

COVID-19 Outbreak and Dentistry: Guidelines and Recommendations for the Provision of Dental Healthcare Services

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ABSTRACT

After lockdown beginning from the third week of March 2020, face-to-face dentistry is gradually resuming with dental health-care personnel feeling encouraged to safely provide treatment to the patients amid stringent infection control strategies. Having alerted to the associated infection threat, dentists will be better responding to the challenges of infection control in their clinics. Infection control strategies will follow the rapidly evolving guidelines of the local and international regulatory bodies that are relevant to this pandemic. Despite this, a concern exists as both the dental team members and the patients do not want to be the vectors for this deadly infection; and hence, the need for guidance. This article aims to inform dental healthcare professionals of the guidelines and recommendations to follow when receiving and treating patients in reopened practices. It appears that the novel coronavirus disease 2019 (COVID-19) outbreak has significantly and adversely impacted dentistry. The impacts seem to have long-term effect on the pattern of dental care; and a need for significant changes in the way dentists will provide dental care from now onwards. A wider use of tele-dentistry consultation platforms will obviously reduce the need for patients' visits to dentists and dental hospitals.

Key Words: COVID-19, Dentistry, Guidelines, Standards, Healthcare services.

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INTRODUCTION

A large number of studies are published on the etiology, epidemiology, diagnosis, transmission, prevention and control of COVID-19.¹⁻¹³ Furthermore, during the past six months of COVID-19 pandemic, our understanding regarding the nature, etiology, modes and sources of transmission, incubation period and fatality rate of this deadly and rare coronavirus, individuals at high risk of the COVID-19 and its clinical manifestations,⁵⁻¹³ its severity and clinical implications has expanded exponentially.¹⁰⁻¹⁴ Similarly, the diagnostics of COVID-19, based on clinical symptoms and antibodies in blood and virus detection in nasal and pharyngeal swabs, has also improved.¹⁵

The COVID-19 outbreak has presented unique challenges to all of us involved in the medical and dental profession, especially in terms of reducing the infection risks in the dental care setting, ensuring effective infection control, and infection mitigation.

This article aims to inform dental healthcare professionals of the guidelines and recommendations to follow when receiving and treating patients on reopening dental practices to patients.

Infection control in dentistry - Useful learning already made:

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is not the first virus to infect mankind, but it certainly has taken the lead to cause such a frightening pandemic, disrupting the social interconnectivity of the whole world. Luckily, since the mid-1980s, dentists have remained the most knowledgeable and the most cognizant healthcare professionals, when it comes to infection control in the workplace. They have in fact done well and have become competent at infection control in their practices for their own benefit, the benefits of their patients, and their dental team. It did not take long, for them, to understand human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS) and the resulting HIV/AIDS epidemic. Dentists and their team members have remained cognizant of the importance of the standard operating protocols, use of personal protective equipment (PPE) and the decontamination processes. Dentists have also witnessed and have worked safely during the previous severe acute respiratory distress syndrome (SARS)-associated CoV (SARS-CoV) and Middle-East respiratory syndrome CoV (MER-S-CoV), H1N1 influenza, and the Ebola virus epidemics. Thus, for those of us who are young to the profession, the COVID-19 outbreak, though more universal, is certainly not the first one (con-

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sidering the earlier plague, flu and smallpox devastation), and also it perhaps seems to be not the last one. As a result, we are witnessing a lot more emphasis on our infection control and placement of enhanced barrier protections.

During the period of forced shutdown of the dental practices and dental hospitals, some of us are stepping into action with new protocols and procedures considering and installing new engineering safeguards.³ Despite all these, the concern still is the safety with which to provide dental treatment to our patients whether they may or may not have the symptoms of coughing and sneezing. The concern is genuine as a great majority of dental treatments require the use of a high-speed dental hand-piece or ultrasonic instruments. The secretions including saliva and blood that are aerosolised to the surroundings with these instruments further enhance the concerns and fear. This is because the virus spreads and settles on the surfaces and areas and can remain viable from hours to days. Hence, the surfaces, areas and instruments so contaminated can threaten the health of all coming in contact.

