



Dentistry in Covid-19: A Review

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Abstract

COVID-19, an acute respiratory pandemic caused by the Coronavirus Disease 2019, has rapidly engulfed the world, resulting in a surge of infections and fatalities. This highly contagious and lethal disease can be transmitted through saliva and contact, whether individuals display symptoms or not. Airborne transmission poses a significant risk, especially during dental treatments, generating aerosols that may serve as a vehicle for infection spread. Common symptoms include nasal congestion, runny nose, sore throat, and diarrhea. Dental practitioners face substantial exposure to the 2019-nCoV virus due to direct interactions with patients, handling bodily fluids, and using sharp instruments. Infection control measures are vital to impede person-to-person transmission in dental settings. This review aims to address COVID-19's nature, symptoms, modes of transmission in clinics, current infection control practices in dental healthcare, and propose modifications to curb virus transmission.

Keywords: Covid-19, Outbreak, Symptom, Infection, Transmission

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Introduction

Since 2019, the entire world has been grappling with the devastating pandemic known as Coronavirus Disease or Covid-19. This highly transmittable and pathogenic viral illness is

caused by severe acute respiratory syndrome coronavirus-2, affecting over 170 million people and causing approximately 3.6million deaths worldwide. In the early outbreak stages, there was evidence of experimental human-to-human transmission, but the primary mode of transmission is now recognized to be airborne. Almost every individual in the population is susceptible to the virus, and its incubation period ranges from 1 to 14 days, with a peak of around 3 to 7 days. Common clinical symptoms include fever, cough, sore throat, breathlessness, fatigue, malaise, and diarrhea. Additionally, Covid-19 may manifest orally with symptoms such as loss of taste sensation, dry mouth, excessive saliva, mouth rashes, angular cheilitis, oral mucosal lesions, bad breath, candidiasis and squamous gingivitis. Older individuals are more prone to severe respiratory syndrome caused by Covid-19. In this pandemic situation, implementing infection control measures is crucial to prevent further virus spread and manage the epidemic effectively. For dental practices and hospitals situated in regions commonly affected by COVID-19, it is imperative to implement strict and effective infection control protocols. The pandemic has severely impacted healthcare systems in numerous countries, leading to job losses and economic repercussions on a global scale. Many nations are grappling with subsequent waves of outbreaks, mainly due to the emergence of mutant variants of the coronavirus. This article serves as a comprehensive review of Coronavirus/Covid-19 and delves explicitly into infection control aspects in dentistry during the ongoing COVID pandemic.

WHAT IS COVID-19?

A coronavirus is a type of common virus that can cause infections in the nose, upper respiratory tract, sinuses, and oral cavity. It is an enveloped, positive single-strand virus with a diameter ranging from 60 to 140 nm. The virus appears spherical or elliptical and displays a distinctive crown-like appearance under the microscope. This novel virus belongs to the subgenus arbovirus, specifically within the Orthocoronairinae subfamily. Currently, there are several variants of the coronavirus, namely Alpha, Beta, Gamma, Delta, Omicron, Lambda, and Mu, that are spreading worldwide. These variants have demonstrated a higher level of contagiousness and increased fatality compared to the original virus strain.

SIGNS AND SYMPTOMS

The symptoms of COVID-19 vary, ranging from mild to severe illness. Common symptoms include fever, headache, loss of taste, congestion, rhinorrhea, muscle pain, and oral manifestations such as ulcers, gingivitis, candidiasis, bad breath, and angular cheilitis.¹¹ These symptoms can be categorized into three clusters: a respiratory cluster with cough, sputum, and shortness of breath, a muscular pain cluster, and a cluster with headache and digestive problems.

POSSIBLE TRANSMISSION IN DENTAL CLINICS

COVID-19 can be transmitted directly from one person to another through various routes, such as direct contact, respiratory droplets from sneezing and coughing, airborne transmission, and even through contact with contaminated surfaces (fomites).^{12,13} The incubation period for asymptomatic individuals with COVID-19 has been reported to be approximately 1-14 days, and even after two or three weeks, individuals without symptoms can still spread the virus.^{14,15,16} Biosafety risks during dental procedures Inhalational transmission of COVID-19 is a significant concern during dental procedures, and the risk is particularly high due to the use of aerosol-generating equipment such as Airtor handpieces, 3-way syringes, ultrasonic scalers, and irrigation devices. These instruments facilitate the diffusion of aerosol particles containing saliva, blood, and secretions, leading to contamination of the dental environment, instruments, apparatus, and floor surfaces.^{17,18,19} Airborne spread of COVID-19 is well-documented in various literature.¹² Aerosols, consisting of both liquid and solid particles with diameters around 50 micrometers, are formed when the liquid in droplets evaporates, leaving behind solid particles with nuclei measuring 0.5 to 10 micrometers, composed of dried saliva and microorganisms.²⁰ Dental offices and hospitals face considerable challenges in controlling the generation of a large number of aerosols and droplets mixed with a patient's oral secretions, such as blood and saliva, during dental procedures.^{21,22}

