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## Pandemic & prosthodontics

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### Abstract

In last 3 months, COVID-19 has been declared as a pandemic. It is a zoonotic which is believed to have originated in bats and pangolins and later transmitted to humans. Human transmission occurs via respiratory droplet/contact. WHO declared COVID-19 as a pandemic due to the alarming levels of spread and severity in response to the current threat. However despite the extensive efforts, this outbreak is still on the rise due to the community spread. In such a scenario, dental healthcare workers may deal with patients who have suspected/confirmed SARS-CoV-2 infection. Prosthodontics stands at an intricate position in Dentistry because of service to Geriatric patients, procedure such as tooth preparation that leads to aerosol generation, involvement of Labs for dentures and crown fabrication and most of treatments requiring multiple sittings. Current article aims to provide brief information pertaining to possible source of spread of COVID-19 in Prosthodontics setup regarding patient management and clinical strategies.

**Keywords:** COVID-19, aerosols, prosthodontics

### Introduction

A novel human corona virus, also called as Severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) was announced as the causative microorganism of COVID-19 outbreak by the Chinese Centre for Disease and Prevention in January 2020<sup>[1]</sup>. The COVID-19 pandemic has rapidly become a public health crisis of global concern. Due to the widespread transmission of SARS-CoV-2 and the unique characteristics of dental office (including proximity of oropharyngeal region, generation of aerosol during dental procedures), both the dental healthcare professionals as well as the patients have an increased risk of cross infection<sup>[2]</sup>. The mortality associated with COVID-19 is low, it has a high spreading potential. Dental experts are exposed to the gigantic danger of 2019-nCoV disease due to near and intimate communication and exposure to salivation, sweat, and other body fluids making the dental clinics hot bed of infection<sup>[1]</sup>.

### Covid Structure and Aetiopathogenesis

Coronaviruses belong to the family *Coronaviridae* in the order *Nidovirales*. Coronaviruses are minute in size (65–125 nm in diameter) and contain a single stranded RNA as a nucleic material, size ranging from 26 to 32 kbs in length. The subgroups of coronaviruses family are alpha ( $\alpha$ ), beta ( $\beta$ ), gamma ( $\gamma$ ) and delta ( $\delta$ ) coronavirus. They can be classified into four genera: *Alpha coronavirus*, *Beta coronavirus*, *Gamma coronavirus*, and *Deltacoronavirus*. WHO announced “COVID-19” as the name of this new disease on 11 February 2020, following guidelines previously developed with the World Organization for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations (FAO). The corona viral genome encodes four major structural proteins: the spike (S) protein, nucleocapsid (N) protein, membrane (M) protein, and the envelope (E) protein, all of which are required to produce a structurally complete viral particle. The E protein is the smallest of the major structural proteins, but also the most enigmatic. During the replication cycle, E is abundantly expressed inside the infected cell, but only a small portion is incorporated into the virion envelope.<sup>13</sup> The membrane protein (M) and the envelope protein (E) are involved in virus assembly, whereas the spike protein (S) mediates virus entry into host cells. Some coronaviruses also encode an envelope-associated hemagglutinin-esterase protein.

Among these structural proteins, the spike forms large protrusions from the virus surface, giving coronaviruses the appearance of having crowns (hence their name; *corona* in Latin means crown) More recently, however, it has become clear that some CoVs do not require the full ensemble of structural proteins to form a complete, infectious virion, suggesting that some structural proteins might be dispensable or that these CoVs might encode additional proteins with overlapping compensatory functions [4, 5, 6].

### Symptoms

Patients with COVID-19 usually present with clinical symptoms of fever, dry cough, and myalgia. In addition, less obvious symptoms such as nausea, diarrhea, reduced sense of smell (hyposmia), and abnormal taste sensation (dysguesia) have also been reported.

