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# Review Article

## Repercussions of post-Covid situations in world dental practice- A Review

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***ABSTRACT*:**
Dentistry is facing its darkest hour yet, with the growth and spread of the Coronavirus pandemic. Dental surgeons are at the highest risk of contracting and transmitting the Coronavirus, alongside paramedics, nurses, and other healthcare workers. Due to the characteristics of dental settings, the risk of cross infection between dental health care personnel (DHCP) and patients can be very high. Several dental care facilities in affected countries have been completely closed or have been only providing minimal treatment for emergency cases. However, there is lack of universal protocol or guidelines regulating the dental care provision to handle 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 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. In this review, we have outlined various guidelines; which will help in the management of dental care around the world during and after this COVID-19 pandemic.
**Keywords** Covid-19, SARS CoV-2, Nosocomial Infection, Dentistry, PPE.

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### INTRODUCTION

The era of Corona-Virus-Disease-19 (COVID-19) is an important historical period from various points of view, from the world health to the huge cascade of socio-economic implications. Everyday habits have been turned upside down, and the way of life of people all over the globe, engaged in all activities, especially in the health sector, will be involved in this necessary change. Dentists, being in close contact with the patient's droplets and aerosols generated, have to revise the operating protocols to protect the team and the patients from the risk of infectious diseases. Unfortunately, the pandemic COVID-19 will not stop immediately and everyone will have to face each other very long working and social recovery times of the population. In this time, a large part of the population will avoid dental treatment other than those imposed by pain or urgency, both due to money

issues and, principally, for a psychological reason: it will not be easy to overcome the fear of infection. For many, the dental practice is a source of possible infections, considering that the first person at risk is the dentist himself. The scenario in dental practices is very complex and several problems can arise which are dangerous for the dental practice.[1] 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. 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. 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%.[2] 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. 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, faecal-oral transmission is possible as SARS-CoV-2 was identified in the stool of patients. Vertical transmission (from mothers to their new-borns) however, is not yet confirmed. 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. Transmission from asymptomatic COVID-19 carriers' possibility was also reported. 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.[3] SARS-CoV-2 has been isolated from the saliva of COVID-19 patients.[4] Moreover, salivary gland epithelial cells can potentially be infected by SARS-CoV and become a major source of the virus in saliva.[5] Even after patient recovery, recusancy during the convalescence period was reported.[6] This is plausible since the presence of some virus strains in saliva for as long as 29 days have been reported in the literature.[7] 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.[3] Countries around the world are trying to cope up with this pandemic and altering guidelines for handling the same for helping medical as well as dental professionals.

**United States**

Dental care has also resumed in the US, despite the country having the highest number of infections of SARS-CoV-2 and deaths resulting from COVID-19 in the world. At the end of May, dentists in New York, Michigan and New Mexico were no longer restricted to providing emergency services only, meaning that elective dental procedures are now permitted in all 50 US states and the District of Columbia.The American Dental Association (ADA) has stated that it supports the resumption of dental services in states where infection rates of SARS-CoV-2 are declining, but the federal centre's for Disease Control and Prevention (CDC) has advised patients to limit their appointments to necessary procedures. The CDC has provided extensive recommendations on its website, and they include the advice that all patients should be triaged via telephone before their appointments and that non-emergency care is to be avoided. Patients must wear face masks on arrival and should be systematically assessed and have their temperatures taken. AGPs should be avoided, as well as the use of dental handpieces and air/water syringes. Protective masks have National Institute for Occupational Safety and Health (NIOSH) recommendations-certified N95 (95%), N99 (99%) and N100 (99.7%) in United States.The various state mandates and recommendations, as well as broad resources and guidelines for dentists on clinical practice, safety, mental health, loans and digital events, are available on the ADA's website. Dental companies like Henry Schein have put together a number of resources to support dentists as they reopen.[8]

**China**

Owing to the rapidly increasing numbers of infected patients, the National Health Commission of the People's Republic of China assigned COVID-19 to the category of infectious diseases Group B on 20 January, which meant that heightened prevention measures were required for all health workers. Three days later, the lockdown of Wuhan city, which has more than 11 million inhabitants, started, followed by the institution of a policy that only dental emergency treatments were allowed to be performed. Private dental practices throughout China were closed in accordance with the epidemiological situation in each area. However, private practices outside of Hubei province have now gradually resumed their work. As reported by Bian, 3,000 healthcare workers, including dentists, were infected in China by 25 February. He

explained that dentists and dental staff have a high risk of contracting SARS-CoV-2 owing to close contact with their patients. During treatments, dental staff wore extensive protective clothing such as medical masks, caps, gloves, goggles or face shields, shoe covers up to the knee and surgical gowns. Procedures which generated spatter or aerosols had to be avoided or at least minimised. In case of the necessity for such a procedure arising, Bian recommended the use of dental dams and high-volume saliva ejectors. Since intra-oral radiography stimulates saliva secretion and coughing, he said it should be replaced by extra-oral radiography. Particulate respirators in China have these specifications- II (95%) and I (99%).The medical staff of the School and Hospital of Stomatology of Wuhan University are regularly examined for COVID-19 symptoms and their temperatures are measured. Anyone who shows respiratory symptoms is taken off the work shift for the time being. The same applies if family members of employees shows such symptoms. In addition, an emergency care work log of treatments has been established in order to be able to trace the transmission path in the event of a SARS-CoV-2 infection.[9]

