

Review Article

Infection control and role of dental professionals during covid era

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ABSTRACT:

Healthcare staff is the collective term for all people employed in healthcare settings. These workers run a high risk of coming into contact with potentially infectious substances such as blood, tissue, specific body fluids, medical supplies, equipment, or environmental surfaces. Key aspects of infection control include preventing iatrogenic nosocomial infections among patients and potential occupational exposure of healthcare personnel to disease-causing germs while providing care. Patients in the Chinese province of Hubei were exposed to pneumonia with an unknown origin as early as December 2019. These patients had symptoms like coughing, sore throat, malaise, diarrhea, high temperature, and dyspnea when they first showed up. Being a coronavirus, this newly emerging disease was given the name COVID-19. The most common ways that COVID-19 is spread are by talking, coughing, sneezing, and salivary sputum. Due to the close contact dental workers have with the oral cavity, thorough adherence to infection prevention measures is essential. Treatment of patients by the dental profession must take into account minimizing potential contamination in the dental environment caused by aerosol formation. Additionally, the dental professional plays a crucial part in educating the public about COVID-19-related biosafety precautions and providing them with guidance. The purpose of this literature review is to provide the dentist with information regarding the COVID-19 epidemic and its effects. Dental practitioners are thought to be at a greater risk.

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INTRODUCTION

All individuals working in healthcare environments are referred to as healthcare staff. These employees are at a high risk of coming into contact with infectious materials, such as blood, tissue, certain body fluids, medical supplies, equipment, or surfaces in the environment. Controlling iatrogenic nosocomial infections among patients and potential occupational exposure of healthcare workers to disease-causing bacteria during the delivery of care are key components of infection management. The terms "Disease Control" and "Infection Control" only refer to lowering the chances of contracting diseases, not to the complete prevention of iatrogenic nosocomial infections or occupational contact to blood and other potentially infectious materials.[1] Although the risk of nosocomial transmission of hepatitis B virus is now less likely, a small but significant number of staff may

be at risk of contracting hepatitis C virus and varicella zoster virus during dental treatments, according to recent data. Literature has also noted that the risk of infection transmission within the dental workplace is not a major concern.[2] Cross infection is another major issue that is brought up to the dentist in every situation. Dentists still don't do enough to prevent nosocomial infections, inconsistently employing the right sterilization techniques and neglecting to provide support workers with the proper protective gear. The findings of these KAP studies are remarkable given that the evaluation of dentists' Knowledge, Attitude, and Practice (KAP) is a well-established method to assess the state of infection management. The main findings of our systematic review on "the knowledge, attitude, and practice of dental practitioners regarding to infection control" show that nearly all KAP studies indicate that there is

insufficient information on this subject. These findings are consistent with previous research. [3, 4] Additionally, it is believed that a lack of information will result in subpar performance and practice leaks, both of which are outcomes of our study. Due to the proven involvement of dentists in the cross-infection of healthcare workers, patients, the dental laboratory, and their families, negligence of proper procedures and guidelines [5] for infection control in a profession like dentistry is dangerous. However, at the first stage of the disease's spread, immunological resistance to infectious illnesses like hepatitis B would play a significant role. All healthcare policy makers must be concerned about the issue of infection control in the dental profession because the etiology of these conditions is not fully understood. Additionally, all dentists and dental students have a moral and professional obligation to care about this issue and make it a top priority.

With a population of more than 11 million, the city of Wuhan in the province of Hubei is regarded as China's most populous. There were 27 people with pneumonia of unclear cause as of December 31, 2019 [6-9]. Clinical symptoms such as coughing, sore throat, malaise, diarrhea, prolonged high fever, and dyspnea were present in these patients. Medical imaging tests also revealed bilateral pulmonary alterations [10]. The World Health Organization (WHO) later designated the illness COVID-19 and determined that it was caused by a coronavirus family [6,7]. At first, numerous modes of human transmission were hypothesized to occur, including vertical transmission (from mother to kid), fecal, and oral [7]. However, speaking, coughing, sneezing, and other respiratory fluids are its main methods of transmission.

Saliva droplet transmission of COVID-19 is crucial because, in the absence of protective measures, this transmission can take place when there is less than one meter between two people [9]. Due to the length of most patient appointments and the close proximity of the two parties, this has an immediate impact on the work of dental professionals [11]. A significant number of dental treatments also require the creation of aerosols. Therefore, when we evaluate the risk of COVID-19 associated pollution, it is thought that the dentistry profession is one of the most dangerous among medical professions [12]. The goal of this literature review is to educate the dental community on the COVID-19 epidemic and its effects on the practice of dentistry. The biosafety regulations specific to the profession are examined in this context, and potential directions for a more suitable dental procedure are offered.

