

COVID -19 OUTBREAK – AN UNCEASING ILLNESS AND ITS IMPACT IN DENTISTRY

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ABSTRACT

The outbreak of novel SARS-CoV-2 has produced major public health issues and engulfed the entire world community. A zoonotic infection was discovered to have spread from animals like bats, pangolians to humans. Incidence of disease was first reported in Wuhan city, China in the month of December 2019 and rapidly spread across other countries. Because of the way this sickness spreads throughout communities, despite all international efforts to stop its spread, the outbreak is continuously getting worse. It was discovered that among medical personnel, transmission was high who come in direct contact with aerosol /saliva droplets and blood products. Dentistry is one such field where highest amount of aerosol production happens and dental professionals are at continuous exposure to these droplets during their practice. Therefore, in addition to providing care, dental practitioners must take proactive measures to stop the spread of infection. This review paper briefly describes the origin, characteristics, routes of transmission, relevance in dentistry and precautions to be taken in dental practice to avoid the spread during this pandemic across world.

Key words: Covid-19, Dental practice, Dentistry

INTRODUCTION:

In a seafood market in Wuhan, Hubei province, China, a new ?-coronavirus (2019-nCoV) caused severe, deadly pneumonia. It quickly spread to 20 other countries and other Chinese regions.^{1,2} The World Health Organization announced on January 30, 2020, that the COVID-19 outbreak was a public health emergency of international concern.³ On February 11, 2020, the World Health Organization (WHO) designated the new viral pneumonia as "Corona Virus Disease (COVID19)". The International Committee on Taxonomy of Viruses (ICTV) proposed the name "SARS-CoV-2" for this new coronavirus. Because SARS-CoV-2 is so widely distributed and has been reported to have spread among Health Care Providers (HCPs)⁴, dental professionals are particularly vulnerable to contracting the disease. These hazards are mostly likely to affect dentistry due to increased aerosol generation, handling of sharps and proximity of the provider to the patient's oropharynx.

Also, there is increased risk of secondary lung infection in SARS-CoV2 infection which favour growth of anaerobes and facultative anaerobes. Since the airways of the lung and oropharynx are closely related, human oropharyngeal microbiome (HOPM) will be altered and act as rich nidus for SARS-CoV2 multiplication. SARS-CoV2 engages angiotensin-converting enzyme 2 (ACE2) as the entry receptor and it is found highly in oral mucosa with more density on dorsum of tongue and salivary glands of buccal

mucosa or palates.^{5,6} Therefore, dental practitioners run a higher risk of infection during treatment and expose patients to cross-contamination if proper precautions are not done. Therefore, dental offices must be more equipped to spot a potential COVID-19 infection and stop it from spreading from person to person. This article examines the most recent guidelines for COVID-19 patient diagnosis and care.

CHARACTERISTICS:

Coronavirus are enveloped, non- segmented RNA viruses, with diameters of approximately 125 nm. The unique feature of this virus is the club-shaped spike projections from the surface of the virion. These act as a defining feature of the virion and give them the appearance of a solar corona, prompting the name, coronaviruses. There are three viral proteins that are present in the virion envelope namely spike protein (S), membrane protein (M), and envelope protein (E). The primary mediator of viral entrance is the spike protein, although the M and E proteins are also involved in virus assembly.^{5,6}

ROUTES OF TRANSMISSION:

The primary spread of this disease are as follows,

- Individual to individual who are within range of approximately six feet to each other
- Through respiratory droplets released during a cough or sneeze by an infected individual.

Because dentists are immediately and closely exposed to COVID-19, inhaling airborne particles and aerosols created

during dental operations on patients with the virus can be a high-risk practice. Therefore, in order to stop the transmission of illness, dentists must use a number of preventive measures, such as hand cleanliness, personal protective equipment (PPE), and vigilance when performing aerosol-generating operations.^{7,8}

POTENTIAL SALIVARY DIAGNOSIS

Salivary diagnostic platforms can be used to diagnose COVID-19. Up to 29 days after infection, strains of this virus were found in saliva, suggesting that a non-invasive platform that quickly distinguishes indicators from saliva could improve illness detection.⁹ The following are the three ways that COVID-19 can enter saliva:

- 1) COVID-19 in the blood can enter the mouth through crevicular fluid, an exudate specific to the oral cavity that contains local proteins derived from extracellular matrix and serum-derived proteins.
- 2) COVID-19 in the lower and upper respiratory tract that enters the oral cavity along with the liquid droplets commonly exchanged by these organs.
- 3) Lastly, severe and minor salivary gland infections are another method that COVID-19 can infect the oral cavity.

Hence, salivary diagnosis of COVID-19 could be performed using specific antibodies (Ig A) to this virus¹⁰.

