Content available at: <https://www.ipinnovative.com/open-access-journals>

IP Annals of Prosthodontics and Restorative Dentistry

Journal homepage: <https://www.ipinnovative.com/journals/APRD>

Review Article

COVID-19 and facility preparedness in the field of prosthodontics

Pratibha Sharma^{1,*}, Rohi Kanwar¹, Archana Nagpal¹, Geetanjali Singh¹, Vidhushi Jindal²¹Dept. of Prosthodontics, Himachal Dental College, Sundar Nagar, Himachal Pradesh, India²Universidad Católica San Antonio de Murcia (UCAM Universidad Católica San Antonio de Murcia), Murcia, Spain

ARTICLE INFO

Article history:

Received 28-10-2020

Accepted 21-11-2020

Available online 02-12-2020

Keywords:

COVID19

Coronavirus

Aerosol generation

Tooth preparation

Symptoms

ABSTRACT

Dental clinics are a hotspot for nosocomial transmission of coronavirus disease (COVID-19). Prosthodontics stands at an entangled position in dentistry because of service to elderly patients, procedures such as tooth preparation that leads to aerosol generation, involvement of labs for dentures, crown fabrication. Moreover most of treatments requiring multiple sittings. These procedures range from low to very high risk of COVID-19. This review article aims to provide brief information pertaining to possible source of spread of COVID-19 in Prosthodontics setup regarding patient management and clinical strategies. Thus, the aim of this article is to present a brief overview of the history, symptoms, and routes of transmission of COVID-19 and specific recommendations for prosthodontic practice

© This is an open access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

1. Introduction

Coronavirus disease 2019 (COVID-19) is an highly infectious acute respiratory disease, which is caused by a novel coronavirus, (SARS-CoV-2).¹ It is the third documented outbreak of an animal coronavirus to humans in only two decades that has resulted in a pandemic. In spite of global efforts to restrict the disease spread, the spillover is still on a rise because of the community spread pattern of this infection. Dental professionals, including prosthodontists, may come across patients with suspected or confirmed SARS-CoV-2 infection and will have to actively engaged to provide care and to prevent nosocomial spread of infection. Thus, the aim of this article is to provide a brief overview of the epidemiology, symptoms, and routes of transmission of this novel infection. In addition, specific recommendations for dental practice are suggested for patient screening, infection control strategies, and patient management protocol.

1.1. Coronavirus

In 1965 when Tyrrell and Bynoe² isolated a virus from the respiratory tract of an adult with common cold and named it B814. After that, an ether sensitive RNA virus (229E) was isolated among medical students who suffered from URI in the winter of 1962.³ McIntosh et al⁴ recognised multiple strains, 2 of which appeared to be ether-stable and were detectable only by their ciliary immobilizing effect in organ culture. The remaining 6 were detected when organ culture harvests were examined by electron microscopy. Since these were grown in organ culture, they were designated as “OC” group.

In late 1960s a new group of viruses was recognised by a group of eight virologists. They found that this virus was round in profile, having a rounded or petal shaped fringe like characteristic projections. This appearance resembled “solar corona”. Due to this characteristic appearance they named it as “coronaviruses” which was later approved by the Vertebrate Virus Committee of the ICNV.⁴

In the first decade of 21st century, SARS (severe acute respiratory syndrome) infection was reported in 29 countries

* Corresponding author.

E-mail address: pratibhalok@gmail.com (P. Sharma).

in North America, South America, Europe and Asia. The cause of this infection was again corona virus.

1.2. COVID-19

In December 2019, Wuhan city in China came into limelight, as many unexplained cases of pneumonia were reported. COVID-19 is caused by SARS-CoV-2, formerly known as 2019 novel coronavirus or 2019-nCoV.⁵ On 30 January 2020, this outbreak was declared an international public health emergency by the World Health Organization⁶ (WHO)