Notably, about 80% of these patients have only mild symptoms that resemble flulike symptoms and seasonal allergies, which might lead to an increased number of undiagnosed cases. Severe forms of this disease have a predilection for men with a mean age of 56 years with preexisting chronic illnesses such as cardiovascular disease or Immunosuppression. The higher-risk patient population manifests symptoms typical of pneumonia or acute respiratory distress syndrome [3, 8].

**Symptomatic transmission:** Symptomatic transmission refers to transmission from a person

While they are experiencing symptoms. Data from published epidemiology and virologic studies provide evidence that COVID-19 is primarily transmitted from symptomatic people to others who are in close contact through respiratory droplets, by direct contact with infected persons, or by contact with contaminated objects and surfaces [3, 8].

**Pre-symptomatic transmission:** The incubation period for COVID-19, which is the time between exposure to the virus (becoming infected) and symptom onset, is on average 5-6 days, however can be up to 14 days. During this period, also known as the “pre-symptomatic” period, some infected persons can be contagious. Therefore, transmission from a pre-symptomatic case can occur before symptom onset [3, 8].

**Asymptomatic transmission:** An asymptomatic laboratory-confirmed case is a person infected with COVID-19 who does not develop symptoms. Asymptomatic transmission refers to transmission of the virus from a person, who does not develop symptoms [3, 8].

**Dental emergencies** are potentially life threatening and require immediate treatment to stop ongoing tissue bleeding, alleviate severe pain or infection, and include:

- Uncontrolled bleeding
- Cellulitis or a diffuse soft tissue bacterial infection with intra-oral or extra-oral swelling that potentially compromise the patient’s airway.
- Trauma involving facial bones, potentially compromising the patient’s airway [7, 9].

### Prosthodontic Emergencies

Although the word ‘emergency’ may not be applicable to prosthodontics treatment in the true medical sense, there are many situations in which a prosthodontics attention is required urgently as specified in the ADA guidelines for better understand. [10,11] This urgent care is needed so that the

patient can carry on with his usual activities without impairment in oral function or appearance. Some of such situations are:

- Dental trauma due to denture fracture
- Repair of broken dentures
- The need for temporary or immediate dentures
- Final crown/bridge repair or cementation if the temporary restoration is lost or broken.
- Problems with implants or implant prosthesis
- Ulceration due to sharp edges of tooth or prosthesis

Management of Prosthodontic emergency/urgency related to CD/RPD

- Denture causing tissue trauma
- Fractured denture
- ill-fitting denture

- Discontinue wearing the denture.

- Disinfect it and pack.

- Prefer sending it with some young family member

### Prosthodontic Urgencies, Elective Procedures

- Treatment Protocol
- The new paradigm shift in the times of pandemic calls for formulations of treatment modalities right from the time of appointment to the delivery of the prosthesis
- Telephonic appointments with detailed case history from the patient by the operator for reducing the treatment timings.
- Incorporation of digital workflow to reduce the number of appointment [11, 13].

### For Complete Denture

- Making of snap impression followed by disinfection with gluteraldehyde.
- Modification of final impression technique such as single step border molding.
- Virtual face bow records and jaw relation records can be made surpassing the conventional technique to reduce chair side time followed by teeth arrangement and try-in.
- Verification of try-in followed by fabrication of denture with Digital work flow for precise prostheses [11, 13].

### For Interim or Cast Partial Denture

- Digital impressions records can be made to reduce contact and chair-time of the patient.
- Virtual face-bow and bite records registrations can be made and prostheses can be fabricated.
- Prosthesis fabricated with CAD/CAM are precise and require lesser chair side adjustments [11, 13].

### For Fixed Prosthodontic Treatment

- The Covid pandemic has changes the paradigm for conventional prosthetic treatment for fixed prosthodontics as the procedures involves aerosols and Splatter productions that makes the dentist prone to infection and dental chairs hot bed of infection.
- Use of laser for tooth preparation to perform splatter and aerosol free procedure to reduce the risk of cross contamination.
- Employment of high suction to reduce the splatter and aerosol production.
- Employment of cordless gingival retraction to further reduce the chair side time.
- Recording the digital impression followed by prostheses

fabricated by CAD/CAM.

