

Review Article

Endodontic and dental practice during COVID-19 pandemic: Position statement from the Indian Endodontic Society, Indian Dental Association, and International Federation of Endodontic Associations

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ABSTRACT

The emergence of COVID-19 pandemic poses an immense global health challenge. As dental care providers, we are faced with significant responsibilities both to the dental team and our patients to limit exposure to the virus. Due to the nature of our work, the team are at a high risk of contracting the virus and potentially transmitting the virus. One of the prime modes of containing this pandemic is in enforcing effective social distancing. However, as dental care providers, we face the twin challenge of protecting ourselves and our patients from community transmission and at the same time ensuring patients continue to have access to urgent/emergency dental care. This position statement is for the benefit of endodontists and dentists and provides an objective method of streamlining their dental practices based on need and evidence-based disease containment protocols.

Keywords: Aerosol, coronavirus, COVID-19, dentistry, disease transmission, endodontics, nosocomial, SARS-CoV-2, virus

INTRODUCTION

Coronaviruses (CoVs) are enveloped single-stranded RNA viruses that are zoonotic in nature and cause symptoms ranging from those similar to the common cold to more severe respiratory, enteric, hepatic, and neurological symptoms.^[1] Other than severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2), there are six known CoVs in humans: HCoV-229E, HCoV-OC43, SARS-CoV, HCoVNL63, HCoV-HKU1, and Middle East respiratory syndrome (MERS)-CoV. CoVs have caused two

large-scale pandemics in the last two decades: SARS and MERS.^[2]

On December 29, 2019, the first four cases of an acute respiratory syndrome of unknown etiology were reported in Wuhan City, Hubei Province, China. It appears that most of the early cases had some sort of contact history with a seafood market.^[1] Soon afterward, a secondary route of

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Submitted: 30-Apr-2020 Accepted: 16-May-2020 Available Online: 18-Jun-2020

Access this article online	
Website: www.endodontologyonweb.org	Quick Response Code
DOI: 10.4103/endo.endo_61_20	

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How to cite this article: Krithikadatta J, Nawal RR, Amalavathy K, McLean W, Gopikrishna V. Endodontic and dental practice during COVID-19 pandemic: Position statement from the Indian Endodontic Society, Indian Dental Association, and International Federation of Endodontic Associations. *Endodontology* 2020;32:55-66.

transmission was found to be via human-to-human close contact. The World Health Organization (WHO) announced the official name of the 2019 novel CoV as coronavirus disease 2019 (COVID-19).^[3] The current reference name for the virus is SARS-CoV-2. The disease was recognized as a pandemic on March 11, 2020, with global spread affecting 3,252,000 individuals with 229,457 deaths at the time of writing. Most of the evidence for understanding the disease process comes from the epidemiological findings from China, Korea, Italy, USA, the United Kingdom, and India. The information from these countries has helped researchers model and draw inference for the rest of the world.

The nature of the dental setting puts both the dentist/dental team and the patient at a high risk of cross-infection. The COVID-19 pandemic has led to the absolute requirement for strict and effective infection control protocols beyond those that already exist within the dental setting. The purpose of this position statement is to establish a standard operating protocol (SOP) for endodontic and dental practice in the current climate. This document presents the essential knowledge about COVID-19 and nosocomial infection in dental settings along with recommended management protocols for institution-based and private clinical practices.

ROUTES OF TRANSMISSION

The three most common transmission routes^[4] of novel CoV include:

1. Direct transmission (through cough, sneeze, or droplet inhalation)
2. Contact transmission (through oro-nasal-ocular route) and
3. Aerosol transmission.

Asymptomatic carriers of the infection are equally capable of transmitting the virus as symptomatic patients.^[5] The SARS-CoV-2 virus can be detected in aerosols up to 3 h postoperatively, and can persist on surfaces for extended periods. The nature of the surface alters the persistence of the virus. On copper surfaces, the virus can persist for up to 4 h, on cardboard up to 24 h, and on plastic and stainless steel up to 2–3 days.^[6] The droplet and aerosol transmission of SARS-CoV-2 is the most important concern in dental clinics and hospitals^[7] because it is hard to avoid the generation of large amounts of aerosol and droplet mixed with patient's saliva and even blood during dental procedures.^[8]

SYMPTOMS OF COVID-19 AND RELATED COMORBIDITIES

A systematic review and meta-analysis of 19 studies and 36 case reports concluded that for 656 patients, the most

prevalent symptoms include fever (88.7%), cough (57.6%), and dyspnea (45.6%). Among these patients, 20.3% required admittance to an intensive care unit, 32.8% presented with acute respiratory distress syndrome, and 6.2% with shock. Some 13.9% of hospitalized patients had fatal outcomes.^[9] The presence of comorbidities such as hypertension, diabetes, cardiovascular diseases, and respiratory system disease is identified as a major risk factor.^[10] The mean incubation period of COVID-19 is around 6.4 days, but can range from 0 to 24 days. Males were generally affected more (60%), and the patients had a discharge rate of 42% and a fatality rate of 7%.^[11]