Guidelines and recommendations to follow:

Despite knowing the importance of protection and decontamination, pitfalls in infections control measures still exist as well as the risk of exposure.¹⁴ Some dental healthcare professionals still fear that safety measures in daily clinical work are not effective enough to prevent the spread of COVID-19. This becomes of great concern with patients in the incubation period; unaware of their infected status; or those concealing their infection. In such a situation, the only way to implement the most effective infection control measures are the following:

The critical measures of hand hygiene and thorough decontamination of surfaces and instruments and equipment reduce the risk of infection transmission in the dental setting. The importance of these measures can be verified by the findings that SARS-CoV-2 could persist in viable state on the surfaces from a few hours to up to several days. In this regard, the type of surface, the environmental temperature and humidity do play a role.¹⁵

To prevent potentially infected blood and other secretions in coming in contact with skin and mucosa, it must be an essential practice to use PPE, including masks, gloves, gowns, goggles and face shields. Furthermore, as this virus spreads mainly through respiratory droplets, routine use of authenticated particulate respirators (N-95 surgical masks or dust mask or FFP2-standard masks) is recommended. Like SARS-CoV-1 and the avian influenza virus, the present virus, SARS-CoV-2 can lead to group B infection. But to be on the safer side, more caution is to be exercised to enhance protection measures recommended for extremely fatal infections (cholera and plague) categorised as Group A infections.

Despite dental practices have been allowed to reopen and work, both the patients and the dental team members are still reluctant and hesitant to do elective dentistry. They restrict caring for dental emergency under strict infection prevention and control measures. They tend to avoid routine dental procedures till effective safety protocols and testing regimen and guidelines are implemented. In addition, dentists allow patients' entry to the dental clinics, by strictly following the 4-stage protocol that is currently

considered essential for preventing COVID-19 cross-infection in the dental office. Patients are filtered for visit to the dental clinic by following the 2-stage triage (remote as well as upon arrival in the dental office).

Patients accepted for visit to the dental clinic, must then be further managed ensuring infection control in both the non-clinical and clinical areas. Dental healthcare personnel must ensure infection control during and after the completion of each individual treatment session.

Dental care personnel are further advised to be aware of and to follow the guidelines provided by the local health bodies, infectious diseases monitoring and preventing agencies and professional dental associations during the COVID-19 outbreak. These additional measures so advised will help reinforce the quality of infection control.¹⁴

Testing to detect exposure to coronavirus:

Testing is important for detecting people irrespective of having or not having symptoms and to stop the communal spread of the infection. Test-based diagnosis carries public health value. It brings confidence among dentists to continue with dentistry.¹⁴ This is because, testing identifies people who are potentially healed to be considered for postponement of dental treatment and when to repeat their tests; probably healed patients to consider for elective dentistry; healthy and suitable for urgent dental care but need to redo tests in case of need for an additional / new visit to the dentist. Thus patients who report and need dental care must be reliably categorized on the basis of their test results (Table I).¹⁶

Table I: Patients' categories after testing and decision for elective dentistry (modified from Giudice *et al.* 2020).²³

SARS-CoV-2 RNA	IgM	IgG	Decision for dental treatment
+	+	+	Postpone treatment and repeat the tests.
+	+	–	Postpone treatment and repeat the tests.
+	–	+	Postpone treatment and repeat the tests.
+	–	–	Postpone treatment and repeat the tests.
–	+	–	Postpone the treatment and repeat the tests.
–	+	+	Potentially healed patient.
–	–	+	Probably healed may undergo routine dental treatments.
–	–	–	Healthy patient may undergo dental treatment, but need to redo tests in case new / subsequent visits are needed.

Currently, two types of tests are used to detect a patient's state of infection with SARS-CoV-2.¹⁵⁻¹⁸ The first type aims at detecting the RNA of the virus, constituting the genetic material of the virus. The other type aims at detecting the specific antibodies (IgM and IgG) produced in the body in response to the virus infection. These are related to the response of the host to the virus infection. Both types of tests have not completely overcome the limitations of cost, time and their specialized processing.

Detection of the virus directly in the respiratory tract by nasopharyngeal and oro-pharyngeal swabs is considered as the

gold standard test. However, as this requires a trained qualified person on-site, it is impractical in the dental setting. The swab is then used to detect the virus RNA by its amplification following reverse transcriptase-polymerase chain reaction (RT-PCR). Although this test accurately detects the acute infection, it may be influenced by factors such as collection and processing of the sample.¹⁵

With regard to the detection of IgM and IgG, it has been reported that a median of 13 days is required for the sero-conversion to occur for the antibodies.¹⁵ As such, serological testing may help the diagnosis of suspect patients having negative RT-PCR results and for identifying the asymptomatic infected subjects.¹⁵ For detecting the stage of infection of a subject, immunoassay techniques allow the rapid 15-minutes simultaneous detection of IgM and IgG antibodies against SARS-CoV-2.¹⁶

If SARS-CoV-2 RNA is found in the collected swab of a patient, he/she is advised and guided to seek consultation and treatment for COVID-19. If the swab result of a patient comes out negative, then antibody test might help in classifying this patient as healthy, healed, or sick, as shown in Table I. It is worth remembering that negative IgG and IgM tests even if done correctly, do carry the possibility for the subject to be infected.

