



ORIGINAL ARTICLE

Guidelines for dental care provision during the COVID-19 pandemic



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Abstract Since the coronavirus disease 2019 (COVID-19) outbreak was declared a pandemic on 11 March 2020. Several dental care facilities in affected countries have been completely closed or have been only providing minimal treatment for emergency cases. However, several facilities in some affected countries are still providing regular dental treatment. This can in part be a result of the lack of universal protocol or guidelines regulating the dental care provision during such a pandemic. This lack of guidelines can on one hand increase the nosocomial COVID-19 spread through dental health care facilities, and on the other hand deprive patients' in need of the required urgent dental care. Moreover, ceasing dental care provision during such a period will incense the burden on hospitals emergency departments already struggle with the pandemic.

This work aimed to develop guidelines for dental patients' management during and after the COVID-19 pandemic.

Guidelines for dental care provision during the COVID-19 pandemic were developed after considering the nature of COVID-19 pandemic, and were based on grouping the patients according to condition and need, and considering the procedures according to risk and benefit.

It is hoped that the guidelines proposed in this work will help in the management of dental care around the world during and after this COVID-19 pandemic.

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1. Introduction

1.1. Background

At a media briefing on 11 March 2020, the Director-General of the World Health Organization (WHO) declared coronavirus disease 2019 (COVID-19) outbreak a pandemic (WHO, 2020a). COVID-19 is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. Originating in

Wuhan, China, the first COVID-19 case was reported to the WHO country office in China on 31 December 2019. As of 29 March 2020, COVID-19 has been recognized in over 200 countries, areas and territories, with a total of over 575,000 confirmed cases and over 26,000 deaths (WHO, 2020b).

Similar to SARS-CoV and the Middle East Respiratory Syndrome (MERS-CoV) virus, SARS-CoV-2 is zoonotic virus. Zoonotic viruses can spread from non-human animals to humans. In this case, Chinese horseshoe bats (*Rhinolophus sinicus*) are the most probable origin and pangolin (*Manis javanica*) as an intermediate host (Li et al., 2020).

The asymptomatic incubation period of the virus is estimated to be between 2 and 12 days; however, up to 24 days incubation period was reported in some studies (C.C. Lai et al., 2020). The most common symptoms of coronavirus disease are fever, tiredness, dry cough and shortness of breath. More than 80% of cases are mild and recover from the disease without needing special treatment. However, around 15% of cases are categorised as severely ill and the remaining 5% are categorised as critically ill. In severe and critical cases, acute respiratory disease can lead to pneumonia, kidney failure, and even death.

Although it is still early to determine the case fatality ratio (CFR); today it is estimated to be over 4.5% (WHO, 2020b).

While the mild COVID-19 cases do not require specific care, and usually symptomatic treatment and home isolation are enough. Oxygen therapy is the major intervention for patients with severe cases. Critical cases management on the other hand is case dependant and will usually need intensive care (Chughtai and Malik, 2020; Guan et al., 2020; WHO, 2020c). Although not completely understood at this stage, human-to-human transmission is now believed to be mainly via saliva associated respiratory droplets and contact transmission. However, fecal-oral transmission is possible as SARS-CoV-2 was identified in the stool of patients (Holshue et al., 2020).

Vertical transmission (from mothers to their new-borns) however, is not yet confirmed (H. Chen et al., 2020). Moreover, aerosol and fomite transmission of SARS-CoV-2 is also plausible as the virus can remain viable and infectious in aerosols for at least three hours and on surfaces for days (van Doremalen et al., 2020). Transmission from asymptomatic COVID-19 carriers possibility was also reported (Bai et al., 2020; C.-C. Lai et al., 2020).

To date, real-time reverse transcription polymerase chain reaction (rRT-PCR) test is utilised for the qualitative detection of nucleic acid from SARS-CoV-2 in upper and lower respiratory specimens obtained through nasopharyngeal and/or oropharyngeal swabs. Viral RNA has been also isolated from the plasma of some patients (Huang et al., 2020).

1.2. SARS-CoV-2 transmission and dental treatment

Given the novelty of the disease, no cases of SARS-CoV-2 transmission in a dental setting are identified yet. However, given the high transmissibility of the disease and considering that routine dental procedures usually generate aerosols; during the course of this pandemic, alterations to dental treatment should be considered to maintain a healthy environment for the patients and the dental team.

