


CONSENSUS

Infectious diseases

Dental practice management during COVID-19 times—Now and beyond

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Abstract

Aim: Coronavirus disease 2019 (COVID-19) being declared a global public health emergency has become a significant challenge for all healthcare workers, including dentistry, recognised as a high-risk profession during these times. This consensus statement aims to highlight and provide guidelines necessary to be implemented for a clinical dental practice.

Materials and Methods: A total of nine conservative Dentists and Endodontists and one Oral and Maxillofacial Surgeon; with four panelists from government dental colleges, one each from the North, South, East and West India and six resource persons from private colleges in South India, all of them being clinicians and administrators practicing dentistry since the inception of the pandemic, collaborated in this consensus statement. The consensus statement was developed through a symposium conducted on the topics; general dental practice during COVID-19 times, the importance of aerosols in clinical dental practice in the spread of COVID-19, effective standard operating protocols for clinical dental practice and Institutional settings with scientific evidence-based justifications, followed by a panel discussion with to devise mandatory protocols to be followed in clinical and institutional settings. The symposium was attended by 46 practitioners who participated in the deliberation.

Results: This consensus statement provides clinicians and researchers with protocols for the dental practice, agreed upon by experts in the field. The Consensus Statement has been formulated according to the AGREE Reporting checklist for the formulation of guidelines.

Conclusion: The experts and panelists reached a Consensus on the protocols and guidelines for the safe clinical and institutional dental practice.

1 | INTRODUCTION

Coronavirus (SARS-CoV-2 [2019-nCoV]) belongs to the lineage of RNA viruses in the Nidovirales order. The shape of crown like structure under microscope derives its name, "corona" being the Latin word for "crown" and garland or wreath from ancient Greek "korōnē". It was first described when it was isolated from humans (HCoV-229E

and HCoV-OC43) in 1931 for the first time. Consequently, various subtypes have been identified over the years, 2003 SARS-CoV, 2004 HCoV NL63, 2005 HKU1, 2012 MERS-CoV, and current 2019 SARS-CoV-2. Large-scale pandemics have been caused by SARS, MERS and 2019-nCoV in the last two decades. Starting in November, 2019 from Wuhan, China spreading all around the world like a wildfire, WHO acknowledged it as a Pandemic with around 12 896 855

infected cases and global deaths reaching up to 568 586 by 12 July 2020.

This consensus statement was formulated following a symposium and panel discussion with resource persons and panelists from All India Institute of Medical sciences-New Delhi, Maulana Azad Institute of Dental Sciences-New Delhi, Government Dental College-Ahmedabad, AB Shetty Memorial Institute of Dental Sciences -Mangalore, Jawaharlal Nehru Institute of Medical sciences-Imphal, Meenakshi Ammal Dental College-Chennai and Sathyabama Dental College-Chennai. The statement highlights the protocols followed in the prestigious dental education institutes all across the country, modified through experiences and literature searches.

2 | WHY IS COVID-19 A DANGEROUS DISEASE?

Of all the information available so far, the disease transmits from symptomatic patients, especially lower respiratory tract infection. One patient infected with coronavirus transmits the virus to nearly 2-4 people over its infectious period, making the spread very rapid and spontaneous over a short period of time. The predilection of the virus to infect the elderly age groups and patients with underlying medical conditions such as asthma, diabetes and heart disease is invariably higher. Hence, the mortality is reported to be more than 8% in ages groups older than 70 years. The USA Centers for Disease Control and Prevention (CDC) has rooted healthcare professionals, including dentists, as a "very high" exposure risk category to syncope SARS-CoV-2. It affects essentially those working in high-risk departments with long duty hours, and substandard hand hygiene practices. Hence, this paper aims in providing analytical understanding of COVID-19 in all aspects ranging from the associated risk factors, standard operating protocols for clinical practice and in the institutional settings.

3 | COVID-19: WHY AEROSOLS MATTER?

An aerosol (an abbreviation of "aero-solution") is a suspension of fine solid particles or liquid droplets in air or another gas. Atmospheric aerosols consist of solid/aqueous particles suspended in the atmosphere and are typical of sizes in the range 0.001-100 μm .¹

Aerosols are likely to remain in air slightly longer and travel short distances (1 meter or 3 feet).¹ It can consist of a single organism, cluster of organisms or organisms coagulated with body fluid or cells of skin or dust particles in the air. They are mainly responsible for airborne transmission of disease.

The mode of transmission for SARS is considered opportunistic airborne, naturally transmitted through direct or indirect contact, but are capable of spreading through inhalation of small particle aerosol under favourable conditions.²

What's known

- COVID-19, an airborne disease, is known to transmit from symptomatic patients to healthy individuals. However, in recent times, asymptomatic carriers have been found to be a potential risk for transmission.
- Dentists are cognizant of oral findings and features such as dysgeusia/ageusia, xerostomia, and ulcers, which might be an early symptom of COVID-19.
- This crisis presents an opportunity to rethink the future of dentistry and address the system.

