A Review

Impact & Implications of COVID-19 on Dentistry : A Narrative Review

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Abstract

The rapid spread of SARS-CoV-2, responsible for the coronavirus disease (COVID-19), has become a worldwide emergency in the public health system. On 30th January 2020, the World Health Organization (WHO) recently announced a global pandemic disease after COVID-19 outbreak began last December from Wuhan, China. Not with standing global attempts to control the spread of the disease, the outbreak is still on the rise due to the trend of this virus spreading through the population. The virus has a predominantly respiratory transmission through aerosol and droplets. Dental care settings typically bear the risk of COVID-19 cross infection between patients and dental practitioners due to the complexity of its procedures. For dental practices and hospitals in areas that are (potentially) affected with COVID-19, strict and effective infection control protocols are urgently needed. This review provide dental practitioners with information on clinical symptoms, preventive measures and dental treatment protocols during and post COVID-19 outbreak.

Keywords: SARS-CoV-2, COVID-19, pandemic, infection control, transmission

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INTRODUCTION

On January 8th, 2020, the Chinese Center for Disease Control and Prevention officially declared a novel coronavirus as the causative pathogen of COVID-19 (Coronavirus disease 2019).[1] It has rapidly become a worldwide emergency. On 30th January 2020, the World Health Organization (WHO) recently announced a global pandemic.[2] The 2019 coronavirus disease (COVID-19) outbreak began last December from Wuhan, China, and has become a major challenge to public health not just for China but also for countries around the world.[3] The novel coronavirus was initially called 2019-nCoV and currently known as the severe acute respiratory syndrome coronavirus 2 (SARSCoV-2).[4]

According to recent studies, similar to SARS-CoV and Middle East respiratory syndrome coronavirus (MERS-CoV), SARSCoV-2 is zoonotic, with Chinese horseshoe bats (Rhinolophus sinicus) being the most probable source and pangolins as the most likely intermediate host.[5-7] To et al. stated that the viral culture method used to display live viruses in the saliva of infected individuals.[8]

The risk of cross-infection between dental practitioners and patients may be high due to the characteristics of the dental settings. Strict and reliable guidelines on the prevention of infections are urgently required for dental practices and hospitals in countries/regions (potentially) affected by COVID-19. The purpose of this review is to provide dental practitioners with information on clinical symptoms, preventive measures and dental treatment during and post COVID-19 outbreak.

Symptoms

Most patients developed fever and dry cough while some have had shortness of breath, weakness, and other atypical symptoms such as muscle pain, nausea, headache, sore throat, diarrhea, and vomiting.[9,10] Notably, 80 percent of these patients have only mild symptoms that mimic flu-like symptoms and seasonal allergies, which could lead to an increased number of undiagnosed cases.[11] In addition, abnormal chest X-Ray and computer tomography (CT) findings such as ground-glass opacities are typically found in the chest.[10] Poorer prognosis was associated with older patients and the prevalence of underlying comorbidities (e.g., diabetes, hypertension, and cardiovascular disease).[4]

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Possible Transmission Routes if COVID-19 in Dental Clinics

The typical transmission routes for novel coronavirus include direct transmission i.e; cough, sneeze, and droplet inhalation and contact transmission i.e; contact with mucous membranes of oral, nasal, and eye.[12] Therefore, an infected person's coughing or sneezing may make SARS-CoV-2 airborne, potentially infecting individuals in close contact (around 6 feet). This had led to recommendations of social distancing. Although typical clinical manifestations of novel coronavirus infection do not include eye symptoms, analyzes of conjunctival samples from confirmed and suspected 2019-nCoV cases indicate that the 2019-nCoV transmission is not limited to the respiratory tract, and that eye contact can provide an efficient route for the virus to reach the body.[8]