Recommendations for dental practice:

There are various strategies to implement on reopening dental practices to patients. These include: managing a patients' entry in the clinic; observing social distancing; wearing mask; hand washing and hand sanitizing. Another challenge is to ensure complete and thorough cleaning and decontamination of all areas and equipment used after each patient, implementing time restraints and limit to the number of patients to entertain each day. All these should have been addressed through prior trial runs to ensure comfort and safety for all with the 'new normal'. Appropriate training of staff is necessary for understanding what constitutes a properly fitting mask and other PPE and how to dispose these and the clinical waste. So far, there is a lack of consensus when it comes to the provision of dental services during this outbreak. What we will do will be mainly based on experience, available relevant guidelines and research. A good advice to all is to take additional steps for personal protection and to avoid or minimize aerosol and droplet generation during dental procedures. The four-handed technique including hand-washing, wearing facemask and gown and ensuring decontamination of working areas and instruments and equipment will surely control infection. The use of high-volume suction and saliva ejectors can control the spread of droplets and aerosols.¹⁹⁻²⁵

Patients screening, evaluation and examination:

During the outbreak of COVID-19, dental clinics are recommended to establish pre-check triages. This will identify patients who can be managed with the AAA approach (advice, analgesia and antimicrobials). Before entering the clinical area, temperature measuring and recording for staff and patients including the attendants should be a routine step. Patients are questioned

about their health status and travel and contact history.¹⁹ A pre-structured screening form should be used for every patient to keep the records. Patients having fever are registered and referred to hospital. If a patient has a history of travel to the outbreak area within the past 14 days, he / she is to self-quarantine for at least 14 days. This applies also to all staff working in the dental clinic. For patients reporting from areas with COVID-19 outbreak, dental procedures should be postponed.^{20,21} It is also advised to postpone elective dental treatment for at least 1 month for those convalescing from COVID-19.²²

Preoperative antimicrobial mouth rinse is recommended for reducing oral and pharyngeal viral infection.²⁰ However, patient must be instructed to carefully use the spittoon and avoid spitting and dropping the rinse in other areas. Cough inducing procedures should be avoided (if possible) or cautiously performed.²¹ Procedures generating aerosols are to be avoided. During oral examination, avoid the use of 3-way syringe. Obtaining images of the intraoral structures is most commonly through intraoral radiographic techniques but they stimulate saliva secretion and coughing.²¹ Therefore, resorting to extra-oral dental radiographic techniques such as orthopantomography (OPG), CT and Cone beam computerized tomography (CBCT) is advised.

Design considerations to ensure safety in practice:

Since the outbreak of COVID-19, there has been an ever-evolving response when it comes to making dental treatment setting safe for patients and the dental team. During the lockdown period, everyone of us remained so much worried and occupied to quickly come up with innovative solutions to make re-entry to dentistry as safe as desirable. Much energy was put to proposing and devising new ways to contain, prevent and capture the virus and the virus particles-loaded aerosols created during dental procedures. Those of us who were clever enough, collaborated with engineers and came up with a variety of contraptions. With the exception of some of the proposed designs that were obviously weird, most of them were apparently wonderful.³ However, most of them still opened the flood-gates. Irrespective of how much praise-worthy, needed and interesting these concepts, designs and innovations were, they mostly failed to answer the basic questions related to their ease of use, goodness, cost-effectiveness, ready commercial availability and superiority over those already in use. These innovations addressed re-designing or up-gradation of everything relevant to the safe dental practice and included: masks, aerosol extraction equipment, air filters and ventilation systems, and design of the dental operatory. However, as yet, we have to depend on precautionary measures and minimizing and managing the aerosols with what we already have in hand.

