

Evidence Based Decision Making In Dental Treatment During COVID-19 Outbreak.

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Abstract

Background: SARS-CoV-2 has resulted in a global pandemic, COVID-19. The disease has spread outrageously from Wuhan, China to rest of the world affecting millions of people. The human transmission is mainly known to occur by aerosols. As almost every dental procedure is associated with aerosol production, oral health care professionals are at a high risk of getting the infection. An attempt has been made to render cohesive practical suggestions for dental professionals amid COVID-19 outbreak.

Objectives: The paper aims at providing evidence based information in managing dental patients during this pandemic.

Material and methods: The paper provides a broad overview of predominant findings based on electronic database search regarding COVID-19 outbreak and its effect on dental practice.

Conclusion: Dental care should not be neglected due to the pandemic. Thorough knowledge about the disease and its prevention will not only help us in providing care to these patients but will also help in preventing the nosocomial spread of infection.

Key words : COVID-19, COVID pandemic, COVID and dental practise, dental public health, infection control.

Introduction

COVID-19 pandemic is one of the worst infections, which the mankind has ever encountered. The disease was discovered in Wuhan, China in December 2019. COVID-19 results in pneumonia and is caused by severe acute respiratory syndrome coronavirus 2, also known as SARS-CoV2, infection. As of 24th May 2020 there were 5,427,555 patients who suffered from COVID-19 while 344,417 died¹. Although the majority of cases present with no or mild

symptoms those who are symptomatic can have fever, cough, malaise, muscle pains, sore throat, anosmia, dysgeusia and respiratory distress.²⁻⁴ The research so far has indicated that pathogenic mechanism that produces pneumonia seems to be particularly complex. The data so far available seem to indicate that the viral infection is capable of producing an excessive immune reaction in the host. In some cases, a reaction takes place which as a whole is labelled a 'cytokine storm', which causes extensive tissue damage⁵. The virus mainly spreads through droplet transmission when a person is in close contact (within 1m) with someone who has respiratory symptoms. The infection may also spread via fomites in the immediate environment around the infected person.⁴ Hence the transmission can happen either by direct contact with the infected person or indirectly by contacting surfaces in the immediate environment or with objects used on the infected person (e.g. mouth mirror, periodontal probe). Although there is some evidence that the virus may have a faecal-oral route of transmission but to date there is only one study which has cultured the COVID-19 virus from stool specimen.⁶ As scientists around the world are working tirelessly to know more about the transmission mechanisms, the clinical spectrum of disease, new diagnostics, and prevention and therapeutic strategies to control the pandemic, a specific treatment or a vaccine still seems a distant milestone. In the light of current evidence about the COVID-19 the prevention of propagation of the disease remains the only option for the world till a definitive preventive or treatment measure is discovered³.

The strategies so far implemented throughout the world to curb the spread of the disease are social distancing and hygiene measures. Although medical professionals are trying their best to serve the people in these hard times but it is also a harsh reality that many have lost their lives while fighting this deadly infection.⁷ As dental professionals work in a close contact with their patients and many of the procedures including oral examination involve aerosol production, dental professionals are at high risk of COVID-19 infection.⁸ Dentists, therefore, should be trained to deal with the disease and manage its spread.⁹ Despite the fact that many professional regulatory bodies have released advisories on dealing with COVID-19 patients in dental setups, there is a dearth of literature on clear-cut patient management protocols for dental professionals. The paper aims to provide evidence based information for managing dental patients during COVID-19 pandemic.

Materials and Methods: Search strategy A literature search was performed to retrieve articles regarding COVID-19 and dental practice using electronic (PUBMED, MEDLINE) and manual searches up to May, 2020. Due to limited availability of data clinical studies,

case reports, review articles and systematic reviews, and various epidemiological studies were reviewed. Inclusion criteria was based on COVID-19 dental management, etiopathogenesis, prevention, hospital management. Studies regarding vaccine, molecular structure, and pharmacotherapy were excluded.

