



COVID-19 PREVENTIVE MEASURES IN DENTAL HOSPITALS: A REVIEW

Dental Science

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ABSTRACT

Dental practitioners are at great risk of COVID-19 infection due to the face-to-face communication and the exposure to saliva, blood, and other body fluids, and the handling of sharp instruments during procedures. We hope that this review of infection control measures during dental practice helps in the understanding and preventing the transmission routes of the threatening disease COVID-19 in dental hospitals.

KEYWORDS

Corona virus; COVID-19; SARS-CoV-2

INTRODUCTION

The pneumonia infection that has spread rapidly from Wuhan to more than 195 countries belongs to the genus 'Betacoronavirus', subgenus 'Sarbecovirus', family 'Coronaviridae', and order 'Nidovirales', comprising large, single, plus-stranded RNA as their genome.^[1] A literature review is conducted using electronic databases, such as "PubMed", and "Scopus" using keywords "Coronavirus," "SARS-CoV-2," and "COVID-19."

On 11th February 2020, WHO named this novel coronavirus (2019-nCoV) as "Corona Virus Disease (COVID19)", while the International Committee on Taxonomy of Viruses suggested this 2019-nCoV as "SARSCoV-2". Coronaviruses have four genera: α -CoV, β -CoV, γ -CoV, and δ -CoV. The α -CoV and β -CoV infect the humans and mammals, while γ -CoV and δ -CoV forms infect the birds.^[2,3] A new type of β -CoV has been isolated from the samples of outbreak in Wuhan.^[3] Coronavirus are well known to undergo genetic recombination, which may lead to new genotypes and outbreaks.^[4] Cheng, et al. in 2007 warned that Southern China with their culture of eating exotic mammals that are reservoirs of SARS-CoV-like viruses might cause a pandemic outbreak.^[5]

A 96% similar 2019-nCoV genome nucleotide sequence was detected in the bats indicating the *Rhinolophus affinis* bat as its natural host.^[3] Another coronavirus isolated from the pangolins comprised 99% similar genome with that of 2019-nCoV, indicating the pangolin as the intermediate host.^[4] The "spike protein" in the membrane envelope of 2019-nCoV is the typical coronavirus structure.^[3,6] Snakes act as a carrier of the virus from bats to humans which involved homologous recombination within the S protein.^[3] This S protein of 2019-nCoV binds to the human angiotensin converting enzyme 2 (ACE2) receptors to facilitate viral entry into target cells suggesting that the population with higher expression of ACE2 might be more susceptible to 2019-nCoV.^[3,4]

SYMPTOMS OF THE PATIENTS WITH 2019-nCoV

Fever, cough, sore throat, nasal congestion, shortness of breath, sputum, malaise, and headache. This infection is more likely to affect elderly people with comorbidities and pregnant women. In severe cases, it progresses to acute respiratory syndrome, septic shock, metabolic acidosis, and coagulopathy. Asymptomatic incubation period for 2019-nCoV infected individuals has been reported to be 1–14 days.^[7,8]

TRANSMISSION ROUTES OF 2019-nCoV

-Direct transmission (cough, sneeze, and droplet inhalation) and -Contact transmission (contact with oral, nasal, and eye mucous membranes).^[3,9]

Virus was isolated from the saliva of infected individuals.^[10] Dental care settings invariably carry the risk of 2019-nCoV infection due to its procedures, which involves face-to-face communication with patients, and frequent exposure to saliva, blood, and other body fluids. The virus from droplets and aerosols generated by high-speed handpiece and

ultrasonic scaler stay airborne for an extended period before they settle on environmental surfaces.^[11]

PRECAUTIONS TO BE TAKEN IN DENTAL CLINIC

A patient who is in the acute febrile phase of COVID-19 is not advised to visit the dental hospital. If this does occur, the dentist should be able to identify the suspected 2019-nCoV patient. A contact-free forehead thermometer is strongly recommended for screening the body temperature and the following questionnaire should be used to screen the patients before leading to the dental chair-side.^[3]

- (1) Have you experienced a recent onset of fever or respiratory problems, such as a cough or difficulty in breathing within the past 14 days?
- (2) Have you, within the past 14 days, travelled to infected local/abroad areas, or visited the neighbourhood with documented 2019-nCoV transmission?
- (3) Have you come into contact with a patient with confirmed 2019-nCoV infection within the past 14 days?
- (4) Have you recently participated in any gathering, meetings, or had close contact with many unacquainted people?

