



## COVID-19: PROSTHODONTIC CHALLENGES AND OPPORTUNITIES IN DENTISTRY

### Dental Sciences

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### ABSTRACT

CO- Corona, VI- Virus, D-disease and 19 as it originates in the year 2019. In December, an outbreak of coronavirus disease 2019, caused by a novel severe acute respiratory syndrome coronavirus -2 (SARA-CoV-2) was reported. This disease was originated in Wuhan, China in late December 2019. World health organization on March 11<sup>th</sup> 2020 declared it as a Pandemic situation. The disease has affected every profession. Dentists and their dental staff including assistants, specialists and patients are potentially at higher risk of COVID-19 infection during dental treatment. The prosthodontic field deals with the patient of young, middle-aged, and old aged. So patients may have low to very high risk of COVID-19. In prosthodontic practice, elderly patients or those with health problems are most vulnerable to this disease. This article summarizes various aspects of COVID 19 and methods of prevention of its spread and recommendations regarding prosthodontics dental treatment.

### KEYWORDS

Pandemic, Covid-19, Preventive Measures, Dental treatment.

### INTRODUCTION

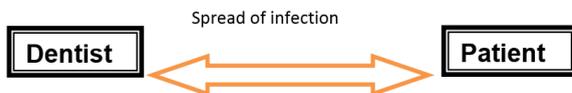
Coronavirus disease is caused by a novel severe acute respiratory syndrome coronavirus -2 (SARA-CoV-2). They are a family of large group of viruses causing illness from the common cold to the most severe disease such as MERS (Middle East Respiratory Syndrome) and SARS (Severe Acute Respiratory Syndrome). Credible evidence is available that this novel coronavirus has a resemblance to that coronavirus species found in bats, pangolin confirming the zoonotic nature of this new cross-species viral-mediated disease.<sup>1</sup> It has been reported that COVID-19 has impacted dentistry and dental practice to much larger extent and it was found that patients receive dental treatments only from 10% of the dentists. It has led to stress and anxiety due to financial burden, future career. The older age groups are at highest risk of getting infected from COVID-19 because of low immunity and other systemic diseases. Most of the old age patients are prosthodontic patients, so special measures should be taken in prosthodontic departments to ensure the safety of patients and prevent the spread of this deadly disease.

### Mode of transmission

Although direct contact with the intermediate host is suspected to be the initial transmission route, its transmission to humans is primarily through the respiratory tract via droplets, respiratory secretions, and or direct contact.<sup>2</sup> Virus enters the mucous membrane of the mouth, nose, and eyes. Lung cells are susceptible to COVID-19 attack because they express a high amount of ACE2, the "lock" protein which SARS-CoV-2 uses for entry.

### Transmission of infection in dental clinics

Dental clinics carry the risk of COVID-19 infection due to the specificity of its procedures as it involves frequent exposure to blood, saliva, other body fluids, face to face communications. Dental Patients and practitioners can be exposed to pathogens that include viruses and bacteria that infect the oral cavity and respiratory tract.



Infection can spread through various routes.<sup>3</sup>

#### 1) Air-borne spread

Through inhalation of airborne microorganisms that are suspended in the air for long periods, aerosols generated from an infected individual, coughing and talking without a mask.

#### 2) Contaminated surface spread

Through contaminated dental instruments and/or environmental surfaces makes a possible route to the spread of viruses.

### Signs and Symptoms<sup>4</sup>

The virus has been reported to remain infectious on inanimate surfaces in the range between 2 hours-9 days. They can be divided into two main categories that are major or minor symptoms. Early symptoms in some patients can be mild or unspecific.

#### Major symptoms

1. Fever
2. Dry cough
3. Running nose
4. Difficulty in breathing
5. Loss of smell and taste
6. Sore throat

#### Minor symptoms

1. Headache
2. Myalgia
3. Nausea
4. Diarrhoea
5. Loss of appetite
6. Nasal congestion

Old aged people and immunocompromised patients may reflect a varying atypical symptoms such as fatigue, reduced alertness, reduced mobility, diarrhoea, loss of appetite, delirium, and absence of fever.<sup>5</sup> Incubation period ranges from 3-14 days.