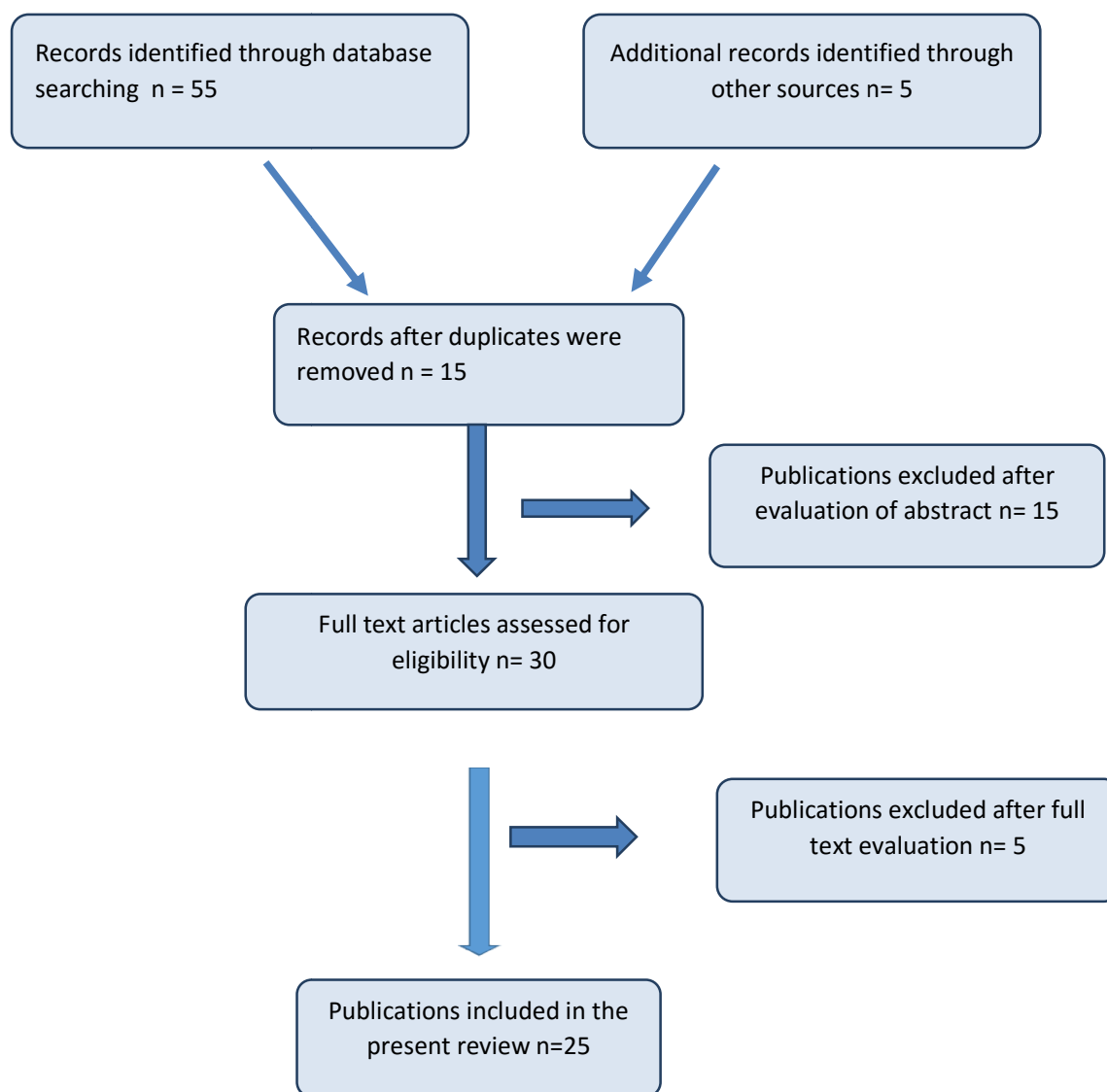


Figure 1: Flow chart depicting the selection criteria

Dental professionals and COVID-19 – an overview

Dental diseases are prevalent in the modern world. The diseases may range from simple caries to life-threatening conditions like oral cancer. In addition to the local effects of oral health, the disease might affect the overall physical and mental well-being; therefore, the role of dental health professionals in controlling and treating various oral health problems is vital.