Since 2019-nCoV may be transferred by respiratory droplets directly from person to person, emerging evidence indicates it can also be transmitted by touch and fomites. Additionally, the asymptomatic incubation period for 2019-nCov infected individuals was estimated to be 1–14 days, and individuals were estimated after 24 days, and it was verified that those without symptoms could spread the virus.[14,10,15] Dental patients and practitioners can be exposed to pathogenic microorganisms, including viruses and bacteria that cause oral cavity and respiratory tract infections. Dental care settings typically bear the risk of 2019-nCoV infection due to the complexity of its procedures, which includes face-to-face contact with patients, and regular exposure to saliva, blood, and other body fluids, and the handling of sharp instruments. The transmission of pathogenic microorganisms through inhalation is higher when performing dental procedures due to the use of irrigated handpieces which facilitate the diffusion of saliva, blood and secretion aerosol particles and also through coughing and talking with infected patient within short distance without a mask, and indirect contact with contaminated instruments and/or environmental surfaces. Infections may be present in dental clinics and hospitals through all of these conditions involving an infected person, particularly during the 2019-nCoV outbreak.[16]

Droplet and aerosol transmission of 2019-nCoV are the most important concerns in dental clinics and hospitals, as it is difficult to avoid producing significant quantities of aerosol and droplet combined with saliva and even blood during dental practice. Also human coronaviruses (HCoV) can persist on surfaces like metal, glass, or plastic for up to a couple of days. So, by reducing the use of an aerosol-producing instruments and procedures and keeping a clean and dry environment in the dental office would help decrease the persistence of 2019-nCoV.[16]

Risk of Nosocomial Infections

After use or exposure to a polluted clinical environment, dental equipment could be infected with different pathogenic microorganisms infection (from patient secretions such as saliva or blood). Infections can then occur by puncturing sharp instruments or by direct contact between the mucous membranes and infected hands.[20] Because of the specific characteristics of dental procedures where a large number of droplets and aerosols could be produced, standard protective measures are not sufficiently effective in daily clinical work to prevent the spread of COVID-19, particularly when patients are in the incubation period, are unaware of being infected or choose to conceal their infection.

Recommended Measures of Patient Management & Dental Professional During & Post COVID-19 Outbreak

Dental practitioners should be familiar with how 2019-nCoV is spread, how patients with 2019-nCoV infection are detected, and what extra-protective steps should be taken during the practice to prevent 2019-nCoV transmission. Recommendations for the infection control measures to be followed by dental professionals, particularly considering the fact that aerosols and droplets were considered as the 2019-nCoV key spread routes.

Phone Screening & Triaging

Initial telephone screening to identify patients with suspected or possible COVID-19 infection can be performed remotely while arranging appointments. The two most important initial screening questions will include any travel history to infected areas of COVID-19, and any febrile signs of respiratory illness such as fever and cough. Positive response to either of the two questions will raise initial concern, and elective dental treatment should be postponed for at least two weeks as previously stated, the incubation period for SARS-CoV-2 may vary from 0 to 24 days. Patients should be encouraged to be in self-quarantine, particularly in areas considered to be at high risk of infection.[17,18]

Patient Evaluation

First, dental professionals should be in a position to recognize a suspected COVID-19 case. If this occurs, the dental professional should be able to identify the patient with suspected 2019 nCoV infection and should not treat the patient in the dental clinic, but quarantine the patient immediately and report to the infection control department as soon as possible, particularly during the 2019-nCoV epidemic time.

The body temperature of the patient should be measured in the first place. Dental practitioners should measure the patient's body temperature using a non-contact thermometer for the forehead or with cameras with infrared thermal sensors.[16] Record the temperature at every visit. Fever patients should be registered and referred to approved hospitals. If a patient has been to outbreak regions during the past 14 days, quarantine is recommended for a minimum of 14 days. Non-emergency dental practices in places where COVID-19 spreads should be postponed.[4]

Patients will fill out a comprehensive medical history form, COVID-19 screening questionnaire and review of a true emergency questionnaire upon arrival in dental practice. **These questions should include the following:**[16]

(1) Have you had fever or felt fever in the last 14 days?
(2) Have you encountered a sudden onset of respiratory symptoms, such as cough or breathing difficulties in the last 14 days?
(3) Did you visit to any infected cities and its surrounding areas with 2019-nCoV during the past 14 days?
(4) In the past 14 days, have you been in touch with a patient with reported 2019-nCoV infection or any people coming from infected cities with 2019-nCoV and its surrounding areas?
(5) Have you recently participated in any gathering, meetings, or had close contact with many unacquainted people?