### Why Prosthodontic Patients need special care?

1. Prosthodontics is a specialty of dentistry that deals with patients of varying ages that are geriatric age group, young adults, and middle age group.
2. The young and middle age group are served in form of Implant-supported prosthesis, Crown and Bridge to replace missing teeth. Geriatric patients need removable dentures such as complete or partial, implant-supported dentures. Patients who belong to the geriatric age group are prone to catch this infection easily.
3. These patients have low immunity and various systemic diseases making them very prone to COVID-19.
4. Unlike other dental treatments which can be completed in a single sitting, prosthodontic treatment demands multiple visits by patients making a unique challenge to ensure safety at every appointment.
5. The challenge is much more because of various factors such as exposure to saliva and blood during implant placement, pre-prosthetic surgeries, exposure to aerosols during tooth preparation, high concentration of copious saliva in trays, and dentures.
6. Another factor to be considered is laboratory services which involve a chain of multiple people starting from a dentist, assistant, laboratory technicians. So, more the people are involved more are the chances of infection.

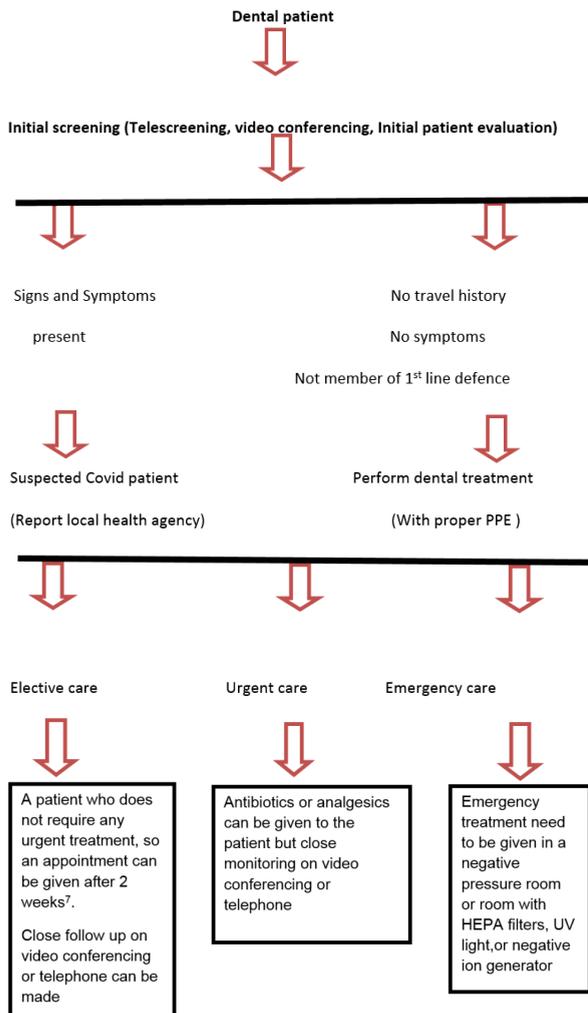
### Changes to be made in a dental clinic to deal with Patient-related to Prosthodontics:

Proper precautions need to be followed by the dentist to prevent cross-infection. Consider every patient as a carrier of the coronavirus.

- 1) The patient should book an appointment before visiting the dental clinic.
- 2) Screening of every asymptomatic patient is important. A detailed questionnaire regarding signs and symptoms, traveling history, any contact with COVID-19 patient need to be fill.<sup>6</sup>
- 3) Maintain a proper record including address, contact number, and

- other related details.
- 4) No patient is allowed to enter the clinic without a face mask.
- 5) For payment try to use as much as a possible digital mode of transactions.
- 6) **Waiting area:**
  - Avoid patient gathering, minimum patients in the waiting area
  - Should be well ventilated
  - Spaced out seating of patients with a space of at least 6 feet.
  - Remove magazines, reading material, or other objects.
  - Instruct patient to be on time.
- 7) Use contactless thermal screening and pulse oximeter even for asymptomatic patients.
- 8) Instruct patient for hand sanitization or hand washing as soon as he enters the clinic.