	If the patient's answer is	
	'NO' to all screening questions	'YES' to any of the questions
Body temperature is below 37.3 °C	Dentist can treat the patient with extra protection measures, and avoid spatter or aerosol-generating procedures to the best.	Treatment can be postponed for 14 days after the exposure event. The patient is instructed to self-quarantine at home and report to the local health department immediately if any COVID-19 symptoms appear.
Body temperature is above 37.3 °C	No treatment should be done. Patient is advised to consult the general physician or special clinics for COVID-19 for further medical care.	No treatment should be done. Patient should be immediately quarantined, and informed to the infection control department or the local health department.

More caution should be taken by the dentists to avoid touching their own eyes, mouth, and nose. A two-before and three-after hand hygiene guidelines should be followed by dentists.^[3]

before patient examination, and *before* dental procedures *after* touching the patient, *after* touching the surroundings & equipment without disinfection, and *after* touching the oral mucosa, saliva, damaged skin or wound, blood, & body fluids.

Since airborne droplet transmission is considered as the main route of

infection spread of 2019-nCoV, Personal protection barriers were strongly recommended in the hospital settings.^[12,13]

Protection for staff in hospitals: Wearing disposable head cap, surgical mask, protective goggles, apron, and disposable gloves.

Protection for dentists: Wearing double impermeable personal protection barriers including disposable doctor head cap, surgical mask, protective goggles, face shield, apron, disposable gloves, and shoe cover.

National Institute for Occupational Safety and Health (NIOSH)-certified particulate-filter respirator (e.g., N95, N99, or N100) should be used by the dentists.^[14,15] When doffing potentially contaminated N95 respirator, do not touch the outside of the respirator without wearing gloves.^[16] Petroleum-based lotions should only be used at the end of the working day as these formulations can weaken latex gloves and increase permeability. Reusable personal protection barriers (e.g., clinician or patient protective eyewear and face shields) should be cleaned with soap and water. After removing personal protection barriers, always wash hands with soap and water.^[15]

Preprocedural mouthrinse containing oxidative agents such as 1% hydrogen peroxide or 0.2% povidone is recommended, for the purpose of reducing the salivary load of 2019-nCoV carriage. The use of rubber dam and extra high-volume suction can significantly minimize the contact with saliva and blood-contaminated aerosol or spatter, particularly in cases when high-speed handpieces and ultrasonic devices are used.^[13,17]

Manual devices, such as Carisolv for caries removal and hand scalers for periodontal scaling are recommended, in order to minimize the generation of aerosol. Anti-retraction dental handpieces are strongly recommended as an extra preventive measure for cross infection.^[13,18]

DISINFECTION OF THE HOSPITAL SETTINGS

The clinic settings should be cleaned and disinfected in accordance with the 'Guidelines for Infection Control in Dental Health Care Settings' released by the CDC. The reusable instruments should be pretreated, cleaned, sterilized, and properly stored. Clinical contact surfaces can be directly contaminated from patient materials either by aerosols or by direct spray or spatter generated during dental procedures or by contact with dental professional's gloved hands. Barrier protection (clear plastic wrap) of surfaces and equipment can prevent this contamination. These contaminated coverings should be removed and discarded with gloved hands.^[15] Floors (clinical areas) should be mopped using three-bucket technique (one with plain water; one with detergent/sanitizer-hot water and one bucket for 1% sodium hypochlorite).^[19]

MANAGEMENT OF MEDICAL WASTE

Wear a clean, long-sleeved fluid-resistant or impermeable gown to protect the clothing. Use a plastic face shield or a surgical mask and goggles to protect the face, eyes, nose and mouth from potentially infectious body fluids. Double-layer yellow color medical waste package bags and "gooseneck" ligation should be used. The surface of the package bags should be marked and disposed according to the requirement for the management of medical waste.^[3,16,20]

SUMMARY

The rapidly increasing number of cases and evidence of human-to-human transmission suggested that COVID-19 is more contagious than SARS-CoV and MERS-CoV. Although stomatology clinics have been closed during the epidemic, a large number of emergency patients still go to the dental hospitals for treatment. Dentists should be aware of possible transmission routes and prevent the spread of 2019-nCoV by following the necessary precautions.

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