SARS-CoV-2 has been isolated from the saliva of COVID-19 patients (To et al., 2020). Moreover, salivary gland epithelial cells can potentially be infected by SARS-CoV and become

a major source of the virus in saliva (Liu et al., 2011). Even after patient recovery, recusancy during the convalescence period was reported (D. Chen et al., 2020). This is plausible since the presence of some virus strains in saliva for as long as 29 days have been reported in the literature (Barzon et al., 2016; Zuanazzi et al., 2017).

In addition to blood and salivary contamination, the majority of routine dental treatments generate significant amounts of droplets and aerosols. This is usually related to the utilisation of devices and equipment such ultrasonic scalers, air-water syringes and air turbine handpieces.

1.3. Dental treatment during the pandemic

Despite the large-scale community transmission of COVID-19 in China during the epidemic; demand for urgent dental treatment decreased by only 38% (Guo et al., 2020). This shows that the public need for urgent dental care even during this pandemic will always be essential. To date, it has been two weeks since COVID-19 outbreak was declared as a pandemic; yet several dental institutes, regulatory and advisory bodies still do not have a clear vision about the worldwide impact this pandemic can have on dental services. Dental associations responses and actions around the world varied from advising practitioners to close their practices in California, USA (CDA, 2020); to reducing the number of routine check-ups in the UK (Scottish Government, 2020); to no advice at all from several dental associations around the world.

Such unclarity is expected due to the varying degree of COVID-19 outbreak in different countries and due to the fact that the previous global pandemic was influenza about 100 years ago (Mills et al., 2004).

However, according to the US Government COVID-19 response plan published by the US Department of Health and Human Services (HHS) on 13 March 2020, this COVID-19 pandemic could last over 18 months (HHS, 2020).

Closing dental practices during the pandemic can reduce the number of affected individuals, but will increase the suffering of the individuals in need of urgent dental care. It will also incense the burden on hospitals emergency departments.

This calls for the creation of standard guidelines for dental care provision during the worldwide spread of the pandemic and/or local epidemic outbreaks.

1.4. Aim

It is the purpose of this work to develop a guideline for dental patients' management during and after the COVID-19 pandemic.

2. Methods

To develop guidelines for dental care provision during the pandemic, the following factors should be considered:

1. The incubation period of the virus is believed to be up to 14 days; and transmission from asymptomatic COVID-19 carriers is possible (Bai et al., 2020; Guan et al., 2020; C.-C. Lai et al., 2020).

2. Aerosol and fomite transmission of SARS-CoV-2 is plausible (van Doremalen et al., 2020).
3. It is unclear yet, but COVID-19 recusancy might be possible and some virus strains can be present in saliva for as long as 29 days (Barzon et al., 2016; D. Chen et al., 2020; Zuanazzi et al., 2017).
4. Some confirmed COVID-19 carriers might need urgent dental care at some point.

That necessitates:

1. Screening every asymptomatic patient meticulously.
2. Considering every patient as a potential asymptomatic COVID-19 carrier.
3. Considering recently recovered patients as potential virus carriers for at least 30 days after the recovery confirmation by a laboratory test
4. Identifying the urgent need of the patient and focusing on managing it with minimally invasive procedures.
5. Categorising dental treatment according to the urgency of the required treatment and the risk and benefit associated with each treatment.
6. Identifying the required dental treatment for each patient and the risks and benefits associated with that treatment.
7. Using contact, and airborne precautions including proper aerosol-generating procedures personal protective equipment (PPE) for every procedure.

From there, patients in need of dental care should be categorised according to the probability of them being COVID-19 affected or carriers (Fig. 1).

The dental treatment should also be classified according to the severity of the case and the degree of procedure invasiveness and risk (Table 1).

2.1. Patients screening and categorisation

Whenever possible, tele-screening of the patients is strongly advised, and at the first point of contact, patients should be screened for any COVID-19 symptoms and any recent contact with confirmed COVID-19 patients and/or recent travel to recent disease epicentres. For active and recently recovered confirmed cases, dental treatment should only be considered after coordination with primary physician. Disease history, and current stage should be meticulously evaluated. Any suspected or confirmed COVID-19 patients' treatment should be postponed if possible or performed in an airborne infection isolation rooms (AIIRs) or negative pressure rooms ideally at a hospital setting.

For these guidelines' development, after the screening, patients are proposed to be divided into five groups (Fig. 1):

- A. Asymptomatic and unsuspected, unconfirmed COVID-19 case.
- B. Symptomatic and/or suspected, unconfirmed COVID-19 case.
- C. Stable confirmed COVID-19 case.
- D. Unstable confirmed COVID-19 case.
- E. Recovered confirmed COVID-19 case.