DISEASE PROGRESS AND CONTAINMENT

A study from China's Centers for Disease Control (CDC) showed that the majority of patients (80.9%) were considered asymptomatic or had mild pneumonia but released large amounts of viruses during the early phase of infection, which poses enormous challenges for containing the spread of COVID-19.^[12] Asymptomatic carriers calculated based upon the data from the Diamond Princess cruise ship constituted as high as 17.9%.^[13] The basic reproductive number (R_0) denotes the number of people who can contract the disease from a contagious person. The R_0 of COVID-19 ranges from 2.6 to 4.7. Importantly, this is higher than that of SARS or MERS.^[2]

Social distancing has been encouraged/expected by many nations as a primary strategy to reduce the rate of infection spread and to "flatten the curve" of numbers of those infected over a period of time. Along with social distancing, other measures taken to limit the doubling time and rate of infection are constantly updated by the CDC, USA.^[14] This minimizes the potential for people to contract the disease from a contagious person. For example, a recent report based on available data projected the death of 260,000 individuals in the UK with the absence of social distancing. In fact, this model not only advocates social distancing but also recommends self-isolation for individuals 70 years of age and above. The Indian government has imposed restrictions on public gatherings beyond fifty and also recommends self-isolation of the elderly population.^[15]

With vaccines and effective drugs still under trial, the Imperial College London has outlined several public health measures to slow down the disease progress, as follows:^[16]

1. Home isolation of cases – Whereby those with symptoms of the disease (cough and/or fever) remain at home for 7 days following the onset of symptom
2. Home quarantine – This involves all household members of the individual (s) with symptoms of the disease remain

- at home for 14 days following the onset of symptoms
3. Social distancing – This is a broader policy that aims to lower the overall contacts that one makes with other people by three-fourths. This involves contacts made outside the household, school, or workplace
4. Social distancing of those over 70 years – Since this age group falls in the highest risk of severe disease
5. Closure of schools and universities.

However, social distancing creates significant challenges for the provision of dental services. Dental practitioners, in particular endodontists, are health-care providers with a major role in the management of dental emergencies including symptomatic pulpitis, acute dental infections, and dental traumatic injuries. Hence, complete closure of clinical practice/dental institutions is not recommended. Dentists also can participate in health education services by extending the information on preventive measures issued by their respective national and refer suspected COVID-19 patients to government-authorized institutions.^[17,18]

PROVIDING DENTAL CARE DURING CORONAVIRUS DISEASE 2019 PANDEMIC: CHALLENGES

1. Dental care settings invariably carry the risk of SARS-CoV-2 infection due to the nature of procedures performed.^[7] The virus can be transmitted in dental settings through inhalation of airborne viral particles that can remain suspended in the air for long periods. Direct contact with blood, oral fluids, or other patient materials presents a risk. Contact of conjunctival, nasal, or oral mucosa with droplets and aerosols containing virus particles generated from an infected individual can lead to infection. These can be propelled a short distance by coughing and talking without a mask, and indirect contact with contaminated instruments and/or environmental surfaces
2. Droplet and aerosol transmission of SARS-CoV-2 is the most important concern in dental clinics and hospitals. Most dental procedures involve the use of high-speed air rotors with water cooling, which generate large amounts of aerosol and droplet mixed with patient's saliva and even blood during dental practice. The aerosols are small enough to stay airborne for an extended period before they settle on environmental surfaces or enter the respiratory tract. Thus, SARS-CoV-2 has the potential to spread through droplets and aerosols from the infected individuals in dental clinics and hospitals
3. The asymptomatic incubation period for individuals infected with SARS-CoV-2 is variable but can be protracted. It has been confirmed that those without symptoms can still spread the virus. This makes it extremely difficult to identify those individuals that pose a risk.^[7] Owing to the

contagious nature of the disease, while we take a history and carry out an examination of the patient and assess for urgency of dental need, an asymptomatic patient could have acted as a potent source of infection for others

4. Risk of nosocomial infection: Because the health-care workers themselves fall in the high-risk group for infection, exposure to them and to the health-care settings is best avoided or postponed to control community spread. As per an earlier report in the early stage of the epidemic, on an analysis of hospitalized patients with SARS-CoV-2, 41% were presumed to have been infected in hospital, including 29% of health-care workers and 12% of patients.^[19]

PROVIDING DENTAL CARE DURING THE CORONAVIRUS DISEASE 2019 PANDEMIC: RECOMMENDATIONS

As health-care professionals, it is our duty to mitigate the community spread of this disease through responsible and informed actions. We need to fulfill our professional duty toward our patients, while keeping ourselves, our staff, and environment safe. The Indian Endodontic Society (IES), the International Federation of Endodontic Associations (IFEA), and the Indian Dental Association recognize and recommend the need for immediate postponement of all elective dental procedures while keeping emergency services operational. Concentration on emergency care will take care of immediate patient needs for true dental emergencies while also reducing the load of such emergencies on hospital emergency departments. The situation in hand is fluid and not time limited, but may persist for some time and will require close monitoring. The governing bodies and local governments are continuously providing timely updates regarding the situation, which needs to be closely monitored.

In this position statement, we intend to answer the following questions for the practicing dentist:

1. Specific recommendations for dentists to triage patients to decide, what is a dental emergency, and when and how to schedule such patients
2. Recommendations regarding a workflow and steps to be followed in a dental setting to reduce exposure while keeping the services functional for emergency care
3. Recommendations for infection prevention and control in a dental clinic
4. Specific dental procedure-related recommendations.