1.3. Symptoms

The most common symptoms at the onset of illness are fever, cough, dyspnoea and myalgia or fatigue less common symptoms are sputum production, headache, haemoptysis, and diarrhoea.⁵ Reduced sense of smell (hyposmia), and abnormal taste sensation (dysgeusia)⁶ have also been reported. Most of the patients possess mild flulike symptoms. These asymptomatic patients can act as “carriers” and also serve as reservoir for re-emergence of infection. Incubation period ranges from 0-24 days, This increased incubation period can lead to transmission of disease prior the appearance of any symptoms. (estimated median incubation period was 7.76 days the 90th percentile was 14.28 days the estimated probability that the incubation period is longer than 14 days was between 5 and 10%).⁷

1.4. Transmission

SARS-CoV-2 infections spread mainly through contact or respiratory droplets, so the social distancing is recommended to minimise the spread. Virus has been also found on the inanimate objects near the infected individual so handwashing and disinfection are the major preventive methods. In addition, studies have shown the presence of SARS-CoV-2 in both saliva and faeces of the affected patients.^{8,9} Therefore, there is a potential for transmission of COVID-19 via aerosol, fomites, or the feco-oral route that may contribute to nosocomial spread in the dental office setting.

1.5. Testing

Currently two methods are used most frequently for the detection of COVID-19. The real time polymerase chain reaction (RT-PCR) is considered as the “gold standard” and is characterized by rapid detection, high sensitivity, and specificity.¹⁰ The sample for RT-PCR is obtained by a nasopharyngeal swab or sputum, as well as saliva.¹¹

The second one detects antibodies produced in response to infection. Another option to identify the COVID-19 is assessment of lung damage via either a computed tomography (CT) scan or low oxygen uptake saturation.

1.6. The basic safety protocols can be discussed under the following headings

1.6.1. Tele-Consult and Tele-Screening

Telephone screening is preferred as the first point of contact with the patient or reception office is encouraged. Past and current medical history should be taken carefully, specially pertaining to the symptoms of COVID-19. Any positive responses should raise concern, and treatment should be deferred except in dental emergencies.

1.6.2. Personal care

N95 face masks, protective eyewear/face shields and gloves along with cover all should be worn for High Risk and very high-risk procedures. After every splatter related or aerosol generating treatment fumigation is mandatory. Use of rubber dam is encouraged. The 4-handed technique is beneficial for controlling the infection. All asymptomatic treatments/elective procedures should be deferred.

Proper donning and doffing protocols of PPE should be followed (Please refer to the attached schematic instruction as recommended by CDC, Figures 1, 2 and 3). The discarded PPE should be disposed of without causing any contamination. 2.5% sodium hypochlorite or 0.5% hydrogen peroxide can be added to the water reservoir of the dental chair. Fees should be preferred to be paid by Digital means. Personal health assessment should be done periodically and immediate self-quarantine if any of the symptoms develop. It is advised to inform the concerned authorities.

1.7. Patient care

Wearing of face mask is mandatory. Every patient should have the body temperature checked by thermos gun without making contact and should use a sanitiser on the entrance of the clinic. They should be instructed not to wear jewellery. The patient should be provided with a mouth wash rinse with 10 ml of the 0.5% solution of PVP-I solution (standard aqueous Povidone Iodine antiseptic solution based mouthwash diluted 1:20 with water). They should be instructed to distribute it throughout the oral cavity for 30 seconds and then gently gargle at the back of the throat for another 30 seconds before spitting out. Patients consent should be taken on paper before proceeding with the treatment.

1.8. Clinic and operator care

Windows should be kept opened so as to maintain the circulation of the air. Ceiling fan should not be used while performing procedure. A table fan should be placed behind the operator and airflow should be allowed towards the patient.¹² Visual alerts should be displayed at the entrance of the facility, waiting room and in operating areas about respiratory hygiene, social distancing and disposal

Fig. 1:

Fig. 2:

Fig. 3: 1,2,3: Centers for Disease Control and Prevention recommendations for putting on and removing personal protective equipment for treating COVID-19 patients. From: <https://www.cdc.gov/hai/pdfs/ppe/ppe-sequence.pdf>

of contaminated items in trash bins. Waiting chairs should be kept a meter apart. Changing room should be available for staff and all workers to wear scrubs and clinic shoes. A trained person should be available for invigilating and testing the quality of sterilisation as per the standard norms. There should be sufficient space for storage of additional PPE kits and sterilisation and disinfection instruments and chemicals. Washrooms should be equipped with Sensor taps and paper towels.