SARS-CoV-2 is regarded as a public health emergency and has a high potential for spreading by saliva, sneezing, coughing, and aerosols ejected through the respiratory system [7]. A little is known about COVID-19. However, the illness appears to start out like pneumonia but can later cause lung fibrosis and even mortality in some cases [9, 13]. Due

to its polymerase proliferative activity, the SARS-CoV-2 RNA has a high mutation capacity. The high rate of mutation directly affects the virus's capacity for evolution. According to Peng et al. [9], SARS-CoV-2 possesses a simple chain genome[14].

SARS-COV-2 TRANSMISSION

The development of noninvasive salivary diagnosis can offer a platform for the quick and early identification of SARS-CoV-2 infection in a convenient and cost-effective manner [12]. Saliva can play a significant role in the human-to-human transmission of the virus. According to recent findings, infected people's saliva contained a live virus [15]. Additionally, it has been established that COVID-19 infection occurs via the ACE2 cell receptor, just like SARS coronavirus infection does [16]. SARS-CoV-2 can efficiently enter cells by using the ACE2 as a receptor, which could encourage human-to-human transmission. Numerous ACE2 positive cells have been discovered in the respiratory system, as well as cells that resemble the salivary gland in the human mouth. Since salivary glands may be a possible target for COVID-19, the expression of ACE2 in minor salivary glands was higher than in the lungs [17]. Patients who list oropharyngeal secretion as one of their symptoms are eligible to have saliva samples taken [18]. Additionally, it offers the chance to make a diagnosis using a noninvasive saliva sample. This might improve COVID-19 detection rates and slow the virus's propagation. Initially, blood and nasopharyngeal (or oropharyngeal) samples are used in the majority of laboratory diagnostic tests. In cases of severe respiratory infections, sputum and other samples were also taken into consideration as lower respiratory tract samples [18, 19].

UNDERSTANDING COVID-19 SPREAD CYCLE IN THE DENTAL CLINIC

More study is required to determine the effects of coronavirus detection in oral secretions on the spread of the virus. For dentists and other healthcare practitioners who undertake operations that produce aerosols, in particular, this will be essential in developing infection prevention strategies. The dental professional must take precautions and adhere to biosafety procedures in order to stop the spread of the COVID-19 virus [12]. The most pressing worry in dentistry clinics and hospitals is the spread of SARS-CoV-2 since it is challenging to prevent the production of significant amounts of aerosols, droplets, and even blood mixed with patient saliva during clinical treatment [15]. Aerosols are solid or liquid particles that are suspended (for at least a few seconds) in a gas and contain bacteria or viruses. It is believed that the smaller aerosol particles (0.5 to 10 mm in diameter) have the greatest potential to transmit SARS-CoV-2 because they have the ability to enter and lodge in the lungs' more restricted airways. As a result, when using dental tools in the oral cavity,

such as high-speed handpieces, there is a significant amount of aerosols generated, which, in turn, increases the risk of transmission of the COVID-19 disease, according to Sabino-Silva et al. [12]. Small enough to float through the air for a long time before settling on surfaces or entering the respiratory system are particles, droplets, and aerosols.

The transmission may happen from patient to patient, dentist to patient, patient to dentist [21], as well as between dentists. Potential contamination routes can be bidirectional. Therefore, the dentist may serve as a key vector for the pandemic and may encourage cross-infection. In order to prevent aerosols from being produced and spread, it is necessary to use personal protective equipment (PPE), such as masks, glasses, visors, chemical and physical protection barriers, constant utensil disinfection with 70% alcohol, and ultrasound equipment. According to Sattar et al. [16], chemical disinfection agents should be tested against SARSCoV-2 to ensure their efficiency. In this situation, medical professionals—like dentists—might not be aware of how to treat patients with silent infections [18]. Asymptomatic infections appear to be conceivable [22], and transmission can take place before disease symptoms manifest.

DENTAL INFECTION CONTROL PRACTICE

Dental surgeons must possess the expertise required to recognize probable COVID-19 patients, according to Qu and Zhou [11] and Ji et al. [23]. To stop the spread of the virus, doctors should question patients about their recent flu experiences, travel to areas with high levels of contamination, fever, and whether they came into touch with somebody who has COVID-19 symptoms. The most emotionally fragile individuals may experience some oral changes as a result of the stress brought on by the spread of erroneous information, which can lead to emotional imbalance. They should also offer guidance to patients and demonstrate empathy. These patients may experience oral psychosomatic problems, including halitosis, bruxism, oral paresthesia, dry mouth, burning mouth, unusual toothache, and recurrent aphthous ulcers. Usually, changes in physical and emotional conditions are the cause of these symptoms. Additionally, due to the weakened immune system and/or susceptible oral environment, severe SARS-CoV-2 infection and associated therapy have the potential to worsen oral health conditions like various opportunistic fungal infections, dry mouth linked to decreased salivary flow, ulcerations, and gingivitis [24].