Specific recommendations for dentists to triage patients to decide, what is a dental emergency, and when and how to schedule such patients

Emergency severity assessment

An objective triaging tool has been suggested to facilitate the scheduling of the patients based on the level of need.

This is based on the adaption of recommendations given by the American Dental Association on March 18, 2020.^[20] The operating question in this situation may be “How long can each patient safely wait?”

The purpose of this triage is to limit incoming patients and to identify those who cannot wait to be seen. It also will help in prioritizing the scheduling of patients as and when we restore normal functioning in our dental setups. This may be preferably done by trained staff or dentists themselves through audio or video communication channels. The following triages the patients into three categories [Tables 1 and 2]:

- Emergency care
- Urgent care
- Scheduled care/elective care.

Section 2. Recommendations regarding a work flow and steps to be followed in a dental setting to reduce exposure while keeping the services functional for emergency care

Certain specific measures are discussed here regarding the general work flow for dental patient management during this period.

2.1. Patient triaging and tele-screening

To minimize the risk of exposure and community spread, it is critical to reduce physical walk-ins in the dental setting. This can be done effectively by tele-screening and triaging by phone. Triageing is the process of determining the priority of patients' treatment needs based on the severity of their condition. In telephone triage, decision makers must effectively assess the patient's symptoms and provide directives based on the urgency. This should be done in a

Table 1: Emergency severity assessment – decision-making tool

Decision Point Question to be ascertained on first interface (physically or on telephone)			Level of emergency	Dental Conditions	Level of Intervention needed
Decision Point A	“Does this patient require immediate life-saving intervention?”	If yes ; Then ES1 If No, Move down	ES-1 Emergency Care Dental conditions leading to impairment of basic functions like breathing and swallowing	Uncontrolled Bleeding Diffuse Intra oral or Extra Oral Swelling which may obstruct the patient airway or with systemic effects Severe Traumatic Injury, including extraoral tissues which can obstruct the airway	Need Immediate Care and should be attended to immediately
Decision Point B	“Is the patient presenting with a condition that requires immediate treatment?” “Is the patient currently in disabling pain?”	If yes ; Then ES2 If No, Move down	ES-2 Urgent Care Dental Conditions that gravely effect the normal functioning of the patient like disabling pain, infection Disabling Pain may be described as severe constant pain or pain increasing in intensity which scores > 7 on numerical pain score scale and not relieved by pharmacological intervention	Symptomatic Irreversible Pulpitis Primary & Secondary Symptomatic Apical Periodontitis Acute Apical Abscess, or localized bacterial infection resulting in localized pain and swelling Pericoronitis or third-molar pain Surgical post-operative osteitis, dry socket dressing changes Tooth fracture resulting in pain or causing soft tissue trauma Dental trauma with avulsion	Such patients should be scheduled for a physical visit at the earliest convenience and specific procedures aimed at alleviating pain/control of infection should be carried out in a minimally invasive manner while reducing the potential for aerosol generation.
Decision Point C	Is the patients’ pain alleviated only under effect of medications? Does the condition needtime sensitive treatment? Is there a possibility that the presenting condition could easily deteriorate and lead to pain and infection in the near future?	If yes ; Then ES3 If No, Move down	ES-3 Delayed Urgent Care	Pulpitis due to lost a restoration or dental caries causing pain Primary & Secondary Symptomatic Apical Periodontitis Pericoronitis or third-molar pain Surgical post-operative osteitis, dry socket dressing changes Tooth fracture resulting in pain or causing soft tissue trauma	Such patients should be scheduled for physical visit after a delay as per the availability and to reduce the patient load at any given time. Specific procedures aimed at alleviating pain/control of infection should be carried out in minimally invasive manner while reducing the potential for aerosol generation.
Decision Point D	Can the condition remain stable for a period of time?	If yes Then ES4 If No, Move down	ES-4 Scheduled Care	Loss of restorations with no pain Replacing temporary filling on endo access openings in patients not experiencing pain Dental trauma involving enamel and dentine only and asymptomatic	Such patients should be only tele-counselled and may be scheduled as a priority when regular dental services are restored. Advise appropriate pharmacological intervention

If the patient's condition does not qualify for any of above or answer in the affirmative for any of the decision point questions, then most of those situations would come under elective care, and should be avoided at present. ES: Emergency Situation

timely fashion while meeting standard guidelines in order to prevent symptoms from worsening.^[21]

The front-desk staff members should be trained to triage callers based on their emergency severity assessment of the dental condition and the exposure risk categories related to COVID-19. Effective triaging of the emergency calls will enable the practice to apply social distancing within the practice and plan the treatment of dental emergency or urgent care more effectively.^[22] Before physically appointing a patient or attending to a walk-in patient in the dental setting, it is necessary to ascertain the following:

Exposure risk categories: Low/high based on a detailed medical history and COVID-19 questionnaire [Annexure 1].