What's new

- The experiences of senior clinicians and administrators practicing dentistry in clinics as well as managing institutions since the start of the pandemic is utilised to devise scientific evidence-based justifications for the protocols and guidelines for clinical practice post-COVID-19.
- This consensus statement, distinctive to dentistry deals with protocols to be followed during dental procedures involving the production of aerosol in clinical and institutional settings for practice management during post-COVID-19 times.

Such favourable conditions include closed environment, high concentration of small particle aerosol and long duration of exposure. Considering procedures that generate high amount of aerosol, treatment involving asymptomatic carriers or presymptomatic patients, closed working spaces and longer treatment duration, there is a likelihood of airborne transmission of COVID-19 in the dental setting.

3.1 | Dental aerosols and aerosol generating procedures (AGP)

There are different procedures that can generate aerosols in dental settings, eg: Ultrasonic scaler, air-water spray, airoter, patient gag during dental impressions. Use of water coolant or spray along with pressurised air can increase atomisation of particles by 20 folds.³ The procedures involving air-water spray generates aerosols with the most significant percentage of the particle diameter of 5 microns or less.³ Particles with 5 microns or less are known as inspirable particles. These particles have ability to enter the deepest part of the respiratory system and impinge on the alveoli causing lower respiratory tract infection.^{3,4}

The oral cavity is exposed to rotary instruments which vibrate and expel compressed air leading to generating an aerosol comprising of microbes inevitably.⁵ But very little evidence is available regarding the infectious nature of such dental aerosols due

to inherent limitations of methods used to study, ethical issues and lack of documentation or organised registry for occupational or nosocomial infections associated with private dental practices. The source of contamination in a dental setting starts from the contaminated operating site, devices or the dental unit waterline (DUWL). The dental aerosols may carry water, saliva, mucous, microbes, debris, calculus, respiratory secretions or even trace amount of elements. Infectious agents disseminated in mucus or saliva remains viable for a longer duration of time. SARS CoV-2 virus has been consistently detected in saliva and nasopharyngeal space Virus from the saliva can be retracted into high-speed handpieces and the dental unit waterlines which can cause cross-contamination later.^{5,6}

Standard precautions must be taken during routine dental practice adequately protect the team of the dental set up along patients from the direct and contact-based transmission. The operating protocol for prevention and management evolves as and when the epidemiology of the emerging infection becomes more specific and controversies are resolved. In the present situation, the dental fraternity must be able to identify risk factors, beware of fundamental principles that govern infection, prevention and control in order to ensure safe dental practice.

4 | EFFECTIVE SOP FOR CLINICAL PRACTICE

4.1 | How to assess dental emergency severity?

Based on the patient's level of needs, an objecting tool for triaging is being suggested based on the ADA recommendation as on 18 March 2020. Triaging will limit the number of incoming patients and give preference to the top priority patients who cannot wait (Table 1).

4.2 | What workflow/steps to follow reducing exposure while serving emergency care?

STEP 1: Prioritising the patients' treatment needs assessing through audio/video consultation based on the severity of the condition minimises the risk of exposure for the patient as well as the clinic staff.⁸

TABLE 1 Categorisation of patients based on the screening⁷

Emergency care (EC)	Impairment of basic functions such as breathing and swallowing enhanced by dental conditions
Urgent care (UC)	Dental issues gravely effecting the normal functioning like unbearable pain and infection
Scheduled care	Elective care

Along with triaging the patient based on the severity of the condition, it is necessary to check if the patient is Low/High risk based on a detailed medical and travel history and COVID-19 Questionnaire. It comprises of evaluation the history of (h/o) fever in the past 14 days, respiratory problems and related symptoms, travel outside the district, state /country, contact with suspected/confirmed COVID-19 patients and contact with a large crowd/meeting in the last month. In dental practice, every patient shall be considered as a carrier, and all precautions should be followed to prevent any further spread in the community.

STEP 2: Once it is decided that the patient need to visit the clinic, the patient should be encouraged to travel alone, avoid public transport, wear mask during their clinic visit and wash/ disinfect their hands upon arrival. Provision for physical distancing in common areas should be ensured. Strict appointments should be followed to reduce the overlapping time for two or more patients. This will reduce the wait time and also reduce the number of people in the clinic complying with social distancing norms.

STEP 3: As discussed the significant risk with PPE for transmission of COVID-19 through droplets and aerosol, appropriate measures to limits this risk is advised. Following the correct method and designating a specific area for donning and doffing of PPE is essential and critical to prevent the spread of COVID-19.⁹

4.2.1 | Hand hygiene

The single most important measure for the prevention of infection according to the WHO guidelines is hand hygiene.