Patients with fever (>37.3°C) and/or signs of respiratory illness should be delayed for at least 2-3 weeks in elective dental treatment. Patient with body temperature below 37.3 °C, the dentist can treat the patient with extra protection measures, and avoids spatter or aerosol generating procedures to the best.[16]

In suspected or confirmed cases of COVID-19 infections, patients that need urgent dental care for conditions such as toothache and/or swelling, antibiotic and/or analgesic pharmacology treatment is an option. It is recommended that NSAIDs in combination with acetaminophen (i.e. 400-600 milligrams ibuprofen plus 1,000 mg acetaminophen) can still be used.[18,19]

Dental treatment should be done according to type of dental emergency. It includes- (1) Emergency i.e., situations which increase the patient's death risk like Uncontrolled bleeding, Cellulitis or diffuse bacterial infections leading to intra-oral or extra-oral edemas, and potential risk of damage to airways. (2) Urgent i.e., situations which require priority care but do not increase the patient's death risk: it includes acute dental pain (Pulpitis), pericoronitis, alveolitis, dental or periodental abscesses, dental care needed for another critical medical procedure, cementation fixed prosthodontics or crowns, biopsies, adjustments of orthesis and prosthesis that cause pain and compromise chewing function, changing intracanal medication, removal of extensive dental caries or restorations that cause pain, mucositis, dental trauma with avulsion or luxation

Recommended Protocols During Dental Treatment

1. Preoperative antimicrobial mouth rinse could minimize the number of microbes in the oral cavity. Chlorhexidine may not be effective to kill 2019-nCoV. Since 2019-nCoV is vulnerable to oxidation, it is recommended to use pre-procedural mouthrinse containing oxidative agents such as 1% hydrogen peroxide or 0.2% povidone to reduce the salivary load of oral microbes, including possible 2019-nCoV carriage.[16]
2. Dentists should take strict steps of personal security and avoid or reduce operations which can generate droplets or aerosols. The four-handed technique helps to suppress infection. The use of low or high-volume saliva ejectors will minimize droplet and aerosol output.[20-22] Aerosol-generating procedures, such as the use of a 3-way syringe, should be minimized as much as possible.
3. Patients could be treated in an isolated and well-ventilated room or negatively pressured rooms if available for suspected cases with COVID-19. After treatment, environmental cleaning and disinfection procedures should be followed.[4]
4. Rubber dam isolation and high-volume saliva ejectors are recommended in order to help in minimizing aerosol or spatter in dental procedures.[16]
5. Anti-retraction dental handpiece with specially built anti-retractive valves or other anti-reflux designs is highly recommended as an extra preventive cross-infection measure because it can substantially reduce the backflow of oral bacteria and HBV into the handpiece and dental unit tubes compared to the handpiece without anti-retraction feature. Therefore, the use of dental handpieces without antiretraction function should be prohibited during the epidemic period of COVID-19.[16]
6. Intraoral x-ray imaging should be avoided as it may stimulate saliva secretion and coughing.[23] Therefore, extraoral dental radiographies, such as panoramic radiography and cone beam CT should be used during the outbreak of COVID-19. Sensors should be double-barriered when intraoral imaging is required to avoid perforation and cross-contamination.[24]