The main factors that may give vital insight into COVID-19 risk are [Table 3]:

- Stage of disease spread in a particular geographic location/state/country
- History of exposure to potentially infected persons or places (through travel) – positive COVID-19 suspect

Table 2: Recommended medications for emergency care patients reporting with severe dental pain during COVID-19 pandemic

The most recommended drugs of choice ^[24-26] for treating acute pulpitis are
Acetaminophen 1000 mg (every 6-8 h) OR
Ketorolac tromethamine 10 mg (every 6 h) OR
Piroxicam 20 mg (every 12 h) OR
Ibuprofen 600 mg (every 6 h) (use with caution)*
The pain felt by patients diagnosed with symptomatic irreversible pulpitis may be also alleviated by administering 4 mg dexamethasone either orally or through intraligamentary and mainly suprapariosteal injections ^[27]
A Cochrane Review ^[28] illustrates that there is not enough evidence to recommend the use of antibiotics to reduce pain in cases with irreversible pulpitis (kindly note that if patient reports with signs and symptoms of acute apical abscess/cellulitis, then appropriate antibiotic medications have to be given)
The Current WHO guideline ^[29] has not contraindicated the usage of ibuprofen during COVID-19 pandemic as on March 27, 2020. However, with conflicting research in this issue, this position statement would recommend the usage of alternative medications to ibuprofen given in this table

- Any respiratory illness symptoms (fever, coughing, and difficulty in breathing).

High-risk patients should be directed toward the local authorities for assessment and management. For the purpose of the dental setting, as a rule of thumb, all patients should be considered as potential asymptomatic carriers, if not already a known case of COVID-19. Dentists can track COVID-19 spread by accessing their respective Ministry of Health and Family Welfare website.^[23]

Emergency severity assessment of the associated dental condition (discussed in emergency severity assessment section): only patients which fall under emergency/urgent care should be attended to or scheduled immediately for management. While others may be tele-counseled, put under pharmacological management if needed [Table 2], and kept on a telephonic follow-up for any exacerbation of symptoms.

For physical walk-ins

Direct walk-ins in the clinics should be greatly discouraged other than life-threatening dental conditions. Educating and informing the patients before-hand using digital and mobile applications and messages and setting up of tele-consultation avenues may prove to be effective tools for the same.

Precheck triage

Dental clinics are recommended to establish precheck triages to measure and record the temperature of every patient as a routine procedure (this should also be carried out for all dental team members). As outlined above, all patients on arrival should be questioned and a detailed medical history form should be completed to identify patients at high risk from infection. A COVID-19-related questionnaire should be completed to identify potential asymptomatic carriers and those that are infected. Only emergency cases should be attended to, whereas others should be counseled and appointed for a later date and may be kept on a telephonic follow-up if needed.

Table 3: COVID-19 risk assessment chart*

Geographical location - areas stage 3 of outbreak (community transmission)	History of exposure	Temperature/respiratory symptoms	Risk category
+	+	+	High risk
+	+	—	
+	—	—	
—	+	+	
—	+	—	
—	—	+	Low risk
—	—	—	

*The risk assessment is based on the evidence gathered up to April 17, 2020. As the disease dynamics is constantly changing, the reader is referred to their respective health bodies to keep abreast of the situation, — Absent, + Present

Table 4: Personal protective equipment requirement at different levels of employee setting in a dental office

SETTING OF EMPLOYEE	SCOPE OF WORK AND RISK LEVEL	HEAD CAP	COVER ALL GOWN	EYE PROTECTION-GLASS	EYE PROTECTION- face shield	SURGICAL MASK	RESPIRATOR MASK (N95/ FFP-2)	GLOVES
Patient walking in for treatment and /or the accompanying person	To maintain a minimum safe distance of 6 ft. Promote Hand Hygiene measures LOW RISK	✓ Single use	✗	✗	✗	✓ Single extended use upto 2 hours		✗ Single use
Clinic Receptionist / Other staff	Patient Registration Interview To maintain a minimum safe distance of 6 ft. LOW RISK	✓ Single use	✗	✗	✗	✓ Single extended use upto 2 hours		✗
Dental Surgeon and Chair -Side Assistant	Dental Check-up (Interview and Clinical procedures) Dental Treatment without involving aerosol procedures MODERATE RISK	✓ Single use	✗	✓ Single use	✗		✓ Single extended use upto 6 -8 hours if not spoilt	✓ Single use
Dental Surgeon and Chair -Side Assistant	Dental Treatment involving Aerosol Generating Procedures HIGH RISK	✓ Single use	✓ Single extended use	✗	✓ Single use		✓ Single use only	✓ Single use
Sanitation/ Cleaning Staff	Cleaning , Disinfection Procedures, Bio waste Collection MODERATE RISK	✓ Single use	✗	✓ Single use	✗		✓ Single extended use upto 6 -8 hours if not spoilt	✓

Important points to be noted: Single use refers to disposal of disposable PPE or decontamination of reusable items, for example, eye protection or respirator, after each patient and/ or following completion of a procedure on a patient or session; respirators can be used safely within their design specifications for 8 h of continuous or intermittent use; Discard N95 respirators following use during AGPs or those contaminated with blood or other body fluids; Perform hand hygiene with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the respirator; ensure that areas for donning and doffing are designated as separate from the patient care area (e.g. patient's room). PPE: Personal protective equipment, AGP: Aerosol-generating procedures

RECOMMENDATIONS FOR INFECTION PREVENTION AND CONTROL

General recommendations

As outlined previously, the triaging of patients is an essential step in reducing the risks of COVID-19 transmission through reduction in the number of patients attending and identification of symptomatic carriers.