Surface Disinfection: For disinfection of tables/platforms, floors and sinks, sodium hypochlorite based solution should be used preferably.

Floors: 2 Step Cleaning Procedure should be followed (Detergent and freshly prepared 1% sodium hypochlorite with a contact time of 10 minutes. For rest of the surfaces freshly prepared 1% sodium hypochlorite is used. Frequency: before starting daily work, after every procedure and after finishing daily work. Delicate Electronic equipment should be wiped with alcohol-based rub/spirit (60-90% alcohol) swab.

Clinicians should be encouraged the clinics to move to digital platform and use of intra oral scanners instead

of regular impressions whenever possible. Impression compound, Zinc oxide eugenol (ZOE), Polyvinylsiloxane and polysulfide impression materials are immersed in a 5.25% sodium hypochlorite solution for 10 minutes after thoroughly rinsing (9-12). Alginate and polyether impressions should be rinsed under water, sprayed with a 5.25% sodium hypochlorite solution and sealed in a plastic bag for at least 10 minutes. It has been found that 2% glutaraldehyde did not affect the accuracy and dimensional stability of polyether and polyvinyl siloxane impression materials after immersion for 30 or 60 minutes.¹³ Twenty minute immersion in 2% ID 210 solution (Durr Dental, Bissingen, Germany) has no adverse effects on the dimensional stability or surface detail reproduction of rigid material such as an impression compound, impression plaster, and zinc oxide-eugenol impression material.¹⁴

1.9. Disinfection of wax bites/occlusal rims, bite registrations

Wax, ZOE, and resin centric relation records should be rinsed under water and sprayed with a 5.25% sodium hypochlorite solution and placed in a plastic bag for 10 minutes.¹⁵

1.10. Disinfection of casts

Stone casts are the most difficult item to be disinfected without causing any much damage. Casts requiring disinfection are sprayed with a 5.25% sodium hypochlorite solution and allowed to sit for at least 10 minutes.¹⁶

1.11. Disinfection of dental prostheses

Complete dentures and provisional restorations that leave the operatory are immersed in a 5.25% sodium hypochlorite solution for 10 minutes. Removable partial dentures with metal bases should be sprayed with 2% glutaraldehyde solution and held in a plastic bag for 10 minutes.¹⁶

Large, non-sterilizable items used in the operatory, such as impression material dispensing guns, articulators, face bows, water bath, silicone spray bottles, tooth shade, and mold guides should be disinfected by wiping, spraying, or immersion with the appropriate disinfectant solution.¹⁷

1.12. Laboratory care

All lab personnel should follow the proper infection control protocols, including wearing Personal Protective Equipment including mask, gloves, protective eyewear, and protective garment. Labs should be disinfected with disinfectants containing virucidal agents. All packets containing the models etc. need to be disposed off with utmost care and then the material subjected to disinfection procedures. Staff should be instructed to stay at home if they develop any of the Covid-19. All dental prosthesis coming in and

going out of the lab should be thoroughly disinfected. Ensure regular fumigation of the dental laboratory. The laboratory burs should be cleaned and placed in a new bag after every procedure for sterilization. For polishing the lathe, the technician should use individually packaged sterile polishing wheels, designated for use with pumice. Antiseptic containing Octenidine can be added as active agent to conventional pumice so as to reduce the number of microorganisms during polishing. The mix of steribim and water also reduces the number of bacteria by 99%.¹⁸

2. Conclusion

The risk of COVID-19 transmission in dental practices is considered high. The reasons are the close contact with the patient, saliva, blood, spatter and aerosol exposure. Elective dental treatments were suggested to be postponed but increased safety measures are suggested to all patients since every patient can be potentially contagious. Though, there is a little known regarding COVID-19 therefore, the present recommendations are based on evidence from similar diseases, such as SARS and MERS.

The described recommendations were suggested for the COVID-19 pandemic only. Before vaccination is available, strict recommendations are required to prevent infection and nosocomial transmission in dentistry. As the rapid test kits are available now, their extensive use prior to dental care procedure is helping in determining the health status of the patients. The duration of the pandemic cannot be predicted at the moment and elective treatments cannot be indefinitely postponed, testing may represent a positive turning point in management of dental patients during pandemic.