- This digital work flow reduces the chair side adjustments thus reducing the time of appointment thus delivering the prosthesis with continues service to the patients safeguarding the operator<sup>[11, 13]</sup>.

#### **For Implant Prosthodontics**

- Guided implant placement with stents to reduce the splatter while surgical procedure.
- Immediate loading under proper diagnosis of the existing clinical situation to reduce the number of appointment.
- If immediate loading is contraindicated post uncovering the Osseo integrated implants digital impression can be employed and prosthesis can be fabricated with CAD/CAM and prosthesis can be delivered<sup>[11, 13]</sup>.

#### **For Maxillofacial Prosthesis**

- During pandemic only the rehabilitation of function is considered as the dental emergency which with certain changes in the protocol of prosthesis fabrication can help the operator rehabilitate the patient thus restoring the function.
- Recording Impression with conventional or digital technology to reduce chair side time.
- Transfer of bite records on articulators for easy lab communication
- Fabrication of prosthesis followed by insertion of prosthesis thus restoring the esthetics function and comfort of the patient<sup>[11, 13]</sup>.

#### **Sterilisation and Disinfection Protocol**

##### **Proposed guidelines for dental personnel**

- Schedule appointments to minimize possible contact with other patients in the waiting room.
- Include temperature readings as part of your routine assessment of the patient prior to performing dental procedures.
- Use a rubber dam whenever possible to decrease possible exposure to infectious agents.
- Use high speed evacuation for all dental procedures producing an aerosol.
- Autoclave your hand pieces after each patient.
- Make patient to rinse with 1% hydrogen peroxide before each appointment. Coronavirus is vulnerable to oxidation; this will reduce the salivary load of oral microbes<sup>[15]</sup>.

If an aerosol generating procedure is necessary, close attention must be paid to managing this aerosol:

- Use appropriate PPE
- Use a single patient treatment room (where possible) with the door closed
- Work with an assistant and use four handed dentistry
- Use rubber dam (or Isolate if available)
- Swab teeth and tissues with hydrogen peroxide (1%) or Chlorhexidine 0.2% before the procedure especially
- If a pre-procedural mouth rinse has not been possible (e.g. children)
- Use high volume evacuation with correct tip placement at the source of the aerosol
- Patient and team positioning to optimize visibility of the operative field and access to the mouth.

##### **Methods of disinfecting Impressions**

- Alginate - 0.5% Sodium Hypochlorite or iodophors or

2% Gluteradehyde

- Zinc-oxide eugenol impression paste – 2% Glutraldehyde or Chlorine compounds
- Elastomeric impression materials – 2% Glutraldehyde or Cidex<sup>[4]</sup>.

##### **Methods of disinfecting Trays & Cast**

- Prefer disposable trays
- Metal trays to be autoclaved
- Plastic trays/Bite rim 2% Glutraldehyde solution for 10 mins
- Dental casts & die can be immersed in Sodium Hypochlorite for 10 mins<sup>[4]</sup>.

##### **Methods to disinfect removable prosthesis at home**

- Soaking of denture in 3% Hydrogen Peroxide for 30 mins
- Soaking in 0.2% Chlorhexidine gluconate for 10 mins (More potent than Sodium hypochlorite)
- 100% Vinegar (acetic acid) for 6-8 hours<sup>[4]</sup>.

##### **Proposed guidelines for laboratory personnel**

- Minimal staff required for the work.
- Practice social distancing
- Routine temperature checks as well as the pulse oximeter readings
- Hand sanitizers are to be placed at vantage points
- All lab equipment as well as clinic transfers including impressions, casts & frameworks should be handled strictly using gloves.
- Hands need to be washed thoroughly with soap and water after every case and avoid touching the face while in lab.
- All lab personnel without exception should observe the proper infection control protocols including wearing Personal Protective<sup>[4]</sup>.