**Flow Chart showing all the steps :**



**Prosthodontics emergency includes**

- 1) Repair of a broken denture
- 2) Cementation or repair of final crown or bridge if temporary restoration is lost or broken
- 3) Need for temporary or immediate dentures
- 4) Dental trauma due to fracture of denture
- 5) Ulceration from the sharp edge of the prosthesis
- 6) Fracture of a screw-retained prosthesis or screw loosening
- 7) Problem with implants such as implant mobility.
- 8) Removable dentures adjustment for radiation therapy.

**Management of emergencies:**

1. In situations where the clinicians have to complete treatment with an **aerosol generation**, complete PPE (Personal Protective Equipment) to be used which includes PPE suit, face shield, double gloves, Eye cover, Shoe cover, N95 marks) by both assistant as well as the doctor.<sup>7</sup>
2. Use of 0.23% Povidine-iodine mouthwash or 1% hydrogen

- peroxide for at least 15 seconds before initiation of dental procedure.<sup>8</sup>
- 3. Install **HEPA** (High-Efficiency Particulate Air) filters, UV light, and Negative ion generators to reduce the viral load in the air of the operatory. HEPA filters help in removing particulates from the air of the size as small as 0.3 microns, so are quite effective even in a closed room.
- 4. **Negative Ion Generators** tend to fill the negative ions in the air and have effect on the lipid layer of the virus skin thus reducing viral load.
- 5. Patient is advised to disinfect dentures at home regularly as well as before sending them to the clinic.

Method to Disinfect Denture at Home	
1)	Soaking denture for 30 minutes in 3% Hydrogen Peroxide
2)	100% Vinegar for 6-8 hours
3)	Soaking denture for 10 minutes in 0.2% Chlorohexidine Gluconate

6. Elderly patients are advised instead of coming to the clinic, send dentures with a young member of the family.<sup>9</sup>
7. Patient is instructed to send a picture of the dislodged prosthesis via email or using other digital methods.

Management of Denture Related Emergencies	
Problems	Treatment
1. Denture causing trauma	Discontinue wearing denture
2. Fractured denture	Disinfect it
3. Ill- Fitting denture	Pack it Send with a younger member of the family.

8. Patient with denture who is infected with COVID-19 should immediately discard wearing the denture.
9. For implant-related emergencies use extraoral radiographs and restrict the use of intraoral radiographs to minimize the salivation and gag reflex.<sup>10</sup>
10. Prefer to use disposable instruments to reduce the risk of cross-infection.<sup>11</sup>
11. Prosthesis should be stored in diluted mouthwash and not in disinfection before insertion.

ADA (American Dental Association) has recommended two methods for disinfection of impressions, dental cast.<sup>12</sup>

These include immersion and spraying. Immersion is the most preferred method. This is because it assures exposes all the surfaces of impression to disinfection to the disinfectant for the recommended time. However, some impression material such as irreversible hydrocolloid (alginate), zinc oxide eugenol impression paste undergoes a dimensional change when the immersion methods are used. So for them, spray method is preferred. Dental cast are immersed in a solution of sodium hypochlorite, 2% glutaraldehydes, Iodophors, Phenols. For impression trays, prefer to use disposable plastic trays. Trays can also be heat sterilized. For wax bites, occlusal rims use iodophors sprays for disinfection.

**Guidelines for Prosthodontics Laboratory Personnel, Equipment's, or Surfaces:**

A prosthodontist work in collaboration with a dental laboratory, they go hand in hand. It is of utmost importance to maintain strict disinfection and sanitization protocols for both dental labs as well as lab technicians.

1. Minimal staff required for the work.
2. Maintain social distancing with a distance of 6 feet.
3. Laboratory should be well air ventilated.
4. Regular check on infrared thermal screening and pulse oximeter reading
5. Hand washing or hand sanitization is a must after every case and avoid touching the face in the laboratory
6. Maintain a proper record including address, contact number, and other related details.
7. All lab equipment as well as impressions, casts, and framework transferred from the clinic should be handled with gloves.
8. All impressions, cast, and framework after disinfection (using sodium hypochlorite or glutaraldehyde), packed in plastic or cardboard lock bag with visible instructions and then transferred to the laboratory.<sup>13</sup>
9. All packets containing the models should be disposed of using Biomedical Waste Management.
10. The clinicians should instruct the assistants who pick up or drop