- Visibly dirty or soiled hands should be washed with soap and water.
- Alcohol-based hand rubs (ABHR) are advised when hands are not soiled, and availability of running water is in question.

4.2.2 | Use of personal protection equipment

Use of complete Protective wear which includes protection from head to toe like eyewear, masks, gloves, headcaps, face shields and protective overall, is strictly advised for all healthcare givers in any kind of set-up during the COVID-19 pandemic.¹⁰

- a. Use of triple-layered surgical mask is advised within 1-2 m of the patient.
- b. Routine dental procedures require the use of Particulate respirators (N-95 masks which are authenticated by the NIOSH or FFP2-standard masks set by the European Union).
- c. An FFP3-standard mask should be used in COVID-19 positive patients care and should be considered essential along with Protective overalls with hood, face shield and goggles.

5 | SOP IMPLEMENTATION IN INSTITUTIONAL SETTINGS

All patients entering the institutional set up are screened for the following;

- Residential address of the patient for Hot Spot Matching
- Medical assessment on basis if presence of any signs and symptoms of COVID-19, and body temperature measurement.
- Dental Needs Assessment and Triaging (Stage 1): Only Emergency Dental Conditions to be attended to during active phase of the pandemic.
- Disclosure and Consent forms to be explained and signed by every patient cleared in Prescreening, and those which need dental treatment for their emergency condition to be sent to registration desk.

5.1 | Post prescreening

There are three ways to go about managing the case.

- Pharmacological management.¹¹
- In case of an emergency/urgent care patients, the patient is referred to the respective department for dental treatment.^{12,13}
- If the patient is a suspected case of COVID-19 from the containment zone, then sample collection and testing is carried out first and then treatment is provided.

5.2 | Departmental reception/waiting area clinic

- Patient scheduling
 - No walk-in appointments to be permitted
 - Not more than 20 patients to be permitted in the waiting area and each department at any given point of time
- Hand hygiene to be done either by washing or by hand rub
- Office design and Infrastructural requirements
 - Minimum 1-2 m distance between patient sitting areas
 - Maximum 20 seats to be put in waiting area
 - Good air ventilation to be ensured by using natural ventilation sources/mechanical ventilation using fans/exhaust. (6 air exchanges per hour minimum)
 - Physical barrier like screens should be considered on registration desk
- PPE Requirements: Head Cap, Gloves, Surgical Mask
- Disinfection protocol:
 - The waiting room/clinic including the table surfaces, chair surfaces and door handles will be wiped after every 1 hour with 1% Sodium Hypochlorite solution using clean cotton/ gauge piece.
 - Keep open as many doors as possible to avoid touching of doorknobs.

- Mop the floor with 1% Sodium Hypochlorite after surface disinfection using separate mop for clinical and non-clinical area while mopping in one direction (from inner to outer area).

5.3 | Identification and segregation of areas

Separate designated and labelled areas to be clearly identified in each department for the following processes:

- PPE donning areas: will be sterile rooms containing only sterile PPEs and hand hygiene is to be done before entering and after leaving the room.
- Treatment and check-up rooms—non-aerosol procedures
- Material dispensing and sterilisation room
- Isolation rooms for aerosol producing procedures. All aerosol procedures if performed, should be mandatorily done in separate designated isolation rooms only
- PPE doffing area: will be non-sterile room containing only used PPEs placed in separate container. Hand washing facility should be available in same area.

Note that PPE donning and doffing must be carried out in separate areas.

Inside the dental operator, the rule of ABCD must be followed.

A = Airflow management.

Maintenance of indoor air quality

- Air mixing and dilution

CDC recommends that dental treatment of known cases of COVID-19 must be performed in an Airborne Infection Isolation Room (AIIR) or a negative pressure room.¹⁴ In the absence of such facility and considering the possibility of having to treat asymptomatic or presymptomatic patients. In a room where no aerosols are being generated, 6 Air Circulation per Hour (ACH) and all AGP must be done in a closed room with an augmented ventilation of a minimum of 12 ACH.¹⁵ It is essential to mix and dilute the air within the operator augmented ventilation in order to reduce the concentration of the contagion and provide sufficient volume of clean air within the breathing zone of the dental personnel.^{16,17}

For air purification and disinfection:

- Centralised Heating, Ventilation and Air Conditioning (HVAC) system with inbuilt high-efficiency particulate air filters (HEPA) can effectively prevent airborne transmission from one area to other. The filtration efficiencies of HEPA have been found to be effective in removing virus-laden aerosols.
 - Alternatively, a strategically placed industrial grade portable HEPA filter with clean air delivery rate (CADR) of 300-800 cu feet/m can be effective in removing the contagion.
- HEPA filter of highest grade like HEPA-13, HEPA-14 is recommended. HEPA filters have been proven effective for more than

95% for aerosols with a diameter between 0.25 to 1 μm and 100% for those with a diameter larger than 2.5 μm .¹⁸

- Upper room Ultraviolet Germicidal Irradiation (UVGI) using far UV-C can be used as an adjunct for air cleansing or disinfection.¹⁹ UVGI bulbs of 30-40 W producing wavelength of 254 nm is considered optimum.