Once a patient has access to the dental setting due to an identified urgent/emergency treatment need, the dental team can further limit the potential impact of a dental visit. The patient if possible can be encouraged to avoid public transport or travel alone. Upon arrival at the dental setup, facilities should be made available for patients to wash or disinfect their hands [Box 1]. Efforts should be made to minimize the number of patients in the dental setting at any one time. Patients should be seen promptly to limit waiting times. If possible, patients should not wait in waiting rooms.

Box 1: General recommendation checklist for dental centers before treating patients during COVID-19 pandemic*

Place visual alerts for patient awareness using posters on COVID-19 pandemic awareness, cough etiquette, and hand hygiene practices
Modify the existing patient waiting area seating arrangement to enforce social distancing of 1-2 m
Insist on the use of ABHR for all upon entry into your dental practice
Provide face mask for all patients prior to consultation
Tissue paper dispenser and foot-operated waste bin mandatory in patient waiting room
Mandatory provision for hand washing with soap and water
Avoid the usage of commercial split/centralized/window air conditioners unless equipped with HEPA filters
It is recommended to use natural and mechanical ventilation using fans and exhaust

*Adapted from National Guidelines for Infection Prevention and Control in Healthcare Facilities, National Centre for Disease Control, Directorate General of Health Services. Ministry of Health and Family Welfare, Government of India. January 2020; <https://www.cdc.gov/infectioncontrol/guidelines/environmental/index.html> Guidelines for Environmental Infection Control in Health-Care Facilities Recommendations of CDC and the HICPAC. ABHR: Alcohol-based hand rub; HEPA: High-efficiency particulate air; HICPAC: Healthcare Infection Control Practices Advisory Committee; CDC: Centers for Disease Control

As outlined previously, droplet and aerosol transmission is a significant risk in the dental practice setting. Due to the

Table 5: Donning and doffing procedure in clinical practice

Step-by-step donning of PPE prior to clinical procedures
Don PPE before entering the operator: https://www.cdc.gov/hai/pdfs/ppe/ppe-sequence.pdf
Surgical gown or coverall Disposable surgical gown/coverall including shoe cover of quality that meets or exceeds ISO 16603 Class 3 exposure pressure, or equivalent (63-69 GSM) https://www.mohfw.gov.in/pdf/GuidelinesonrationaluseofPersonalProtectiveEquipment.pdf Closed neck autoclavable cloth gowns and shoe cover
Mask - N95 respirator: NIOSH N95, EN 149FFP2, or equivalent Perform fit test to select the right size https://www.osha.gov/video/respiratory_protection/fittesting_transcript.html User seal check must be performed each time after wearing the mask: https://www.cdc.gov/niosh/docs/2018-130/pdfs/2018-130.pdf Single extended use of 6-8 h if it does not become contaminated Protect N95 with a surgical triple-layered mask which must be changed after every patient Ref link for extended use or limited reuse of N95 masks https://www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html
Wear goggles with a flexible frame to ensure good seal to the skin compliant with or equivalent to: EU standard directive 86/686/EEC, EN 166/2002 or ANSI/SEA Z87.1-2010
Disposable or cloth head cap in the absence of hood
Put on face shield compliant with or equivalent to EU standard directive 86/686/EEC, EN 166/2002 or ANSI/SEA Z87.1-2010
Nonsterile nitrile gloves complying with any of the below standards: EU standard directive 93/42/EEC Class I, EN 455 EU standard directive 89/686/EEC Category III, EN 374 ANSI/SEA 105-2011 ASTM D6319-10
Step-by-step doffing of PPE after clinical procedures
Doff the PPE after exiting the operator
Follow doffing sequence: https://www.cdc.gov/hai/pdfs/ppe/ppe-sequence.pdf
Provide ABHR in the doffing area
Dispose PPE appropriately according to biomedical waste disposal regulations
Reusable autoclavable cloth gown and head caps if used must be immersed in domestic detergent for 20-25 min, washed at 70°, and then autoclaved ^[38]
ABHR: Alcohol-based hand rub; PPE: Personal protective equipment

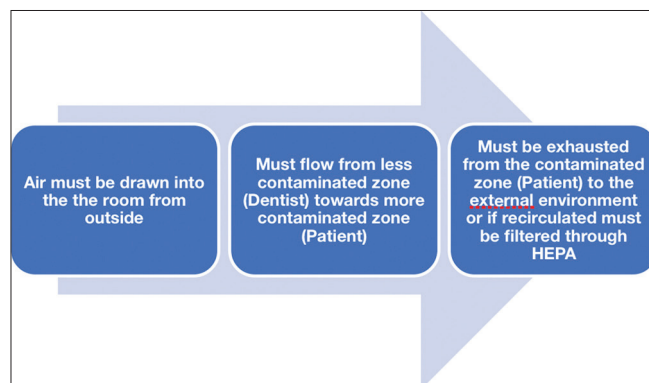


Figure 1: The sequence of air flow plan within a dental clinic

potential risk of asymptomatic COVID-19 patients presenting in the dental setting, appropriate measures to limit risk should be taken. Personal protective equipment (PPE) in line with guidance should be used (see use of personal protection protective equipment section). Generally, certain endodontic emergencies that necessitate the use of high-speed handpiece to gain access to the root canal system should be performed under dental dam and high-volume aspiration.^[30,31] However, all aerosol-generating procedures (AGPs) should be avoided.