##### **Equipment**

- The protective garment, mask and eyewear that is worn in the lab needs to be left in the lab itself and not taken out of the lab and to be discarded be done through proper channel.
- While using the trimmers and buff other than using the PPE see that the flints or fragments are sucked out using a high vacuum suction<sup>[4]</sup>.

##### **Proposed guidelines for the disinfection of the laboratory equipment's, surfaces & prosthesis**

- It is of paramount importance that dental impressions, casts, prosthesis or appliances should be thoroughly disinfected prior to
- Handling both at the clinic or operator, on acceptance of the work at the lab and prior to delivery.
- Dental prostheses should be stored in diluted mouthwash and not in disinfectant before insertion.
- Laboratory surfaces can be disinfected using the disinfectant spray or surface wipes.
- The dental laboratory should be fumigated on a regular basis.
- If burs, polishing points, rag wheels, or laboratory knives are used on contaminated or potentially contaminated appliances,
- Prostheses, or other material, they should be heat-sterilized.
- Separate polishing attachments should be kept for all cases coming in the lab.

- The lathe machine should be cleaned and disinfected daily.
- Pumice must not be used for more than one case and must be discarded after use.
- Colonization from airborne and other organisms in warm, wet pumice can be prevented by Articulators can be disinfected by spraying with a hospital-level disinfectant followed by rinsing,
- Non-sterilizable equipment such as some face bow components must be cleaned with soap.
- Laundry service should be organized for regular cleaning after every patient.

#### Instructions to the delivery pickup person

- Strict instructions that all the staff should be checked periodically for symptoms.
- If the delivery/ pick up person who picks up the impression from the dentist is a part of lab, then he needs to follow strict hygiene & packaging protocols with labelling.
- The delivery person should avoid entering the lab or clinic.
- All packets containing the models etc. needs to be disposed of with BMW protocols.
- Prosthetic appliance received from a lab rotary should be disinfected prior to insertion in patient's mouth.
- The work to be sent to the lab should be disinfected and sealed in a single use plastic bag/cardboard box with the lab instruction sheet visible over the container.
- The assistant should be wearing gloves while receiving the work from lab, proceed with the disinfection process of the cardboard box/plastic bag.
- The clinic staff should come in minimum contact with the delivery/pick up person.

#### Waste Mangement and Disposal

Disposal of soiled waste the protecting equipment and all the dental waste is deemed necessary to ensure the safety of the professional and the patient.

To remove PPE after procedure – the following order should be followed

1. Gloves (outer)
2. Goggles/Loupes and Face shield
3. Gown 4. Head and Foot covers
4. N-95 Respirator and Facemask
5. Gloves (inner)

Preferably, the PPE should be removed and discarded in a dirty section of the clinic which can be cleaned later. All staff must remove the PPE in the same area of the clinic. If possible – the operatory should be separated for aerosol and non-aerosol producing procedures.

Unless waste generated in the dental laboratory (e.g., disposable trays or impression materials) falls into the category of regulated medical waste, these materials can be disposed of in standard waste containers<sup>[5]</sup>. Under most circumstances, very small amounts of regulated waste will be generated in the dental laboratory. All disposables that can be considered “sharps” items (e.g. orthodontic wire, disposable blades, burs, etc.) should be disposed of in appropriate containers designated as “sharps” disposable containers or in puncture resistant containers.

The medical waste containing disposable protective equipment after use should be promptly delivered to the temporary storage facility of the medical center the reusable

tools and materials should be cleansed, sterilized, and carefully preserved in compliance with the Protocol for the Disinfection and Sterilization of Dental Instrument<sup>[7]</sup>. The medical and domestic waste produced by treating suspected or confirmed COVID-19 cases are infectious medical waste. Double-layer yellow clinical waste bags with a “goose-neck” knot should be used. The surface area of the waste bags should be labeled and disposed in compliance with the requirements of medical waste disposal.