Contact Spread

Contact spread of COVID-19 is prevalent in dentistry, both through direct and indirect contact with human fluids such as saliva and blood, as well as through contact with patient materials, contaminated instruments, and environmental surfaces.²¹ During dental procedures, dental professionals, other staff, and patients are at increased risk of contacting conjunctival, nasal, or oral mucosa with droplets and microorganisms containing the virus. These infectious aerosols can be propelled short distances through talking, breathing, and coughing, especially when proper mask-wearing practices are not observed.¹²

Contaminated Surface

Human coronaviruses like Severe Acute Respiratory Syndrome coronavirus (SARS-CoV), Middle East Respiratory Syndrome coronavirus (MERS-CoV), and endemic human coronavirus (HCoV) can easily persist on various surfaces such as glass, metal, and plastic for a few days to weeks.^{23,24} Healthcare workers and dental professionals frequently come into contact with these potential sources of coronavirus transmission. In dental clinics or hospitals, aerosols and droplets derived from infected patients can contaminate surfaces throughout the facility. Therefore, maintaining clean and dry environments in dental clinics and hospitals becomes crucial to reduce the persistence of the virus on surfaces and minimize the risk of transmission.

Infection Controls Measures In Our Dental Clinic

Dental professionals and healthcare workers must be well-informed about COVID-19 and its modes of transmission. In the field of dentistry, as in any other health profession, infection control plays a critical role in maintaining a safe environment in dental clinics and hospitals. This is particularly important because patient saliva and blood may contain oral commensals and opportunistic pathogens, making infection control measures essential. Dental professionals are trained to identify patients who may have COVID-19 infection and are aware of the crucial extra-protective measures that need to be implemented during routine work. By adhering to strict infection control protocols, dental professionals can effectively reduce the risk of COVID-19 transmission in their practice and protect the health and safety of both patients and themselves.

Patient's Past, And Present History

Amid the pandemic, it's vital to assess emergency dental treatment needs before scheduling appointments. Prior to confirming an appointment, the patient's general history is obtained through telephone or other suitable means. A COVID-19 screening questionnaire is administered, including inquiries about symptoms, recent travel history, and potential exposure. If there are indications of a SARS infection, the patient must undergo testing, and additional infection control measures should be implemented. Non-emergency procedures should be deferred to minimize risks.

Hand Hygiene

Faeco-oral transmission of the coronavirus highlights the significance of hand hygiene for dental professionals. Although it is a routine practice, hand washing compliance among dental professionals tends to be low, posing a significant challenge to infection control during the pandemic. To mitigate risks, dental professionals must practice thorough hand hygiene before examining a patient or performing dental procedures. Additionally, they should refrain from touching their eyes, nose, mouth, or hair to avoid potential contamination.

Personal Protective Measures For The Dental Professionals

In response to the potential spread of coronavirus/Covid-19 infection, dental professionals are advised to follow three-level protective measures for specific situations: Primary protection (standard protection for staff in clinical settings) includes wearing a disposable working cap, surgical mask, and white coat, using protective goggles or a face shield, and disposable latex or nitrile gloves if necessary. Secondary protection (advanced protection for dental professionals)

involves wearing a disposable doctor cap, surgical mask, protective goggles, face shield, and white coat along with disposable isolation clothing or surgical clothes outside, and disposable latex gloves. Tertiary protection (strengthened protection when contacting patients with suspected or confirmed 2019-nCoV infection) requires implementing additional protective measures when dealing with such patients.

Mouth Rinse before dental procedures

The use of preoperative antimicrobial mouth rinses is believed to effectively reduce the number of oral microbes. These rinses often contain antimicrobial compounds such as chlorhexidine, fluoride, triclosan, cetylpyridinium chloride, essential oils, and iodine, which are commonly used for general oral hygiene and therapy. By utilizing a therapeutic antimicrobial mouth rinse before dental procedures, the potential for aerosol contamination can be significantly reduced.