3. Source of Funding

No financial support was received for the work within this manuscript.

4. Conflict of Interest

The authors declare they have no conflict of interest.

References

1. The species Severe acute respiratory syndrome related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2. *Nat Microbiol.* 2020;p. 536–44.
2. Tyrrell DAJ, Bynoe ML. Cultivation of viruses from a high proportion of patients with colds. *Lancet.* 1966;287(7428):76–7. doi:10.1016/s0140-6736(66)92364-6.
3. Hamre D, Procknow JJ. A New Virus Isolated from the Human Respiratory Tract. *Proc Soc Exp Biol Med.* 1966;121(1):190–3. doi:10.3181/00379727-121-30734.
4. Tyrrell DA, Almeida JD, Cunningham CH. Coronaviridae. *Intervirology.* 1975;5:76–82.
5. Zhu N, Zhang D, Wang W. A novel coronavirus from patients with pneumonia in China. *N Engl J Med.* 2019;382(8):727–33.
6. World Health Organization. Novel coronavirus disease named COVID-19; 2019. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>.

7. Huang C, Wang Y, Li X. Clinical features of patients infected with 2019 novel coronavirus in Wuhan. *Lancet*. 2020;395(10233):497–506.
8. To KK, Tsang OT, Yip CC. Consistent detection of 2019 novel coronavirus in saliva. *Clin Infect Dis*. 2020; Available from: [10.1093/cid/ciaa149](https://doi.org/10.1093/cid/ciaa149).
9. Zhang J, Wang S, Xue Y, Rothe CH, Schunk M, Sothmann P, et al. Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. *N Engl J Med*. 2020;382:970–1.
10. Tahamtan A, Ardebili A. Real-time RT-PCR in COVID-19 detection: issues affecting the results. *Exp Rev Mol Diagnostics*. 2020;20(5):453–4. doi:10.1080/14737159.2020.1757437.
11. Wyllie AL, Fournier J, Casanovas-Massana A, Campbell M, Tokuyama M, Vijayakumar P, et al. Saliva is more sensitive for SARS-CoV-2 detection in COVID-19 patients than nasopharyngeal swabs. *medRxiv*. 2020; Available from: [10.1101/2020.04.16.20067835](https://doi.org/10.1101/2020.04.16.20067835).
12. Covid19 guidelines for operation of air conditioning ventilation system DT; 2020. Available from: <https://mes.gov.in/sites/default/files/>.
13. del Pilar Rios M, Morgano SM, Stein RS, Rose L. Effects of chemical disinfectant solutions on the stability and accuracy of the dental impression complex. *J Prosthetic Dent*. 1996;76(4):356–62. doi:10.1016/s0022-3913(96)90538-7.
14. Fong PG, Walter JD. The effects of an immersion disinfection regime on rigid impression materials. *Int J Prosthodont*. 1990;3:522–7.
15. Naylor WP. Prosthodontic items of interest. *Int J Prosthodont*. 1992;5:188–9.
16. Rampal N, Kaushik P. Infection Control In Prosthodontics. *J Oral Health Community Dent*. 2010;4(1):7–11. doi:10.5005/johcd-4-1-7.
17. Phull S, Arora A, Yashendra. Sterilization and Disinfection In Prosthodontics. *Ind J Dent Sci*. 2014;6(4):112–6.
18. Setz J, Heeg P. Disinfection of pumice. *J Prosthetic Dent*. 1996;76(4):448–50. doi:10.1016/s0022-3913(96)90553-3.

Author biography

Pratibha Sharma, Post Graduate Student

Rohi Kanwar, Post Graduate Student

Archana Nagpal, HOD

Geetanjali Singh, Senior Lecturer

Vidhushi Jindal, IIIrd Year Student

Cite this article: Sharma P, Kanwar R, Nagpal A, Singh G, Jindal V. COVID-19 and facility preparedness in the field of prosthodontics. *IP Ann Prosthodont Restor Dent* 2020;6(4):184–188.