice and teaching environment safe for all including the dental care team, dental trainees and dental patient. It also highlights the need for more research on the ways for responding to similar contagio

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