



Coronavirus Disease-19 and Dentistry: A Review

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Abstract

Novel coronavirus (nCoV) is a novel form of virus with a new strain identified recently in humans. Common clinical signs and symptoms primarily consist of fever, cough, and breathing difficulties. In severe cases, it can result in pneumonia, severe acute respiratory syndrome, kidney failure, and even death. It is important to follow all infection control measures in prevention of the nCoV from spreading and controlling the epidemic situation. The risk of cross infection can be high between dental practitioners and patients due to the features of dental clinical settings. Here, we are summarizing the nCoV related information and infection control measures to be followed in dental practice.

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Introduction

The pandemics of coronavirus disease (COVID-19) started from Wuhan, China, last December and Chinese Center for Disease Control and Prevention [1] on January 8, 2020, officially announced a novel form of coronavirus (nCoV) as the causative agent. It was first named as 2019-nCoV, but later officially as severe acute respiratory syndrome nCoV 2 (SARS-CoV-2) [2]. Now, it has become a major health problem not only for China but also majority of countries around the world [3]. The World Health Organization on January 30 announced that COVID-19 outbreak is a public health emergency of international concern [2], [4].

Characteristics of Virus

SARS-CoV-2 is a zoonotic virus [2]. nCoVs are from the family of *Coronaviridae*, of the order *Nidovirales*. It has genome of large, single, and plus-stranded RNA [5], [6]. There are four genera of nCoVs, namely, α -CoV, β -CoV, γ -CoV, and δ -CoV. The α -CoV

and β -CoV mainly infect the respiratory, gastrointestinal, and central nervous system of humans and mammals, while γ -CoV and δ -CoV mainly infect the birds [7].

SARS-CoV and the Middle East respiratory syndrome CoV explored in 2002–2003 and in 2012, respectively, belong to the β -CoV. The virus explored in Wuhan, SARS-CoV-2, also belongs to the β -CoV11. The genome nucleotide sequence uniqueness was 96.2% between nCoV detected in the bat *Rhinolophus affinis* from Yunnan Province, China, and SARS-CoV-2, indicating the natural host of SARS-CoV-2 is the *R. affinis* bat [7].

However, the genome sequence similarity was 99% to the nCoV isolated from pangolins, indicating that these as the most likely intermediate host of SARS-CoV-2 [2], [7].

Incubation Period

An average of 5–6 days is the estimated incubation period of COVID-19. There is evidence that it might be as long as 14 days, which is now the universally adopted duration for medical surveillance

and quarantine of potentially exposed or exposed persons [2].

People at High Risk of Infection

1. Peoples of all ages are usually susceptible to COVID-19. Healthcare workers and other individuals who are in close contact with patients of symptomatic and asymptomatic COVID-19 are at higher risk of SARS-CoV-2 infection [2]
2. Patients with most severe disease were more likely to have hypertension respiratory disease and cardiovascular disease [8]
3. In other studies, obesity and smoking were associated with increased risks [9], [10].

Common Symptoms

The characteristics symptoms of the patients were fever, cough, and myalgia or fatigue with abnormal chest computed tomography (CT). The less common symptoms were sputum production, headache, hemoptysis, and diarrhea [7].

Oral Manifestations

Ulcerations (unilateral palatal ulcerations) or blistering in the oral cavity	Reported as possible signs and symptoms in confirmed case of COVID-19 by Sinadinos and Shelswell [11]
52% – changes in taste sensation 56.25% – dry mouth 11% – pain in muscles of mastication	Reported as major changes in study by Biadsee <i>et al.</i> [12]
Necrotizing periodontal disease	Patel and Woolley in their letter to the editor proposed this can be an oral manifestation in patients with COVID-19 [13]
Oral reddish lesions and ulcerations	Soares <i>et al.</i> [14] and Chaux-Bodard <i>et al.</i> [15] in their letter to the editor marked in patients of COVID-19
Smell and taste loss (chemosensory dysfunction)	Reported by Pedrosa <i>et al.</i> [16]

Source of Transmission

1. Patients with symptomatic COVID-19 have been the main source of transmission [2]
2. Asymptomatic patients in their incubation period [2].

Epidemiology

- Interpersonal transmission occurs mainly through respiratory droplets and contact transmission [2], [7]
- Studies have suggested that 2019-nCoV may be airborne through aerosols produced during medical procedures. However, the aerosol transmission route and the fecal–oral transmission route worried by the public still required to be further studied and confirmed [2], [7].

Spread in Dental Clinics

Eyes, nose, and oral cavity as the “T” zone in the maxillofacial region being the main entry for the virus into an individual, alerts all dental professionals while doing any procedures [17].

Dental care settings invariably carry the increased risk of 2019-nCoV infection due to the following reasons (Table 1 and Figure 1).