- the lab work from the clinic about the hygiene protocol.
11. All the staff members should observe the proper infection control protocols are being followed.
  12. All staff members should wear PPE suit, eyewear, and mask during trimming or buffing.<sup>14</sup>
  13. Dental laboratory should be fumigated on a regular basis.
  14. Laboratory surfaces should be disinfected using surface wipes or sprays.
  15. Dental burs, polishing points, wheels, are mostly contaminated, so they must be heat sterilized.
  16. Regular cleaning and disinfection of the lathe machine.
  17. Same pumice should not be used for more than one case for polishing the denture as bacteria may colonize in it.
  18. Articulators, Facebow used should be disinfected using disinfection sprays or cleaned with soaps.
  19. Laundry service should be provided for regular cleaning.
  20. Recent advances in disinfectants include the use of Probiotic disinfectants.
  21. They use Probiotic bacteria for disinfection.

## CONCLUSION

Prosthodontists and assistants are at high risk of infection due to proximity with the patients. As most of the prosthodontic patients are of old age and these are at higher risk of developing COVID-19 infection because of low immunity, so all the preventive measures should be taken as advised by higher health authorities.

## REFERENCES:

1. Humagain M, Humagain R, and Rokaya D. An impact of COVID-19 on dentists, dental practice, and patients in Nepal: a descriptive cross-sectional study. *J Nepal Med Assoc.* In press.
2. Li, Q., Guan, X., Wu, P., Wang, X., Zhou, L., Tong, Y., Ren, R., Leung, K.S., Lau, E.H., Wong, J.Y. and Xing, X., 2020. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *New England Journal of Medicine.*
3. Peng X, Xu X, Li Y. Transmission routes of 2019-nCoV and controls in dental practice. *Int J Oral Sci.* 2020; 12:9
4. Giacomelli, A., Pezzati, L., Conti, F., Bernacchia, D., Siano, M., Oreni, L., Rusconi, S., Gervasoni, C., Ridolfo, A.L., Rizzardini, G. and Antinori, S., 2020. Self-reported olfactory and taste disorders in patients with severe acute respiratory coronavirus 2 infection: a cross-sectional study. *Clinical Infectious Diseases.*
5. McMichael, T.M., Currie, D.W., Clark, S., Pogojans, S., Kay, M., Schwartz, N.G., Lewis, J., Baer, A., Kawakami, V., Lukoff, M.D. and Ferro, J., 2020. Epidemiology of Covid-19 in a longterm care facility in King County, Washington. *New England Journal of Medicine*, 382(21), pp.2005-2011.
6. Ather A, Patel B, Ruparel NB, et al. Coronavirus disease 19 (COVID-19): implications for clinical dental care. *J Endod* 2020; 46(5): 584–595. 9.
7. Eggers M, Koburger-Janssen T, Eickmann M, et al. In vitro bactericidal and virucidal efficacy of povidone-iodine gargle/mouthwash against respiratory and oral tract pathogens. *Infect Dis Ther* 2018; 7(2): 249–259.
8. Liu K, Chen Y, Lin R. Clinical feature of COVID-19 in elderly patients: A comparison with young and middle-aged patients. *J Inf.* 2020;80(6):e14–8.
9. FGDP. Implications of COVID-19 for the safe management of general dental practice: a practical guide.
10. Ather A, Patel B, Ruparel NB, Diogenes A, Hargreaves KM. Coronavirus Disease 19 (COVID-19): Implications for Clinical Dental Care. *J Endod.* 2020;46(5):1–1.
11. Bhat, V.S., Shetty, M.S. and Shenoy, K.K., 2007. Infection control in the prosthodontic laboratory. *The Journal of Indian Prosthodontic Society*, 7(2), p.62.
12. Lee HE. Effects of different denture cleaning methods to remove *Candida albicans* from acrylic resin denture-based material. *J Dent Sci.* 2011;6:216–23.
13. Alharbi A, Alharbi S, Alqaidi S. Guidelines for dental care provision during the COVID-19 pandemic. *The Saudi Dental Journal.* 2020;32(4):181–186.
14. Gupta, S., Singh, G., Bansal, N., COVID-19 pandemic and prevention and the role of orthodontists, Lambert Academic Publishing, November, 2020.