Rubber dam isolation

To prevent the transmission of Covid-19, the use of rubber dams in dental procedures can effectively reduce the production of saliva, blood-contaminated aerosols, and spatter, especially when using high-speed handpieces and dental ultrasonic devices. According to various studies, the use of rubber dams has been shown to reduce airborne particles within the ~3-foot diameter of the operational field by approximately 70%. During dental procedures with a rubber dam in place, it is recommended to employ extra high-volume suction to control aerosols and spatter, in addition to regular suction.

Anti-Retract Handpiece

During dental treatment, a high-speed dental handpiece without anti-retraction valves can create a risk of aspirating and expelling debris and fluids. This can lead to the contamination of air and water tubes within the dental unit, potentially causing cross-infection with microbes such as bacteria and viruses. Numerous studies suggest that using an anti-retraction high-speed dental handpiece can significantly reduce the backflow of oral bacteria and HBV into the tubes of the handpiece and dental unit compared to handpieces without anti-retraction function. This measure helps enhance infection control and minimize the risk of cross-contamination during dental procedures. Some Modifications required in infection control in dental office settings during COVID-19 pandemic situations:

Before Booking A Patient Telephonically

- Prioritize the diagnosis to determine the urgency of the treatment.

- Request the most recent COVID-19 test results and conduct COVID screening using a questionnaire method.
- For scheduled appointments, instruct patients to wear masks, and if needed, only one accompanying person can complete COVID-19 questionnaires.
- Advise patients to brush their teeth and use mouth rinse before arriving at the practice.

Waiting Area

- Arrange a limited number of chairs, maintaining a 3-foot distance between them.
- Eliminate unnecessary items like toys and magazines from the waiting area.
- Provide hand sanitizer at the dental office entrance.
- Display COVID transmission-related information on a wall poster.
- Offer mouth rinse options (peroxide-, iodine-, or chlorine-based) for patients to use before treatment.
- Install a glass or plastic partition between the waiting area and the receptionist.

Administration Area

- Maintain essential staff or implement staff rotation.
- Ensure staff receive proper education about COVID-19 and its transmission.
- Enforce mask-wearing, hand hygiene, and adherence to social distancing among staff.
- Conduct daily temperature checks and COVID screening for everyone entering the dental office.

Treatment Area With The Dental Chair

- Cover the dental chair with plastic.
- Disinfect all surfaces, including the dental chair, before and after treatment using 70% alcohol.
- Remove non-essential items from the dental office.
- Dental practitioners and assistants should wear PPE, including a high-collar long-sleeve gown, plastic apron, gloves, mask, disposable hair and shoe covers, and a facial shield.
- PPE must not be removed immediately after treatment. Consider unused materials as contaminated and process or dispose of them appropriately after treatment.

Treatment

Consider using a rubber dam during restorative or endodontic procedures if possible. Utilize high and low-volume evacuators during the procedure. Avoid using high-speed handpieces and

ultrasonic scalers if possible.

Instruments, DUWL

Ensure that heat-resistant instruments are sterilized appropriately. Regularly inspect and test sterilizers for their effectiveness. Adopt the spray-wipe technique to disinfect all surfaces before and after treatments.

Consider using 70% alcohol or chlorinated compounds (2000 mg/L) for disinfection. Disinfect Dental Unit Water Lines (DUWL) by flushing them with appropriate disinfectant.

Air, ventilation, and general

- Ensure that air flow is adjusted to allow clean air to enter the treatment area from the rest of the surgery.
- Keep bathroom air extractors running continuously during consulting time.
- Install HEPA filters with UV light above the dental chair or use portable HEPA filters placed close to the patient during treatment.

CONCLUSION

The outbreak of this new virus has severely impacted the economic, medical, dental, and public health infrastructure of countries like China, India, and others. In dentistry, infection control has always been crucial, but during airborne infection epidemics and pandemics, extra precautions become necessary. Unlike medical facilities where pathogens are mainly transmitted through coughs, sneezing, and direct contact, dentistry involves the creation of saliva aerosols that can contaminate the air and surfaces. Dental practices put many individuals at risk, including practitioners, assistants, patients, administration staff, and cleaning staff, as well as accompanying individuals. Standard precautions are insufficient to combat the highly infectious and easily transmissible SARS-CoV-2 during this pandemic. Adequate personal protective equipment (PPE) and hand hygiene are imperative, and considering hair and shoe covers can further enhance safety. Efficient patient management can significantly improve the prognosis for those affected by this dreaded disease.

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