In order to reduce the dangers of COVID-19 spreading, dental practitioners must also educate the general public on preventive measures, according to Sohrabi et al. [10], Peng et al. [9], and Wang et al. [18]. Simple rules like frequently washing your hands with soap and water, using 70% alcohol, using alcohol gel, covering your mouth and nose with absorbent paper when coughing or sneezing, being cautious

when using and storing your toothbrush, and maintaining good oral hygiene to control microorganisms should be taught.

The entire setting in the dental office should be viewed as high risk. Therefore, it is advised that periodicals, ornaments, and other items that could spread the virus contamination be removed, and that the dental office supply masks and disinfectant alcohol [25]. Once inside the clinic, a digital thermometer should be used to take the patient's temperature on the forehead to check for any potential fevers. The visit should be rescheduled and the patient should be encouraged to consult a doctor if they are experiencing an acute febrile state [9].

To prevent cross contamination, the professional must use PPE properly, including a mask to stop the spread of fluids, goggles or other face protection, and gloves. No appointments should be made for non-urgent treatments, especially in patients who have the flu or other comparable symptoms. Proper chemical and physical barriers must be implemented. Additionally, it is necessary to properly dispose of biological waste and contaminated items [26]. Since the use of masks does not successfully guard against particles below 5mm, the professional must be extremely attentive with the dangers of cross contamination both before and after the procedures. Surgical masks do not adequately protect against airborne transmission, as is widely known.

It is noteworthy that the danger of contact virus transmission from the PPE surface to the skin of healthcare workers is highest during the removal of PPE [27, 28]. It is crucial to understand that the front of a surgical gown, from the chest to the knees, and the sleeves, from the cuff to above the elbow, make up the contamination critical zone. Without thoroughly cleaning their hands, the dental expert should be careful to avoid touching their eyes, nose, and mouth. According to Meng et al. [7], the procedure should be carried out utilizing absolute isolation and high-volume evacuation for a patient who will need immediate care, such as a patient with a diagnosis of symptomatic irreversible pulpitis or painful symptoms brought on by trauma. The use of absorbable suture threads for soft tissues should be prioritized if surgery is required. If the patient is thought to be at risk for COVID-19, the dentist should take all necessary biosafety precautions, without skipping a beat, and schedule the patient's appointment for the end of the day or in a separate room to prevent cross-contamination in the waiting area [29]. Overall, any dental operation that has a chance of producing salivary aerosol could lead to COVID-19 airborne contamination. Techniques for air filtration are required inside the dental practice.

CONCLUSIONS

There is no established treatment for COVID-19. Dental professionals are thought to have a significant risk of COVID-19 infection. The transmission of

COVID-19 through saliva is mostly to blame for this. Only emergency dental care should be provided, and PPE such N95/FFP2 or FFP3 masks, disposable cloaks, visors, goggles, disposable caps, and gloves should be used due to the increased risk of contamination during dental care. Patients should receive advice on how to practice proper oral hygiene during the epidemic.