Considering the fact that treatment involves working in close proximity to the patient dental professionals, auxiliary dental staff and their patients are on high risk of aerosol exposure. Current scientific evidence highlights that aerosols are the main source of COVID-19 viral propagation.^{10,11} Aerosols are defined as particles less than 50 micrometers in diameter and are classified as coarse particles 2.5–10 microns, fine particles less than 2.5 microns, and ultrafine particles, which are smaller than 0.1 micron. An ultrafine particle like the COVID-19 virus, can enter the bloodstream and target organs such as the heart and brain.^{10,12,13} Many commondental procedures result in massive aerosol production. Studies have shown that procedures like ultrasonic scaling have highest incidence of particle transmission, followed by air polishing, air/water syringe, and high-speed handpiece aerosolization. In addition the dental operatory involves machinery and equipment which can act as a surface for virus and further increase the risk for infection spread.⁴

Although guidelines for infection control and sterilisation are already established but considering the highly contagious nature of the COVID-19 virus many dental surgeons and their patients are falling prey to the infection and some have even lost their lives.^{4,8,11} The directions and advisories of the governments and regulatory authorities to defer dental treatments and stop routine dental work has made things more difficult for the dentists as well as dental profession. The limited availability of PPE and the cost involved to maintain the operatory has raised the expenses involved in rendering the dental treatment. Many dental societies and organizations have even sought for economic waivers to save the profession.^{14,15} Experts have suggested that dentistry and dental professionals must prepare themselves to cope up with the adverse effects of COVID 19 situation by getting familiar with the use of PPE and following evidence based protocols for managing their patients.^{4,16}

Personal Protective Equipment (PPE) basics: an overview

PPE are protective gears designed to safeguard the health of workers by minimising the exposure to and a biological agent. As defined by OSHA it is “specialized clothing or equipment worn by an employee for protection against infectious materials.” PPE can be categorised based on area of body protected, by the types of hazards and by the type of garment or accessory. PPE includes gloves, gowns/ coverall, mask, respirators, goggle, face shield, shoe cover and should not be of ill-fitting size. These should meet standards of the laboratory tests that evaluate the effectiveness of PPE.¹⁷

Masks:

Masks are PPE, which if used correctly would protect the user from various air-borne infections. CORONA virus targets mainly the respiratory tract. Hence, protecting the airway with use of masks can be helpful. Recent studies have reported asymptomatic transmission of the virus, also it was seen that the risk of infection transmission might become negligible if 80% of the people wear the mask.¹⁸ Different types of masks are available for different working conditions and should be used accordingly (Table 1). Ideally N-95 respiratory masks should be the standard practice wherever possible. If N-95 masks are not available the next best option is FFP2 respirator mask. N-99, N100 and FFP3 do fulfil the purpose of filtering the virus but are not comfortable to wear (resulting in breathing difficulties) hence not recommended.¹⁹

	Type of Mask	Effectiveness against COVID-19		
❖	Dust mask	<ul style="list-style-type: none"> No protection against COVID -19 		
❖	Cloth mask	<ul style="list-style-type: none"> 67% protection with reduced transmission of virus by 40% 		
❖	Surgical Mask	<ul style="list-style-type: none"> Made up of three layers Surgical masks are intended to be used only once between 3 to 8 hours and then safely disposed. Not to be reused. Surgical masks need to conform to the following quality standards: bacterial filtration efficiency >98%, particulate filtration efficiency <99% for 0.1micron particle size, differential pressure that measures ease of breathing <3mm, and fluid resistance of 80 mmHg. 		
❖	Respirators	<ul style="list-style-type: none"> Tight fitting masks with filtration system The 0.3μm cut off is used for measuring filtration efficacy because that is the most penetrating size into the lungs 		
US Standard Classification (Filtration efficiency (FE%))		N95 (95%)	N99 (99%)	N100 (99.97%)
		N95 without a valve. suitable for COVID-19 patients	Suitable for COVID -19 patients.	Suitable for COVID -19 patients.
European Union Classification		FFP1 (80%)	FFP2(94%)	FFP3(99.95%)
		Not suitable for COVID-19 patients	suitable for COVID-19 patients	suitable for COVID-19 patients
Reuse of N-95 mask: These can be reused after fumigation and UV irradiation. As per CDC guidelines mask can be reused after 5 days.N95 mask should not be reused more than 5 times.				

Table 1: Different types of masks and their effectiveness against COVID-19.