Recommended Protective Measures for the Dental Professionals & Clinics

1. There is currently no special guidance in the dental clinics and hospitals for the safety of dental professionals from the 2019 nCoV infection. Since airborne infection droplet transmission is considered the main route of spread, particularly in dental clinics and hospitals, barrier-protection equipment, including protective eyewear, masks, gloves, caps, face shields and protective outwear, is strongly recommended for all healthcare providers in the clinic/ hospital settings during the 2019-nCoV epidemic season.[16] As respiratory droplets are the main route 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.[4]
2. Hand hygiene is already well emphasised and stated for all concerned by alcohol based hand rub or use of soap and water for washing with standard steps recommended by WHO. Hand hygiene has been considered the most important measure to minimize the risk of transmitting microorganisms to patients.[25] The dental professionals are highly recommended to avoid touching their own eyes, mouth, and nose while dental procedures.
3. Human coronavirus can survive up to 9 days at room temperature on inanimate surfaces, with a higher preference for humid conditions. Careful disinfection of surfaces, with particular attention to door handles, chairs, and desks are strongly suggested. Moreover, a dry environment in the dental office are recommended to control diffusion.[4,16]
4. Dental clinics should be properly ventilated, because it can reduce the risk of infection by diluting and eliminating infectious particles by exchanging air. Improved ventilation is necessary in clinics to prevent airborne infection transmission.
5. All biomedical waste pertaining to patient care should be carefully disposed as per the BioMedical Waste (Management and Handling) Rules, 1998 amended from time to time through an authorized biomedical disposal agency by the State Pollution Control Board.

All the dental professionals should follow recommended treatment protocols until the Local/State Administration or Ministry of Health and Family Welfare, Govt. of India does not issue any advisory with regard to end of community transmission or risk minimization.

Infection Control in Waiting Area

Specific protection must be combined with the protection of the spread of the virus by environmental remediation, both for health workers and for patients. In particular, due to the high concentration of the virus in the particles exhaled by coughing and sneezing, any surface in the waiting room must be considered at risk; thus, all surfaces, tables, magazines and doors that come into contact with healthcare professionals and patients must be deemed "potentially contaminated" in addition to

sufficient periodic air exchange. Having an alcoholic disinfectant and masks available in the waiting room to the patients can be helpful. The entire air conditioning system also frequently needs to be sanitized. If patients wish to, or if the waiting room does not require sufficient "social space" (at least 6 feet or 2 meters apart), they can wait in their personal car or outside the facility where they can be called by cell phone when their turn is to be seen. This can be communicated to patients at the moment of scheduling the appointment, based on established office procedures.[19]

Recommended Post Treatment Protocols for Dental Clinics & Staff

1. The dental clinics and other areas should be fumigated at the end of the day as per manufacturer's instructions on daily basis in clinical and biweekly in non clinical areas. The area/room must be sealed completely using newspaper or adhesive tapes. Then place the Fumigation machine at one corner of the room after filling the fumigation solution in it and switch on the machine and leave the room for the process for 30 minutes after complete sealing. Then Remove the machine after the process time. Now the area can be ready for next dental procedure.
2. Disinfection of all dental unit waterlines (DUWL) should be done using appropriate organic disinfectant and drained as per manufacturer's instructions. All suction and spittoon filter should remove and clean and sterilize the hand pieces.
3. After the patient leaves the treatment room, collect all hand instruments immediately, rinse them in running water to remove organic matter and dip in into appropriate disinfectant of appropriate grade for 30 minutes or as per manufacturer guidelines.
4. When the dental staff arrives home, he/she should leaves everything belonging at house's entrance. When entering home he/she should avoid to touch anything until washing his/her hands first. Then remove shoes and clothes off and keep them away to cleaned up. Mobile phone should be sanitized. Then shower and wash the most exposed areas.

CONCLUSION

To conclude, the major limitation of clinical and surgical activities in the medical and dental sector has been a very impacting measure on the sector's economy. Nevertheless, this dramatic action has made it possible to protect citizens' health and safety, and to control coronavirus spread. The policies and measurement packages implemented by governments are therefore addressed to all dental organisations, setting out specific guidelines for preventing and managing COVID-19 infection during oral diagnosis and in everyday practice before a vaccine or medication is available.

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