Current COVID-19 patients are considered stable if the case is mild and no hospitalisation or oxygen therapy is

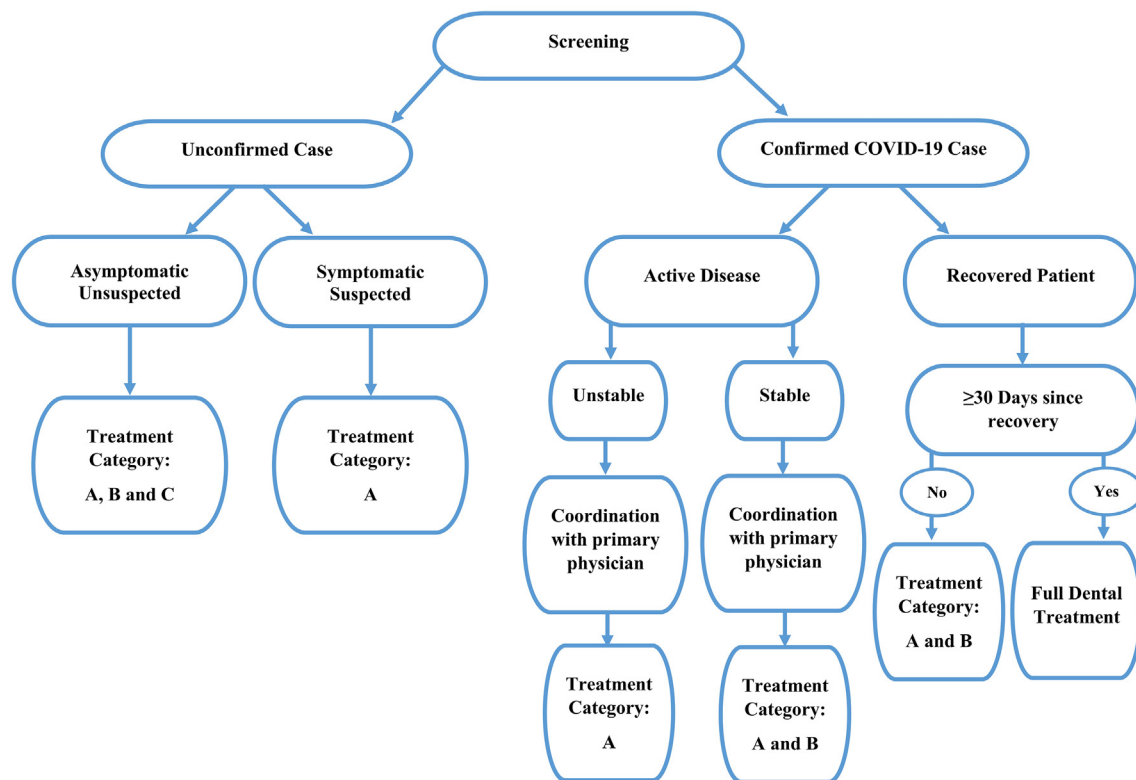


Fig. 1 Flowchart showing the dental patients screening and categorisation method during the COVID-19 pandemic as well as the categorisation method of the affected patients after the pandemic.

Table 1 A guidance table showing the categories of dental treatments and the variety of treatments that can be provided for the patient during the COVID-19 pandemic.