DROPLETS AND AEROSOLS IN DENTAL SETTING:

- Too much heat would be produced by friction between the tooth and the fast-rotating bur when using a high-speed handpiece for dental operations. The absence of a coolant may result in pathological alterations to the dental pulp and harm to hard dental tissue. Therefore, it is widely agreed upon that using a water coolant during dental treatments, such as tooth preparation, oral prophylaxis, and oral surgery, will avoid heat increase.¹¹
- However, the water coolant may produce aerosols. Bioaerosols are produced when mouth cavity biological fluids including blood and saliva are mixed with them. These bioaerosols, which can linger in the air for a long time and be inhaled by dentists or other patients, are frequently tainted with bacteria, fungus, and viruses.
- Current epidemiological research indicates that dentists are more susceptible to 2019-nCoV transmission. In light

of this, it is imperative that the regular precaution and infection control strategy be modified to target 2019-CoV during this outbreak.¹²

PRECAUTIONARY MEASURES TO BE TAKEN IN DENTAL OFFICE

- i. It is recommended that dentists adhere to conventional contact and airborne precautions, which include the appropriate use of personal safety equipment (PPE), surgical masks and disposable working caps, protective goggles or face shields, nitrile or latex gloves, and good hand hygiene.^{8,9}
- I. Preprocedural mouthwash: Using 1% hydrogen peroxide or 0.2% povidone-iodine prior to surgery may help lower the number of coronaviruses in saliva^{14,15}.
- ii. To avoid cross-contamination, use single-use, disposable items like blood pressure monitors, syringes, and mouth mirrors.¹⁶
- iii. The gag reaction or cough that may occur with intraoral imaging should be avoided by using extraoral imaging, such as CBCT or panoramic radiography. Sensors should be double barriered when intraoral imaging is required in order to avoid cross-contamination and perforation.⁵
- iv. To reduce the amount of splatter produced, dentists should employ a rubber dam. According to reports, using rubber dams can drastically cut airborne particles in operational fields by 70%. In addition to routine suction, additional high-volume suction for aerosol and spatter should be employed during procedures when rubber dams are deployed.
- v. Three-way syringes and high-speed handpieces should be used less frequently by dentists. To avoid cross-infection, it is highly advised to use an electric handpiece with anti-retractive valves, an anti-retraction dental handpiece, or other anti-reflux designs.^{14,16}
- vi. Patients suspected of having COVID-19 should be treated in negative pressure treatment rooms or airborne infection isolation rooms (AIIRs). WHO advises using a negative pressure room with at least ¹² air changes per hour or at least 160 L/s per patient in order to promote natural ventilation. Prior to treating the next patient, mechanical ventilation should be started.¹⁷

- vii. Continuous air exchange in operating rooms can be facilitated by the use of air suction, filtration, and sanitary systems, such as stationary devices with plasma cluster ion technology or UV lights, portable air cleaners with High-Efficiency Particulate Air (HEPA) filters, or specialized negative pressure rooms. It is best to use systems with Ultra-Low Air Penetration (ULPA) or HEPA filters.
- viii. The human coronavirus prefers humid environments and can live on inanimate surfaces for up to nine days at room temperature. The operation area and inanimate surfaces must be thoroughly cleaned using a variety of disinfectants, such as hypochlorite and other alcohol-based solutions. To prevent the transmission of SARS-CoV-2^{13,14}, keep the surroundings dry.
- ix. To remove as many airborne infectious particles as possible, the dentist office must be fumigated after the surgery. Because ultraviolet C photons do not enter the layers of skin like UV-A and UV-B do, their toxicity is minimized when handled appropriately. Dental clinics can reduce the transmission of infection by implementing UV-C filters¹⁸.
- x. Medical waste, including disposable protective gear after use, must be promptly moved to the medical institute's temporary storage facility. Use "gooseneck" ligation and double-layer yellow medical waste package bags. Package bags should be labelled on the outside and disposed of in accordance with medical waste management regulations.¹⁹
- xi. Consider alternating levels of mask protection when performing activities to address mask shortage.
 - Level 1 mask (particulate filtration > 95%): Low-risk procedures with fewer aerosols, such as screening patients, cleaning equipment, taking impressions, cutting, polishing, and finishing temporary clothing, and collecting radiographs.
 - Level 2 mask (particulate filtration 98%). When operations like limited oral surgery, endodontics, prophylaxis, restorative /composite, and sealants produce light to moderate volumes of aerosols.
 - Level 3 mask (particulate filtration 98%): Use in scenarios involving difficult oral operations, crown

preparations, implant implantation, periodontal surgery, the use of ultrasonic scalers, and laser-based procedure that produce moderate to high levels of aerosols.²² Healthcare workers and anyone who have close contact with COVID-19 patients during treatment and other testing procedures are strongly encouraged to use N95 masks.

Though this pandemic reduced initially and various vaccination protocols were followed to reduce the occurrence and severity of this disease, several outbreaks were seen in the following years March-May 2021, December 2022, February 2023, December 2023, January 2024²⁰. Also, covid-19 is seen to be associated with lot of cardiac complications like ischemic heart disease, heart failure, arrhythmias, myocarditis. In India, several cases with history of covid infection were reported with cardiac complications recently. Hence it is mandatory to contain the spread of infection as much as possible to avoid any further complications.

Dental practice during these times were continued with all necessary precautions without halting the service to patients. In most of the cases, tele-dentistry was highly followed in order to avoid unnecessary exposure to pathogen. Since this disease has become more common globally and also people keep travelling to different countries, chances that these people can become carriers of SARS-CoV infection are predominantly high. Thus, it is better to consider COVID-19 infection as a universal disease and dental professionals should be performing the procedures cautiously with all necessary precautions to order to avoid spread of infection.

CONCLUSION:

Hence, it is utmost important to control this COVID -19 outbreak across the world. Healthcare professionals are at increased risk of this exposure while treating the patients. Awareness about the disease and adequate protective measures to be followed to halt the progression of disease. It is important to educate the public, make informed clinical decisions, to prevent panic and promote well-being of patients during these pandemic time. Also, we can consider COVID-19 as most commonly prevalent disease among individuals these days and necessary universal precautions

need to be followed during dental treatments to avoid unnecessary complications.

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