Table 1: Risk factors in dental clinic settings

Risk factors
Have more face-to-face communication with patients [2],[7]
Everyday exposure to saliva, blood, and other body fluids [2],[7]
Handling of the sharp instruments [2],[7]
Contact with droplets and aerosols [18]
Direct contact with patient materials [19]
Indirect contact with contaminated instruments and/or environmental surfaces [20]

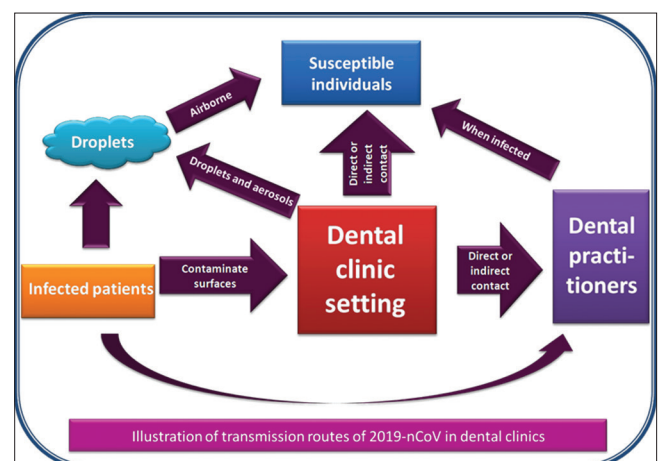


Figure 1: Illustration of transmission routes of 2019-nCoV in dental clinics

Infection Control in Dental Practice

In the early stages of COVID-19, the viral load in the saliva was constantly found high than that in the

region of oropharynx. The SARS-CoV-2 viral load in the saliva can be effectively reduced for a short period of time with chlorhexidine mouthwash [21].

Alharbi *et al.* [22] classified therapeutic dental procedures into five groups: Emergencies, emergencies manageable through invasive or non-invasive procedures (minimum aerosol), non-emergencies, and elective treatments, depending on the dentist.

Following are the suggested measures to avoid spread of infection in dental clinics (Table 2).

Table 2: Infection control in dental practice

Infection control in dental practice
Patient evaluation: Identify a suspected case of COVID-19 [7]
Measurement of the body temperature: Should be measured in the first place using a contact-free forehead thermometer [7]
Screening: With the help of questionnaire [7]
Mouth rinse: preoperational antimicrobial mouth rinse with 1% hydrogen peroxide or 0.2% povidone is generally believed to reduce the number of oral microbes [7]
X rays: Orthopantomographs (OPG) or lateral oblique views may be considered instead of intraoral radiographs (IOPA) when required [23]
Hand hygiene: Good hand hygiene is of the utmost importance [7]
Dental professionals should avoid touching their own eyes, mouth, and nose [7], [24]
PPE: Protective eyewear, masks, gloves, caps, face shields, and protective outwear, is strongly recommended [7]
Dispensing instruments and materials: Should be done just before treatment. This prevents particles from settling on the surfaces [25]
Rubber dams: Significantly minimize the production of saliva- and blood- contaminated aerosol or spatter [7]
Anti-retraction high-speed dental hand piece: Can significantly reduce the backflow of oral microorganisms into the tubes of the hand piece and dental unit as compared with the hand piece without anti-retraction function [7], [26]
Impression making: Very sensitive patients may be anesthetized or sedated before taking impressions to control gag reflex [27], [28]
High volume evacuation: To remove infectious droplets at the source as soon as they are emitted. This minimize or prevent their dispersion in the air [29]
Disinfection of surfaces: Effective and strict disinfection measures using hospital-grade disinfectants after each patient in clinic setting [7], [30]
Sterilization of instruments: Is must for all the instruments [7]
Public areas such as door handles, chairs, and desks and elevators should be frequently disinfected [7]
Management of medical waste: Double-layer yellow color medical waste package bags and "gooseneck" ligation should be used [7]

Diagnosis and Laboratory Tests

- The diagnosis of COVID-19 can be based on a combination of [31]
 - Clinical symptoms
 - CT imaging findings (seen in severe infection patients), and
 - Laboratory tests: For example, reverse transcriptase polymerase chain reaction (RT-PCR) tests on respiratory tract specimens using nasopharyngeal, oropharyngeal, and blood samples.
- It should be mentioned that a single negative RT-PCR test result from suspected patients does not rule out infection. Clinically, we should be alert of patients with an epidemiologic history, COVID-19-related symptoms, and/or positive CT imaging results [31]
- Saliva was found to be even more sensitive for SARS-CoV-2 detection in COVID-19 patients than nasopharyngeal swabs [32].

Treatment

In the present scenario, there has been no confirmation from randomized controlled trials to suggest any particular anti-nCoV treatment. Thus, the management consists of measures such as controlling the source of infection; lower the risk of infection transmission; and also provide early diagnosis, isolation, and supportive care for affected patients [9].

Conclusion

Although dental clinics have been closed during the epidemic, a large number of emergency patients need dental treatment. We have summarized the virology of 2019-nCoV, possible transmission routes and its control in dental clinics.

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