**Europe**

Dentists all over Europe are doing their part to limit the spread of COVID-19 while staying up to date with national and local regulations. In a recent statement, European health professionals and their student organisations urged the European Commission and governments to support and protect healthcare professionals fighting SARS-CoV-2. Dentists are officially safeguarded under the EU Working Time Directive and should, therefore, be assured of adequate working conditions, breaks and time off between shifts. Finally, as working in current conditions may take a heavy toll on the mental well-being of staff, healthcare workers should be able to access mental health support services. Particulate respirators have certain specifications -CE-certified FFP class 1 (FFP1) (80%), class 2 (FFP2) (95%), or class 3 (FFP3) (99.7%) in European Union.

The German Dental Association and the National Association of Statutory Health Insurance Dentists have ordered dentists in Germany to keep their practices open, owing to their health insurance companies' licensing. However, the Robert Koch Institute, the German Dental Association and the regional dental associations have recommended postponing treatments that can be deferred.[10]

**UK and Ireland**

While dental professionals across the world are hoping for the relaxation of lockdown restrictions and are anxious to reopen their dental practices, the UK government has not yet provided clear guidance on when dentists in the country can return to general practice and resume normal service. Similarly, the Irish Dental Association (IDA) is eagerly awaiting a response from its government and is deeply concerned over the impact of COVID-19 crisis on the dental profession in the country. For specific protective use of respirators in dental settings, FFP3 respirators offer the highest level of protection against infectious agents and are the only FFP class accepted by the Health and Safety Executive (HSE) as regards the protection in the healthcare environment in the United Kingdom.[11]

**General guidelines for handling Coronavirus pandemic**

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.

***Patient screening***

For these guidelines' development, after the screening, patients are proposed to be divided into five groups:

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.

***Treatment categorisation***

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

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.[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 seconds before the procedure can reduce the viral load in the patient's saliva.[12]
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 [13]
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.[14]

In high-risk environments, it is recommended to use waterproof and fluid-resistant gowns or overalls. During minor oral surgery, surgical gowns must be worn with tight cuffs that must be inserted under the gloves. Fabric work uniforms must be washed daily on a hot 60 °C cycle. Fabric uniforms are not considered PPE since the material they are made of is absorbent and therefore offer little protection against infectious pathogens. Disposable or sterilizable face shields can be used in alternative to glasses. Face shield protects the other areas of the face besides the eyes. The face shields that extend from the chin to the forehead offer better protection of the face and eyes from spray and splashes.[15] The simultaneous use of two pairs of gloves considerably reduces the passage of blood through micro-perforations.[16] There are no significant reductions in manual skills and the sensitivity of the operator wearing the double glove.[17]
Any waste containing human or animal tissue, blood or other body fluids, drugs, swabs, dressings or other infective material is defined as "clinical waste" and it must be separated from non-clinical waste.[18] Used disposable syringes, needles, or other pointed instruments must be disposed of in a special rigid container, in order to avoid injury to operators and operators in charge of waste disposal. The waste must be kept in a dedicated area before it is collected, away from public access, and excessive accumulation of waste must be avoided.[19]

## DISCUSSION

The dental team must adapt several precautions to avoid these infections; an adequate training and information of the personnel is mandatory in order to control infections in the dental office. The individual protection methods include a series of enforcement with the aim to reduce the risks of contamination, unfortunately without being able to eliminate them. The basic principle of infection control is to approach to each patient as if he was an infected patient and to correctly carry out the protection methods.[20]
Adequate personal protective equipment (PPE) must be selected based on a risk assessment and the procedure to be performed. The precautions for infection control require wearing gloves, aprons, as well as eye and mouth protection (goggles and mask, such as medical masks and Filtering Face Piece or FPP) for each procedure involving direct contact with the patient body fluids. Whenever possible "single use" or "disposable" equipment should be used.[21]
In the face of the COVID-19 pandemic, new biosafety measures are necessary to reduce contagion. Dentistry is a profession that works directly with the oral cavity and is therefore very exposed to this virus or other infectious agents. Because of this, some measures need to be taken to minimize contagion. In fact, dentists can play an important role in stopping the transmission chain, assuming correct procedures in order to reduce the viral agent diffusion, or in promoting undesirable infectious disease diffusion, if operating in adherence to adequate safety protocols. Dental-care professionals must be fully aware of 2019-nCoV and other viral agent spreading modalities, how to identify patients with active infections and, most importantly, to prioritize self and patient protection. Finally, the dental team must reconsider the overall infective risk level of every dental procedure and respect the new operative protocols that are or will be formulated by respective national official committees in order to reduce as much as possible the risk of the contagion for the health and safety of their community.[22]

## CONCLUSION

To date, no universal protocol or guideline is available for dental care provision to active or suspected COVID-19 cases. The guidelines developed in this work are general guidelines and the final decision will always be provided through the practitioner's judgment. Knowledge of basic protective guidelines will help in reducing any cross -contamination and thus limit the pandemic spread.

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