Factors influencing decision for dental treatment:

A decision to accept patients for treatment will be dictated by the patients' test results, the urgency of the care needed as well as the availability of facilities and expertise in the dental practice. In case of procedures generating aerosols, when the

use of rubber dam is feasible, it must be used. Similarly, using high-volume saliva suction will better manage aerosols or spatter and its spread. It is better to use speed-increasing hand-piece and avoid the turbine hand-piece. It is still debated which gown/apron combination provides better protection in the dental practice. Due to their reduced potential for cross contamination, reusable cotton surgical gowns are relatively more practical in the dental clinic than those that are disposable and fluid resistant. The plastic apron creates the most cross contamination and should only be used if there is significant risk of fluid contamination from droplets or aerosols. Removal of contaminated gowns should be done carefully to ensure that any contamination does not spread further. Furthermore, a head-cap, face shield, goggles and gloves are essential and must be used in case of using high- or low-speed drilling with water spray.²²

After having done a procedure for a patient, environmental cleaning and decontamination of all areas and equipment should be diligently performed. Alternatively, suspected or confirmed COVID-19 patients who will require urgent dental care, could be treated in an isolated and well-ventilated room or negative pressure rooms if available.

Teeth with caries and symptoms of irreversible pulp pathology planned for devitalisation and pain relief, after anesthesia and rubber dam isolation are best treated by removing caries chemo-mechanically. High-volume saliva suction must be used. For patients with toothache because of a cracked tooth without dental decay, or dental procedures and wishing to retain it, dentists will use high-speed hand-piece to prepare access cavity preparation. To reduce the risk of infection transmission, such a patient is to be scheduled as the last case in the day's session.

Several factors influence treatment planning for tooth fracture, luxation, or avulsion. These include; patients' age, trauma severity and extent, developmental status of root apex, and avulsion duration.²³⁻²⁵ For teeth extracted with need for stitching of the extraction socket wound, the use of absorbable suture is preferred. Soft tissue contusion cases will require debridement and suturing. Such a wound is to be slowly cleansed without using triple syringe. The saliva ejector must be used to contain the aerosols / splatter. Patients with life-threatening orofacial trauma leading to compound maxillofacial injuries must be referred to accident and emergency services for immediate hospitalization. Those caring for these patients in the maxillofacial surgical wards, must advise these patients to have chest CT done to exclude infection with SARS-CoV-2 as the RT-PCR test (Table I) will require time-consuming laboratory processing in addition to pan-coronavirus or specific SARS-CoV-2 detection capacity.²³⁻²⁶

Hospital-based dental service experiences in the COVID-19 outbreak:

The present situation has been very unique and unprecedented with a sudden and most terrifying start in a Chinese city

that soon engulfed the entire planet and lead to shutting dentistry altogether. The approach and strategy for continuing hospital-based dental care services in response to the challenges faced over there are very encouraging.²⁴⁻²⁶ Therefore, it is important that dental practitioners are made aware by elaborating upon the response made by the dental school and hospital in Wuhan and many other dental hospitals in China.²⁵ Publications elaborating the excellent experiences made in the Chinese dental hospitals and an Italian dental hospital are worth-reading^{25,26} and can act as useful references for guidance to all including those working in dental hospitals as well as to dental practitioners everywhere. These publications do indicate a significant long-term effect on dental care pattern and wider use of tele-dentistry platforms.²⁶ A poll of the American Dental Association Health Policy Institute (ADA-HPI)²⁷ held on 15 June 2020 and involving 5000 dentists, on the impact of COVID-19, showed a continued rising trend for dental practices reopening. Patient turnover went up to 38% of that noted in May 2020. This was equivalent to 65% of the pre-COVID-19 levels. Some 97% of dental offices reported open for elective dental care. This trend reflects more or less similar patterns elsewhere and good sign for dentists returning to working and caring patients.

CONCLUSION

With ever improving awareness on COVID-19, dentists can continue safely amid efficient strategies to prevent, control, and stop COVID-19 from further spread. Whether we work during this pandemic or after it, there is need to further investigate how to upgrade infection control strategies as well as the dental operatory environment and infrastructure for better response to infectious outbreaks. The adverse impact, on dentistry, of the COVID-19 outbreak is significant and long-lasting. The pattern of dental care from now onwards needs significant change. A wider use of tele-dentistry consultation platforms is evident with its obvious benefit of reducing the need for direct visit of the patient to dentists.

CONFLICT OF INTEREST:

The author declared no potential conflict of interest.

AUTHOR'S CONTRIBUTION:

FG: Contributed to the conception, literature search, writing/revising all drafts of the manuscript and gave final approval as well as agreed to be accountable for all aspects of the manuscript and agreed to act as the corresponding author.

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