Dental Treatments Categories				
A Emergency	B Urgent conditions that can be managed with minimally invasive procedures and without aerosol generation	C Urgent conditions that need to be managed with invasive and/or aerosol-generating procedures	D Non-urgent	E Elective
Unstable maxillofacial fractures that can compromise the patient's airway.*	Severe dental pain (7≤) from pulpal inflammation that requires tooth extraction.**	Severe dental pain (7≤) from pulpal inflammation that need to be managed with aerosol generating procedures.**	Removable dentures adjustments or repairs.	Initial or periodic oral examinations and recall visits.
Diffuse soft tissue bacterial infection with intraoral or extraoral swelling that can compromise the patient's airway.*	Severe dental pain (7≤) from fractured vital tooth that can be managed without aerosol generation.**	Severe dental pain (7≤) from fractured vital tooth that need to be managed with aerosol generating procedures.**	Asymptomatic fractured or defective restoration.	Aesthetic dental procedures.
Uncontrolled postoperative bleeding.*	Dental trauma with avulsion/luxation that can be minimally managed without aerosol generation. Surgical postoperative osteitis or dry socket that can be managed without aerosol generation.*	Dental trauma with avulsion/luxation that need invasive/Aerosol Generating Procedures Deboned fixed prosthesis cleaning and temporary cementation.	Asymptomatic fractured or defective fixed prosthesis. Asymptomatic fractured or defective orthodontic appliance. Chronic periodontal disease.	Restorative treatment of asymptomatic teeth. Extraction of asymptomatic teeth. Orthodontic procedures other than those in category B/C. Routine dental cleaning and preventive therapies. Replacement of missing tooth/teeth with fixed or removable prosthesis. Dental implant surgery.
	Pericoronitis or third-molar pain that can be managed without aerosol generation.	Removable dentures adjustments for radiation/oncology patients.		
	Stable maxillofacial fractures that requires no intervention.*	Fractured or defective fixed prosthesis causing soft tissue injury.		
	Localised dental/periodontal abscess that can be managed without aerosol generation	Acute periodontal disease.		
	Fractured or defective fixed orthodontic appliance causing soft tissue laceration.			

* Usually managed by oral and maxillofacial surgeons.
** Pain assessment is carried out using the Universal Pain Assessment Tool (UPA).

required. Severe and critical cases are classified as unstable. Confirmed recovery is considered if the patient has been asymptomatic for at least 30 days after the last negative laboratory test.

2.2. Treatment categorisation

For these guidelines' development, dental procedures are proposed to be divided into five categories (Table 1):

- A. Emergency management of life-threatening conditions.
- B. Urgent conditions that can be managed with minimally invasive procedures and without aerosol generation.
- C. Urgent conditions that need to be managed with invasive and/or aerosol-generating procedures.

- D. Non-urgent procedures.
- E. Elective procedures.

2.3. Treatment considerations

1. Intraoral imaging should be restricted and extraoral radiographs should be utilised to reduce the excessive salivation and gag reflex associated with intraoral radiographs.
2. Using 0.23% povidone-iodine mouthwash for at least 15 s before the procedure can reduce the viral load in the patient's saliva (Eggers et al., 2018).
3. Disposable and single-use instruments and devices should be used whenever possible to reduce the cross-infection risks.

4. Rubber dam should be used whenever possible as this will significantly reduce the spread of microorganisms (Cochran et al., 1989).
5. The dental treatment should be as minimally invasive as possible.
6. Aerosol-generating procedures should be avoided whenever possible.
7. Whenever pharmacologic management of pain is required, Ibuprofen should be avoided in suspected and confirmed COVID-19 cases (Day, 2020).

3. Discussion

To date, no universal protocol or guideline is available for dental care provision to active or suspected COVID-19 cases. In fact, no universal guidelines are available for dental care provision during the times of any epidemic, pandemic, national or global disaster. Due to that lack of a standard, dental care provision has completely stopped or significantly decreased in several affected countries. In addition to increasing the affected populations suffering, this will also incense the burden on hospitals emergency departments already struggle with the pandemic. This lack of guidelines can also increase the nosocomial COVID-19 spread through dental health care facilities.

Due to the possibility of COVID-19 recusancy and the fact that some viruses can be present in saliva for as long as 29 days after recovery of the patient 16–18. The management of recently recovered COVID-19 patients was also considered in these guidelines. This can help in reducing and preventing new outbreaks.

The guidelines developed in this work are general guidelines and the final decision will always be provided through the practitioner's judgment. For instance, if the required treatment cannot be provided for the patient due to his/her patient category; the practitioner's judgment and evaluation of the case can provide for other alternative methods of management. Otherwise, the treatment should be postponed and pharmacologic management of the pain and/or infection should be considered. Moreover, the dental treatments categories in Table 1, covers most but not all of the dental cases. Therefore, case and treatment categorisation should always be considered by the practitioner.

It is hoped that the guidelines proposed in this work will help in the management of dental care around the world during this COVID-19 pandemic, and provide a solid base for further healthcare guidelines development.

CRedit authorship contribution statement

Ali Alharbi: Conceptualization, Methodology, Writing - original draft, Writing - review & editing. **Saad Alharbi:** Methodology, Writing - original draft. **Shahad Alqaidi:** Methodology, Writing - original draft.

Declaration of Competing Interest

The authors declared that there is no conflict of interest.

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