If AGPs are undertaken, the operators should wear appropriate PPE ideally comprised of a fluid-resistant mask, a visor, and an apron. It is important to remember to put on and remove PPE in an order that minimizes the risk of contamination.

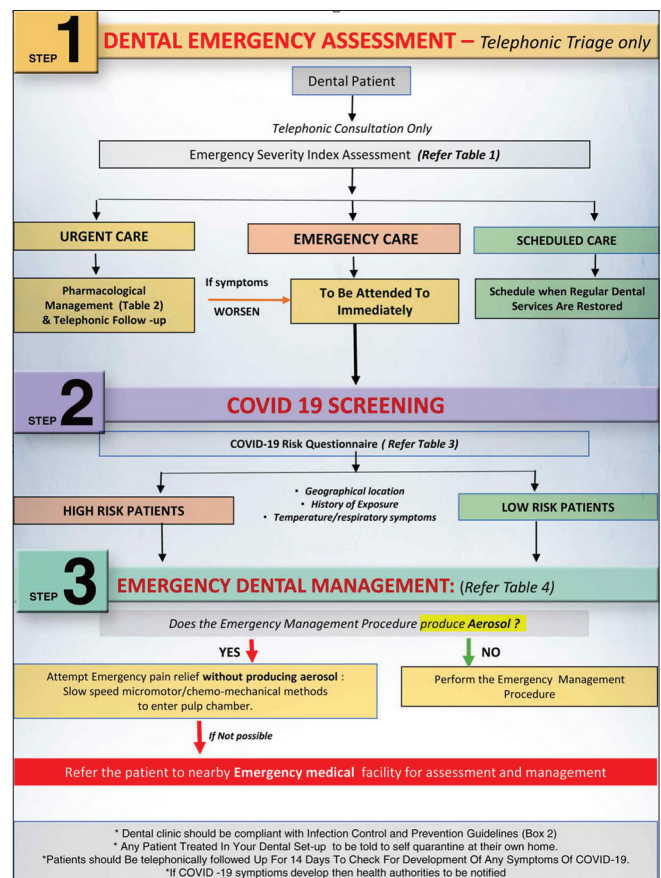


Figure 2: Clinical decision-making flowchart for assessing dental emergency and treatment recommendations during COVID-19 pandemic

Table 6: Recommended disinfection and sterilization protocols for dental clinics treating patients during COVID-19 pandemic

Area	Specifications
Reception and patient waiting area (housekeeping surfaces)	Avoid sweeping with broom Use wet moping with warm water and detergent or hospital disinfectant (e.g., 1:50 dilution of 5.25%-6.15% sodium hypochlorite) ^[39] High touch surfaces (e.g., door knobs, handles, and elevator buttons) must be cleaned more frequently with hospital-grade detergent/disinfectant Toilets, wash basins, and sinks must be cleaned with detergent and disinfected with 1% sodium hypochlorite ^[43]
Treatment area/patient care area	
Standard recommendation	Floor - Use wet moping - multi bucket technique - water/detergent/low-level disinfectant such as 3% hydrogen peroxide, 1% sodium hypochlorite, or EPA-approved agents ^[39,42] High touch/clinical surfaces within 3 feet diameter of the dental chair that are difficult to clean must be covered using a physical barrier for every patient or disinfected between patients using a wipe (e.g. 0.5% to 0.1% sodium hypochlorite or 70% alcohol for sensitive surfaces) ^[39,43] Wet dust all noncritical/nontouch surfaces and horizontal surfaces with freshly prepared disinfectant solution once a day unless visibly soiled (e.g., 0.5%-1% sodium hypochlorite or 3% hydrogen peroxide) ^[39,42] Walls, window blinds, and frames must be cleaned and disinfected when visibly soiled or end of the day Mop heads and cleaning cloths must be discarded in biomedical waste bins appropriately or decontaminated regularly by laundering (heat disinfection) with detergent and 1:1000 dilution of sodium hypochlorite and dried at 80°C. Must be changed frequently ^[39] The housekeeping staff must adorn the recommended PPE [Table 4]
Aerosol adjuncts (additional recommendations)	Identify a closed room to perform AGP if available 1:100 dilution of 5.25%-6.15%, i.e., 0.01% of sodium hypochlorite for DUWL (we need to give full form) ^[44] Air should be filtered with (HEPA 13 or 14) - if recirculated or otherwise exhausted to the outside effectively ^[39,40] Temporary use of a strategically placed portable, industrial-grade HEPA filter may expedite the removal of airborne contaminants: https://www.abatement.com/learning-center/patient-isolation/faqs ^[39,40] UVGI 252 nm, duct irradiation, or upper-room air irradiation (30-40 W/100 square feet) can be used as an adjunct air-cleaning measure, but it cannot replace HEPA filtration ^[45-47] Allow adequate time for sufficient ACH to remove 99% of airborne particles and to perform environmental disinfection of min 15 min after non-AGP and 30 min after AGP between patients ^[39,40] Hydrogen peroxide vapor fumigation with 30% hydrogen peroxide can be performed ^[42] Extra oral suction