Face shield

Face shields are an integral part of standard and contact precautions. Inadvertently touching the eyes/nose/mouth with a contaminated hand can also result in contamination. There is a need to protect these exposed parts of face by using face shields. Various studies have been conducted showing that the use of face shield has reduced the inhaled viral exposure by 92% and immediate viral exposure by 96%.²⁰ Recommendation of face shield are as follows:

- Made of clear plastic and provides good visibility to both the wearer and the patient.
- Best thickness is OHP OF 150-200 micron.
- Adjustable band to attach firmly around the head and fit snugly against the forehead

Protective eyewear

All health workers should use goggles while providing clinical care for patients of COVID-19 disease in order to prevent eyes exposure to virus as prevalence of conjunctivitis with COVID-19 has been reported to be 0.8-4.8%.²¹ CDC/NIOSH has stated : ‘Appropriately fitted, indirectly ventilated or non –vented goggles with anti-fog coating provide the most reliable practical eye protection.’²²

Coveralls and shoe covers

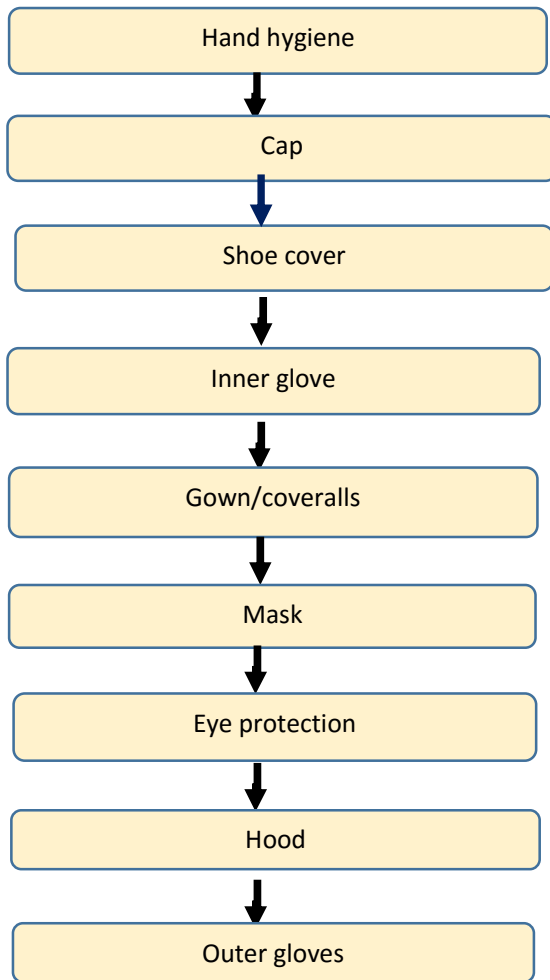
By using appropriate protective clothing, it is possible to create a barrier to eliminate or reduce contact and droplet exposure, both known to transmit COVID-19, thus protecting healthcare workers working in close proximity of suspect/confirmed COVID-19 cases or their secretions.

Gloves

Gloves can be used to prevent contact transmission from object or surface contaminated by COVID-19 infected person. A study demonstrated that 90.5% of ungloved hands become progressively contaminated with commensal flora and potential pathogens during routine neonatal care.²³ Nitrile gloves are preferred over latex gloves as they resist chemicals and have lower reported instances of allergy than latex gloves.

A sound knowledge about the PPE can immensely help in preventing the health care professionals from getting infected while treating COVID-19 patients while reducing iatrogenic transmission of the virus among the patients.⁷ Figure 2 shows proper sequence for donning and doffing of PPE respectively.