B = Barrier.

A systematic review on effective methods for preventing the spread of respiratory virus claims, implementing barriers to transmission, such as isolation, and hygienic measures (wearing masks, gloves and gowns) can be effective in containing respiratory virus epidemics or in hospital wards.² All dental personnel, auxiliary and patients must be masked at all times while within the dental facility. Patients should remove their masks only at the time of treatment. It is important for the dental personnel to understand the specifications, indications and limitations of various Personal Protective Equipment (PPE) to enable them to select and optimise use.

A surgical mask is fluid-resistant and protects from large splatter and do not protect against finer aerosol as well as they do not provide a tight seal. Hence, N95 respirators equivalent or those providing higher level of protection must be worn by the dental personnel while treating a known case of COVID-19, while working in areas with moderate to substantial community transmission or while performing AGPs. Protective eyewear with a soft tissue fit is recommended to prevent the splatter and spray from coming into contact with eyes. Apart from these, protective clothing, ie, disposable surgical gowns are also recommended.^{14,20,21,22,23}

PPE that is being used by the dentist must be SITRA certified. Fit test of N95 mask must be done to ensure a full tight seal. The N95 mask can be reused when reuse protocol is followed, which includes sterilisation with vaporised or liquid hydrogen peroxide, UV light.^{8,24}

C = Clinical protocol.

In a clinical setup, patients must be placed in extreme corners to ensure distancing. Procedures are carried out with the help of an additional assistant to reduce the chair side time.¹⁶

The treatment protocol includes reducing aerosol generation with the help of high volume suction, rubber dam to isolate the tooth, reduced usage of airtor and three-way syringe.

To reduce the viral load in patients saliva, extraoral scrubbing, preprocedural oral rinse and decontamination of the tooth with 1% NaOCl is carried out. However, CDC has not approved the usage of preprocedural oral rinse to reduce viral load; there is evidence in the literature which shows positive results.^{17,25}

As for the dental unit waterline, flushing for 30 seconds in the beginning of the day and 15 seconds after every patient is recommended.²⁶ A study done by Kampf G et al suggested that 0.5% Hydrogen peroxide and 0.2% Povidone-iodine were effective against human coronavirus in suspension tests.²⁷ Certain studies suggested use of 0.01% sodium hypochlorite,²⁷ 0.5% providione iodine and 0.03% hydrogen peroxide in waterline unit for disinfection.^{28,29}

One auxiliary staff is kept in charge for cleaning of the chair and floor with hydrogen peroxide. No spraying must be done on the

infected surface. Only wiping from the clean to the infected surface must be done.

D = Discharge note.

The auxiliary officer must be the one to write the discharge note, and he must not enter the operatory or carry out any procedure on that day.

Once the patient leaves the operatory after a procedure, any of the following disinfection protocols may be followed:

- UVGI, carried out for 15 minutes
- Disinfection and defogging for 30-45 minutes with hydrogen peroxide vapour fumigation
- Natural ventilation with a minimum of 6 ACH for 60 minutes is done.

Disposal of the PPE must be done in the yellow bag and gloves in the red bags.

6 | CONCLUSION

With COVID-19, biggest fear is the fear of the unknown, a fear of the asymptomatic patients who can act as carriers and also serve as a reservoir for re-emergence of infection; incubation period can range from 0 to 24 days; therefore, transmission can occur before the symptoms start appearing. The key to a successful dental practice would be considering every patient to be an asymptomatic carrier and treating him accordingly with the standard operating protocols.

Fear and anxiety are powerful emotions witnessed related to the overwhelming reports on the COVID-19 pandemic. Mild anxiety is natural and fosters preventive and safeguarding behaviour. The silver lining in this situation being every time there's a crisis, mankind is known to adapt and innovate. As endodontists, there is a moral obligation of relieving the patients of the pain. There exists a necessity to follow the proper infection protocol and practice dentistry safely. Emergency and elective procedures should be differentiated. Increasing the knowledge among the dentists, regarding the infection control procedures, reduce the levels of anxiety, hence creating a positive change in their attitudes towards providing dental care to patients.

DISCLOSURE

The authors have declared no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available at <http://absmids.nitte.edu.in/>.

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