Disinfectants approved by the Environmental Protection Agency, Disinfectant List Coronavirus Disease 2019 (COVID-19) March 13, 2020, are recommended for surface disinfection procedures. <https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2> last updated on March 13, 2020. Accessed on March 18, 2020; Do not use disinfectant spray on potentially highly contaminated areas (such as toilet bowl or spittoons) as it may create splashes which can further spread the virus; 70% alcohol can be used to wipe down surfaces where the use of bleach is not suitable, for example, metal. (chloroxylonol [4.5%-5.5%]/benzalkonium chloride or any other disinfectants found to be effective against coronavirus may be used as per manufacturer's instructions); always use freshly prepared sodium hypochlorite solution and discard remnant diluted solution. AGPs: Aerosol-generating procedures; HEPA: High-efficiency particulate air; UVGI: Ultraviolet germicidal irradiation; PPE: Personal protective equipment; ACH: Air Changes per Hour; DUWL: Dental Unit waterline

Table 7: Recommendations for specific dental procedure

Number	Subject	Recommendation	Reason
4.1	Procedures to be avoided	Avoid all aerosol-producing procedures Avoid tooth preparation with air turbine or electric handpiece Avoid use of ultrasonic or sonic scalers	To prevent aerosol production
4.1.1	Procedures to be minimized	Avoid intraoral radiographs or should be performed cautiously Avoid use of three-way air-water syringe ^[49-51]	They tend to stimulate saliva secretion and induce coughing ^[29,48] To minimize aerosols
4.2	General measures	Patient escorts should be discouraged and patients should be instructed to maintain social distancing from others Preferable to give nonoverlapping appointments Provide the patient with a surgical mask at the entrance of the clinic Prior to meeting the patient, the dentist should wear all PPE, including	To avoid disease transmission
4.2.1	PPE	Protective eyewear, masks (N-95/FFP 2/FFP 3 equivalent), gloves, head cap, face shields, and protective outerwear	These are strongly recommended for ALL health-care providers and support staff in the clinic/hospital settings ^[19]
4.3	Preprocedural Mouthrinse	1% hydrogen peroxide or 0.2% povidone-iodine (chlorhexidine is ineffective against SARS-CoV-2)	To reduce the salivary load of oral microbes, including potential SARS-CoV-2 carriage ^[52,53]
4.3.1	Management protocol for acute pulpitis without generating aerosol	Preoperative administration of any NSAID 1 h prior to the local anesthesia injection [Table 2] Local anesthesia with 2% lidocaine with 1:100,000 epinephrine (1.8 ml)	To achieve optimal anesthesia

Contd...

Table 7: Contd...

Number	Subject	Recommendation	Reason
4.3.2	Emergencies that require aerosol-producing procedures	Allow sufficient time (15 min) for anesthesia to take effect	To prevent aerosol production
		If required, use supplemental buccal infiltration with 4% articaine with 1:100,000 epinephrine (0.9-1.2 ml) at the apex of the tooth to be treated ^[54-56] OR Intraligamentary injection 0.2ml of 2% lidocaine with 1:100,000 epinephrine ^[57]	
		Buffered (alkalinizing) LA solution ^[58]	
		Mechanical/chemomechanical caries excavation methods	
		Dental dam isolation with high-volume saliva ejectors	
		Four-handed technique ^[19]	
		Caries excavation with a sharp spoon excavator to remove soft caries or Carisolv + spoon excavator	To provide interim relief
		Slow speed micromotor handpiece without water spray until pulp is exposed ^[19]	
		Perform partial/complete pulpotomy	
		Arrest bleeding with sterile cotton or soaked with 3% NaOCl applied with slight pressure. Place sterile dry cotton and provide temporary seal ^[59]	Promote hemostasis
4.4	Disinfection of the clinic settings ^[50,60]	If bleeding is not arrested, place arsenic-free pulp devitalizer and temporary filling ^[19]	
		Prescribe NSAIDs approved by the local government health authorities for postoperative pain management [Table 1b]	
4.5	Waste management	Where indicated, extraction should be followed by suture placement	
		Any procedure which would involve aerosol production should only be done in dental/medical setups equipped with negative-pressure or AIIR treatment rooms which allow for complete disinfection to prevent cross-contamination ^[19]	To avoid disease transmission
4.4	Disinfection of the clinic settings ^[50,60]	If the concerned dental setup is not prepared with the same, then patient should be directed toward equipped dental center in his/her area/the local medical authorities for assessment and management ^[60]	
		General areas - FREQUENTLY clean and disinfect, including door handles, chairs, and desks	
4.5	Waste management	Disinfectants - Isopropyl alcohol, 0.5% sodium hypochlorite	
		Reusable instruments - Pretreated, cleaned, sterilized, and properly stored [refer Table 6]	
4.5	Waste management	Medical and domestic waste should be marked and disposed in accordance with the Biomedical Waste Management and Handling Rules 2016, 2018 ^[61,62]	

NSAID: Nonsteroidal anti-inflammatory drug; AIIR: Airborne infection isolation room; PPE: Personal protective equipment; SARS-CoV-2: Severe acute respiratory syndrome-coronavirus-2; LA: Local Anesthetic

Even when not using AGPs, it is important that robust infection control measures are employed. In nonclinical areas such as reception and waiting areas, thorough cleaning should take place. Ideally, all nonessential items should be removed from these areas and surfaces free of clutter (section 4.5).