Donning Sequence



Doffing Sequence

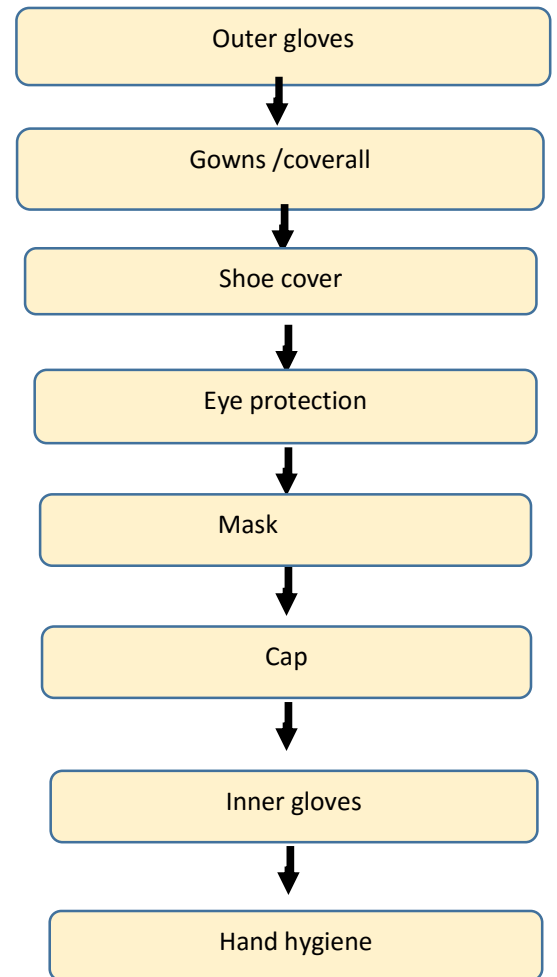


Figure 2, Sequence of donning and doffing of PPE

Decision making principles for managing COVID-19 patients in dental setup

The following are considered to be the guiding principles when planning dental treatment during COVID-19 pandemic and must be adhered to for safe practice. The guidelines are based upon the recently published research on prevention of COVID-19 transmission.^{4,7,8,10,13,16,24,25}

- Tele triaging and meticulous screening for detecting the COVID positive patients.
- Clear understanding of the mode of spread and pathogenesis of the viral infection.
- During dental practice, central areas of the face such as inner part of the eyes and around the nose were most contaminated areas. These parts are the important areas for transmission of infection. It is recommended to use protective means like glasses, mask, and protective shield, which have more protection field in these areas.
- Clear understanding about the PPE and their judicious use is vital for safe dental practise.
- Between 5% and 80% of people, testing positive for SARS-CoV-2 may be asymptomatic.
- The COVID-19 virus can survive in saliva up to 29 days.
- Clinical setups need modifications to deal with the current pandemic situation.

Based upon the above principles Figure 3 depicts the standard operating procedure to screen, examine and manage various categories of dental patients reporting in the times of COVID-19 pandemic in the form of flowchart. Table 2 shows various treatment protocols (i.e. necessities of PPE and clinical setup) as per the need of the patient's condition. A concise list of key practice points is summarised in Table 3.