#### Summary

Progressive spread of COVID-19 pandemic is associated with increased possibility that Dental clinicians will be exposed to COVID-19 infected patients. Therefore it has become all the more important for dental professionals to incorporate all precautions in their routine practice and additional safety measures treatment of patients provision has completely stopped or significantly decreased in several affected countries. This lack of guidelines can also increase the nosocomial COVID-19 spread through dental health care facilities. New specific guidelines need to be developed to be followed stringently & uniformly across all the dental hospitals & private practices. This can help in reducing and preventing new outbreaks. The guidelines given in this work are general guidelines and the final decision will always be provided through the practitioner's judgment. Treatment protocols are repeatedly changing, due to mutations of coronavirus. A definite treatment plan is under research<sup>[2]</sup>.

#### References

1. Bhanushali P, Katge F, Deshpande S, Chimata VK, Shetty S, Pradhan D. COVID-19: Changing Trends and Its Impact on Future of Dentistry. *International Journal of Dentistry*, 2020, 29.
2. Harrel SK, Molinari J. Aerosols and splatter in dentistry: a brief review of the literature and infection control implications. *The Journal of the American Dental Association*. 2004; 135(4):429-37.
3. Bizzoca ME, Campisi G, Muzio LL. Covid-19 Pandemic: What Changes for Dentists and Oral Medicine Experts? A Narrative Review and Novel Approaches to Infection Containment. *International Journal of Environmental Research and Public Health*. 2020; 17(11):3793.
4. Mishra K, Hegde D, Shetty S, Shah S, Priya A, Reddy SL. Coronavirus Disease 19 (COVID-19) and Prosthodontic Consideration-A. *Journal of Advanced Medical and Dental Sciences Research*. 2020; 8(5).
5. Sekhsaria S, Sharma A, Tiwari B, Sharma A, Mahajan T. Changing paradigm in prosthodontics practice post COVID-19 outbreak.
6. Nigam H, Shah TD, Pareek V, Pramdar P, Shetty NK, Bhardwaj S. Corona Virus: Endemic To Pandemic. *J Immuno Allerg*. 2020; 1(3):1-8.
7. Hamid H, Khurshid Z, Adanir N, Zafar MS, Zohaib S. COVID-19 Pandemic and Role of Human Saliva as a Testing Biofluid in Point-of-Care Technology. *European Journal of Dentistry*. 2020 Jun 3.
8. Papi P, Di Murro B, Penna D, Pompa G. Digital prosthetic workflow during COVID-19 pandemic to limit infection risk in dental practice. *Oral Diseases*, 2020.
9. Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): emerging and future challenges for dental and oral medicine. *Journal of Dental Research*. 2020; 99(5):481-7.
10. American Dental Association. What constitutes a dental

- emergency? Available at) (Accessed April 19, 2020) [https://success.ada.org/~media/CPS/Files/Open%20Files/ADA\\_COVID19\\_Dental\\_Emergency\\_DDS.Pdf](https://success.ada.org/~media/CPS/Files/Open%20Files/ADA_COVID19_Dental_Emergency_DDS.Pdf) View in Article. 2020 Apr 2.
11. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B *et al.* Transmission routes of 2019-nCoV and controls in dental practice. *International Journal of Oral Science*. 2020; 12(1):1-6.
  12. Madarati A, Abid S, Tamimi F, Ezzi A, Sammani A, Shaar MB *et al.* Dental-dam for infection control and patient safety during clinical endodontic treatment: preferences of dental patients. *International journal of environmental research and public health*. 2018; 15(9):2012.
  13. Al-Sandook TA, Al-Naimi RJ, Younis MS. An investigation of dentist's knowledge, attitude and practices towards HIV+ and patients with other blood borne viruses in Mosul City. *Al-Rafidain Dental Journal*. 2010; 10(2):298-308.
  14. Bhat VS, Shetty MS, Shenoy KK. Infection control in the prosthodontic laboratory. *The Journal of Indian Prosthodontic Society*. 2007; 7(2):62.
  15. Sa Y, Lin WS, Morton D, Huang C. Coronavirus disease 2019 (COVID-19): Experiences and protocols from the Department of Prosthodontics at the Wuhan University. *The Journal of Prosthetic Dentistry*, 2020.