REFERENCES

- Porter SR. Infection control in dentistry. *Curr Opin Dent.* 1991;1(4):429-35. pmid: 1666310.
- Mahboobi N, Agha-Hosseini F, Mahboobi N, Safari S, Lavanchy D, Alavian SM. Hepatitis B virus infection in dentistry: a forgotten topic. *J Viral Hepat.* 2010;17(5):307-16.
- MoradiKhanghahi B, Jamali Z, Pournaghi Azar F, NaghaviBehzad M, Azami-Aghdash S. Knowledge, Attitude, Practice, and Status of Infection Control among Iranian Dentists and Dental Students: A Systematic Review. *J Dent Res Dent Clin Dent Prospects.* 2013;7(2):55-60.
- Garland KV. A survey of United States dental hygienists' knowledge, attitudes, and practices with infection control guidelines. *J Dent Hyg.* 2013;87(3):140-51.
- Centers for Disease Control and Prevention (CDC). Updated CDC recommendations for the management of hepatitis B virus-infected health-care providers and students. *MMWR Recomm Rep.* 2012;61(RR-3):1-12.
- Y Chen, Y Guo, Y Pan, and ZJ Zhao. Structure analysis of the receptor binding of 2019-nCoV. *Biochem Biophysical Res Commun.* 2020;525(1):135–140.
- L Meng, F Hua, Z Bian. Coronavirus disease 2019 (COVID-19): emerging and future challenges for dental and oral medicine. *J Dent Res.* 2020; 99(5): 481–487.
- X Pan, D M Ojcius, T Gao, Z Li, C Pan, C Pan. Lessons learned from the 2019-nCoV epidemic on prevention of future infectious diseases. *Microbes Infect.* 2020;22(2):86–91.
- X Peng, X Xu, Y Li, L Cheng, X Zhou, B Ren. Transmission routes of 2019-nCoV and controls in dental practice. *Int J Oral Sci.* 2020;12(1):1–6.
- C Sohrabi, Z Alsafi, N O'Neill et al. World Health Organization declares global emergency: a review of the 2019 novel coronavirus (COVID-19). *Int J Surg.* 2020;76:71–76.
- X Qu, X D Zhou. Psychological intervention in oral patients in novel coronavirus pneumonia outbreak period. *Chin J Stomatol.* 2020;55(4):235–240.
- R Sabino-Silva, ACG Jardim, WL Siqueira. Coronavirus COVID-19 impacts to dentistry and potential salivary diagnosis. *Clin Oral Investig.* 2020;24(4):1619–1621.
- H Xu, L Zhong, J Deng et al. High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa. *Int J Oral Sci.* 2020;12(1):8.
- Z Wu, J M. McGoogan. Characteristics of and important lessons from the coronavirus disease 2019 (COVID19) outbreak in China: summary of a report of 72 314 cases from the Chinese center for disease control and prevention. *JAMA.* 2020;323(13):1239–1242.
- KKW To, OTY Tsang, C Chik-Yan Yip et al. Consistent detection of 2019 novel coronavirus in saliva. *Clin Infect Dis.* 2020;71(15):841–843.
- S A Sattar, V S Springthorpe, Y Karim, P Loro. Chemical disinfection of non-porous inanimate surfaces experimentally contaminated with four human pathogenic viruses. *Epidemiol Infect.* 1989;102(3):493–505.
- J Xu, Y Li, F Gan, Y Du, Y Yao. Salivary glands: potential reservoirs for COVID-19 asymptomatic infection. *J Dent Res.* 2020; 99(8):989.
- C Wang, P W Horby, F G Hayden, G F Gao. A novel coronavirus outbreak of global health concern. *The Lancet.* 2020;395(10223): 470–473.
- G Gupta, D Mitra, KP Ashok et al. Efficacy of preprocedural mouth rinsing in reducing aerosol contamination produced by ultrasonic scaler: a pilot study. *J Periodontol.* 2014;85(4):562–568.
- S Acharya, H Priya, B Purohit, M Bhat. Aerosol contamination in a rural university dental clinic in south India. *Int J Infect Control.* 2010;6(1):1–7, 2010.
- AMGA Laheij, JO Kistler, G N Belibasakis, H Valimaa, JJ de Soet. Healthcare-associated viral and bacterial infections in dentistry. *J Oral Microbiol.* 2012;4(1).
- JFW Chan, S Yuan, KH Kok et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *The Lancet.* 2020;395(10223):514–523.
- W Ji, W Wang, X Zhao, J Zai, X. Li. Cross-species transmission of the newly identified coronavirus 2019-nCoV. *J Med Virol.* 2020;92(4): 433–440.
- PS Casamassimo, JA Townsend, CS Litch. Pediatric dentistry during and after COVID-19. *Pediat Dent.* 2020;42(2):87–90.
- G Spagnuolo, D De Vito, S Rengo, M Tatullo. COVID19 outbreak: an overview on dentistry. *Int J Environment Res Public Health.* 2020;17(6).
- M Malta, AW Rimoin, SA Strathdee. The coronavirus 2019-nCoV epidemic: is hindsight 20/20?. *EclinMed.* 2020;20.
- AL Hewlett, JB Varkey, PW Smith, BS Ribner. Ebola virus disease: preparedness and infection control lessons learned from two biocontainment units. *Curr Opinion Infect Dis.* 2015;28(4):343–348.
- WA Fischer, DA Wohl. Confronting ebola as a sexually transmitted infection. *Clin Infect Dis.* 2016;62(10):1272–1276.
- European Centre for Disease Prevention and Control, European Surveillance for Human Infection with Novel Coronavirus (COVID-19), European Centre for Disease Prevention and Control, Solna Municipality, Sweden, 2020, <https://www.ecdc.europa.eu/en/european-surveillance-humaninfectionnovel-coronavirus-COVID-19>.