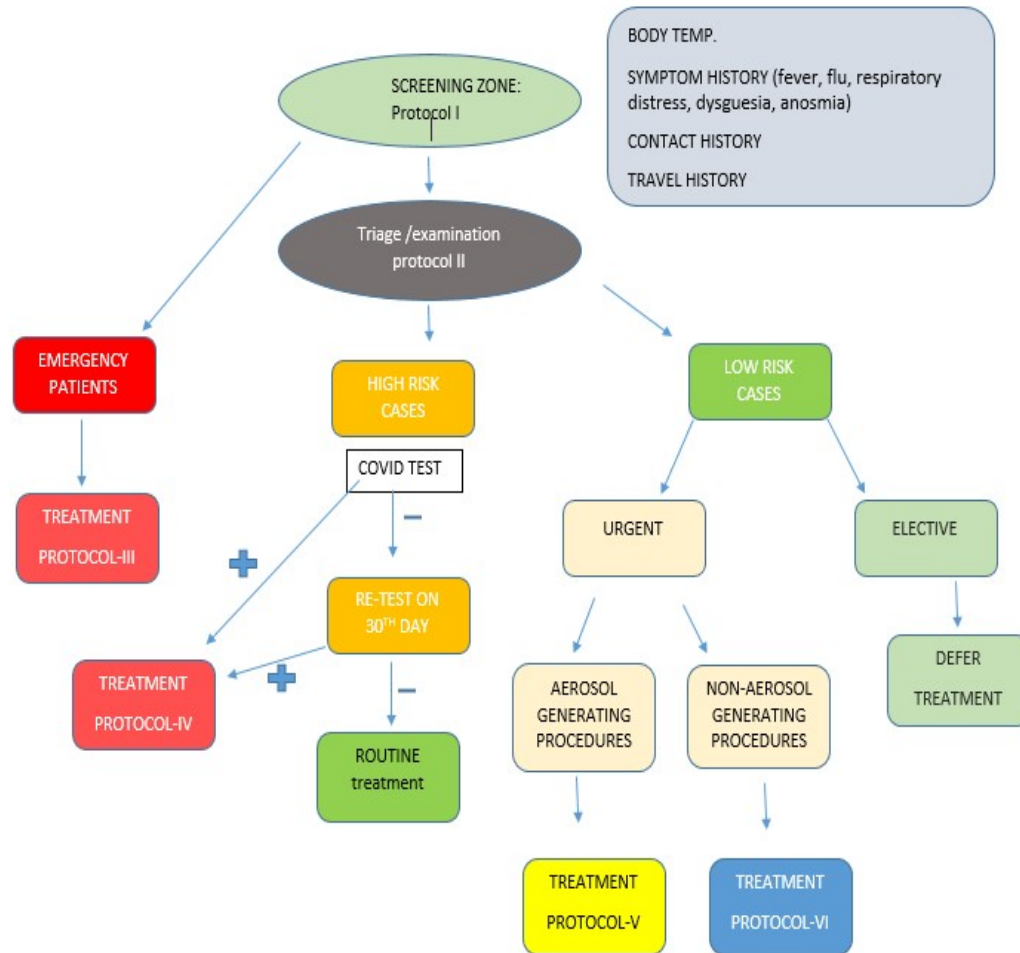


Figure 3: Showing the standard operating procedure to screen, examine and manage various categories of dental patients reporting in the times of COVID-19 pandemic

Protocol	Clinical conditions	PPE	Clinic setup
I	Screening only	Head cap ,Triple layer mask ,gloves and eye protection	Preliminary screening not involving direct contact Display visual alerts Maintain physical distance of 1 meter Glass screen/plastic screen to create a barrier
II	Triage and examination	Surgical mask, N-95 preferred, surgical gown and eye protection	Distant waiting chairs preferably 1 meter apart Pre-procedural mouth rinse with 1% H2O2/ 0.2% povidone iodine for 15 seconds.
III	Emergency Trauma (facial +dental) causing airway obstruction Diffuse space infection Uncontrolled bleeding	Full complement of PPE	single patient occupancy Four handed dentistry Negative pressure room/ AIIRs(airborne infection isolation rooms) Use of high volume aspiration Anti- retraction dental hand piece
IV	COVID +ve	Full complement of PPE	Protocol III + HCQ prophylaxis recommended after physician consultation Fogging Patient to be undertaken in consultation with physician
V	Urgent (Aerosol generating procedures)	FFP3 + Full complement of PPE	protocol III + rubber dam isolation, high evacuation

	Acute dental pain (pulpitis) Ultrasonic scaling Removal of extensive dental caries or restoration that cause pain Adjustment of a prosthesis that cause pain, discomfort, and compromising the chewing function. Changing intra-canal dressing		suction
VI	Urgent (Non aerosol generating procedures) Pericoronitis Dental /periodontal abscess Unavoidable dental extractions /post extraction complications Trigeminal neuralgia	Head cap, eye protection,N-95 mask, face shields, disposable gown, and shoe cover	Prioritize minimally invasive/atraumatic restorative techniques(hand instruments only)
*pre and post procedural disinfection to be done for every patient			
*fumigation, fogging mandatory for emergency COVID + operating area			

Table 2: Shows various treatment protocols as per the need of the patient's condition

❖	Key practice points
➤	Dentist are at very high risk of COVID-19 infection
➤	Until proven otherwise every dental patient should be considered as a probable case of COVID-19
➤	PPEs are not alternative to basic hand hygiene and respiratory etiquettes
➤	Pre-procedural mouth rinses are effective in reducing the viral transmission
➤	Emphasis should be on safe dental practice and preventing spread of viral transmission

Table 3: Key practice points

Conclusion:

Treating dental problems without compromising patient safety is a challenging task in current situation. Despite the emerging information on managing dental patients in COVID-19 times, clear cut decision making while practically dealing with the patient is very important and can go a long way. The authors have done a detailed review of the current evidence available in the literature on treating and managing dental problems in the light of COVID-19 pandemic and believe that the information presented will help the dental health care professionals in managing dental patients in a safe and effective manner.

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