- After touching the patient
- After touching surroundings or equipment that are not disinfected
- Dental professionals should avoid touching their own eyes, mouth, and nose.^[7]

Hand hygiene

The WHO guidelines on hand hygiene in healthcare (2009) suggest that hand hygiene is the single most important measure for the prevention of infection.

- Hand washing with soap and water is preferred when hands are visibly dirty or soiled with blood or other body fluids or after using the toilet.
- Use alcohol-based hand rubs (ABHR) when hands are not visibly soiled or tap and running water is not available

Hand hygiene must be performed:

- Before patient examination
- Before dental procedures
- If gloves are torn or compromised during the procedure
- After removing gloves

Use of personal protective equipment

The use of PPE, including protective eyewear, masks, gloves, caps, face shields, and protective outerwear, is strongly recommended for all health-care providers in the clinic/hospital settings during the COVID-19 pandemic.^[19] All PPE that are intended for use for dental treatment are aimed to adequately protect the dentist, his/her staff, and the patient when providing care. At the same time, PPE usage needs to be optimized, to ensure their availability and to keep the treatment costs in check. Keeping the above two criteria in mind, these guidelines aim to provide optimization strategies for rationale use of PPE, depending on the type of personnel, kind of activity involved, and hence the risk of exposure [Tables 4 and 5].^[32-37]

The donning and doffing of PPE is an essential step to ensure the prevention of infection and cross-contamination [Table 5].

Environmental disinfection of dental clinic

Air flow circulation

The air flow must be planned in a way to facilitate clearing of the contaminated aerosol within the dental operatory with adequate provision of ventilation [Figure 1].^[39,40] It is generally recommended to:

- Avoid air conditioning without high-efficiency particulate air filters
- Use natural ventilation when available
- Introduce additional positive air flow (e.g. pedestal or tabletop fans) from less contaminated to more contaminated zone
- Place exhaust fans to evacuate the contaminated air to the external environment.

The dental practice should have a SOP for handling patients during this pandemic with enhanced focus on the sterilization and disinfection protocols, as highlighted in Table 6.

RECOMMENDATIONS FOR SPECIFIC DENTAL PROCEDURE

In this section, there are specific recommendations for dental emergency procedures, with a focus on the management of symptomatic irreversible pulpitis [Table 7]. With many countries under lockdown measures to contain the spread of COVID-19, the blanket instruction is to avoid all aerosol-related procedures in dental clinics. If possible, these patients must be managed with nonaerosol procedures or refer to medical facility equipped with negative-pressure operatories.

Following nonaerosol procedures, the steps to disinfect and sterilize, specific to COVID-19 pandemic, are summarized in Table 6. Also included is a decision-making checklist [Table 7] that will enable the dentist to decide if he or she could handle patients in his/her dental clinic.

In order to summarize the document, we recommend the clinical decision-making flowchart [Figure 2], to make a judgment call on a case-to-case basis.

CONCLUSION

Unprecedented challenges necessitate unprecedented solutions. As dental health-care providers, our primary goal is to serve our patients during their times of need. However, the current pandemic makes dentistry a potent channel of community transmission of disease. Hence, the current reality requires revised policy guidelines that provide clarity on the extent of dental services that can be provided by us

safely. This joint position statement from the IES, IFEA, and IDA is an attempt to provide a logical and effective clinical decision-making process that enables us to effectively screen, protect, and serve our patients.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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ANNEXURE

Annexure 1

Screening/Disclosure Form for Dental Patients During Covid-19 Epidemic

(Developed by the Indian Endodontic Society)

Name of patient: Age/Sex: Mobile Number:.....

Residential Address (*Proof to be verified*):

COVID-19 Questionnaire	NO	YES
1 Do you have any symptoms of fever, cough, sore throat, and/or fatigue anytime during the last 21 days ?		
2 Did you experience any difficulty in breathing anytime during the last 21 days ?		
3 Do you have any exposure to a known or suspected case of COVID-19 patient in the last 21 days ?		
4 Have you visited any other medical facility/hospital in the last 21 days ? If yes, for what reason?		
5 Are you residing in a locality that has been notified by the government as a COVID containment zone ?		
6 Have you ever been tested for COVID-19? If yes, give details		

The above information given by me is true to the best of my knowledge. I fully understand and acknowledge that withholding or misrepresentation of any information is highly unethical and against the interest of larger population during this pandemic.

I have been made aware that dental procedures create ultra-fine water spray that may transmit the COVID-19 virus. I understand the COVID-19 virus has a long incubation period during which carriers of the virus may not show symptoms and still be highly contagious. I also understand that, due to the contagious nature of the disease and characteristics of dental procedures, I have an increased risk of contracting the virus simply by being in a dental office in spite of the best disinfection protocols applied.

I fully understand and acknowledge that I may be an asymptomatic carrier of the disease and hence will strictly comply with all safety precautions and protocols advised. In the eventuality of my testing COVID positive at a later date, I will not hold the dental service provider/staff/dental setup responsible for it. I hereby knowingly and willingly give consent to have my emergency/urgent dental treatment completed during the COVID pandemic.

Signature of patient: Staff signature:

Date: