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Management of dental care practice and prevention of cross infection during COVID-19 pandemic

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***Abstract*---**The etiological agent of Coronavirus Disease-2019 (COVID-19) is Severe Acute Respiratory Syndrome- Coronavirus-2 (SARS-CoV-2), a novel coronavirus. The COVID-19 pandemic dramatically reformed all aspects of life throughout the world. The spread of this infection mainly occurs through the aerosol which contain the microdroplets. It is now fully accepted that the transmission of this viral disease occurs through the infected subjects with or without specific disease symptoms. The principal routes of this viral infection are through mouth, nose, eyes, thus the spread of this infection can be highest at all the levels of dental clinics. Specific protocols have been devised on time to time since the start of this viral pandemic for the dental practitioners. It is an utmost responsibility of all dental care practitioners to follow all the guidelines to minimize the cross-

infection of this disease. The new guidelines are implemented to comply with the policies of public health, ensuring safety of dental care professionals, staff and patients to prevent further spread of this viral disease. The introduction of particular devices, proper patient management and organized clinical practice is extremely significant to stop the spread of this disease. This article highlights some most essential procedures to be followed at dental care unit to minimize the risks of infection.

***Keywords*---**COVID-19, dental public health, health risks, safety measures, infection control.

Introduction

The ongoing global coronavirus disease-2019 (COVID-19), a pandemic is caused by severe acute respiratory syndrome (SARS) Coronavirus-2 (SARS-CoV). This virus contains a single stranded RNA (+ssRNA), 60-140 nm in length and belongs to β-Coronavirus genus. On its envelope, due to the presence of spike glycoproteins, this virus has crown-like shape.[1,2] The outbreak of this pandemic was first reported on Dec. 12th, 2019 in Wuhan, China. The data retrieved from World Health Organization (WHO) till this day Mar. 2nd, 2022, more than 439.135 million cases and 5.98 million deaths have been reported. This pandemic has affected older men far more, who are suffering from pre-existing health complications as compared to young generation.

This virus is transmitted through micro droplets and aerosol.[1] Coughing and sneezing help in the diffusion of these microdroplets in the environment and the suspension of these droplets in air is determined by droplet size, air flow and relative humidity.[1] The entry points for the infection include mouth, nose and eyes.[3,4] The spread of infection can be due to close direct interpersonal contact (< 2m) with a duration of >15 min.[4] It has been reported that the identification of this viral disease as positive could be about 96 h from the exposure.[5,6] This viral infection can be asymptomatic with incubation period of maximum 14 days. The clinical symptoms broadly range from mild (flu like symptoms) to very severe life threatening complications like acute respiratory distress syndrome (COVID-19 pandemic.[7,8] The other possible symptoms can be chills with fever, shortness of breath, sore throat, cough, headache, loss of taste and smell. These symptoms can also be followed by nausea, congestion, diarrhea and vomiting.[9,10,11]

The COVID-19 disease symptoms can be classified differently in relation to the symptoms. This includes; mild form, moderate form; severe and very severe form. The mild form symptoms are nonspecific. Currently the best clinical diagnosis for the detection of COVID-19 includes a rapid antigen test from the throat and nasal cavity. In addition to PCR test, this method is performed to differentiate common non-infectious conditions and other respiratory pathogens from COVID-19 viral disease.[12] The aim of this review article is to highlight some updated hygienic procedures that need to devised in all clinical practice to control the spread of this viral infection. These measures are emphasized through the discussion of

common infection risks, standard hygiene measures, and precautions at operative areas at dental clinics to minimize the cross infection of COVI-19 disease.

Common infection risks at dental practice

The intrinsic biological threats in dental practice can affect all the staff members including patients. The possible transmission of any infectious agents must be properly assessed for the prevention of all types of risks. However, the routinely adopted procedures were not specifically designed to prevent the aerosol borne pathogen transmission. Hence, previously no specific guidelines were assigned for the protection of dental clinical staff and concerned patients against COVID-19 viral infection.[3]. In addition to common measures of infection prevention, from person to person or by touching equipment (cross-infection), some more precautions need to be added to routine infection prevention measures, in order to reduce to maximum, the spread of this pandemic viral infection. It is highly recommended to paste large size posters outside and inside the walls of the dental clinics to illustrate some safety protocols for patients and staff to minimize the cross infection of this viral disease [Figure 1].

Figure 1. Important labels to be fixed outside and inside walls of Dental Clinic during the current COVID-19 pandemic

In a dental clinic, reduction, control and prevention of infection and its transmission commonly takes place through the use of good quality personal

protective equipment (PPE) like masks, gloves, goggles, visors, surgical gown and shoes. The procedures to inactivate, destroy and remove the pathogens from all instruments and surfaces include proper decontamination, disinfection and sterilization procedures before handling the patients.[4,13] As per the WHO reports, the COVID-19 virus persists of common surfaces from few hours to few days, depending on environmental conditions.[14] The spread of this infection occurs through air borne droplets with <5μm or >5 μm. Theis SARS-CoV-2 is sensitive to head and ultraviolet radiation and can get destroyed at 56 ^{o}C for 30 minutes. In addition 75% alcohol, ether and other disinfectants containing chloroform, peracetic acid and chlorine kill this virus immediately. The use of chlorhexidine has been reported to be insensitive for the spread of this virus.[14]

Standard hygiene measures for dental practice professionals

Some broad types of hygiene measures include generic measures and specific measures.

Generic measures:

To minimize the spread of COVID-19 viral infection, some preventive measures and suggestions are listed here which include:

- Patients should be informed about the procedures to be followed while in the dental office
- Patients should be informed that any suspicious case will be reported to concerned health authorities for further clinical investigations.
- A telephonic triage will be carried for patient to assess:
  - Whether the patient has the symptoms of COVID-19 infection
  - Any contact with some infected people
  - Has been in area reported with high risk of infection
  - Any recent travel outside the country, any contact with some persons with national/international travel, (if yes) name of countries, residing in area with high risk territory
  - Over past 14 days, any symptom of fever, headache, cough, diarrhea, or muscle pain
  - Any recent contact with people with the above symptoms.

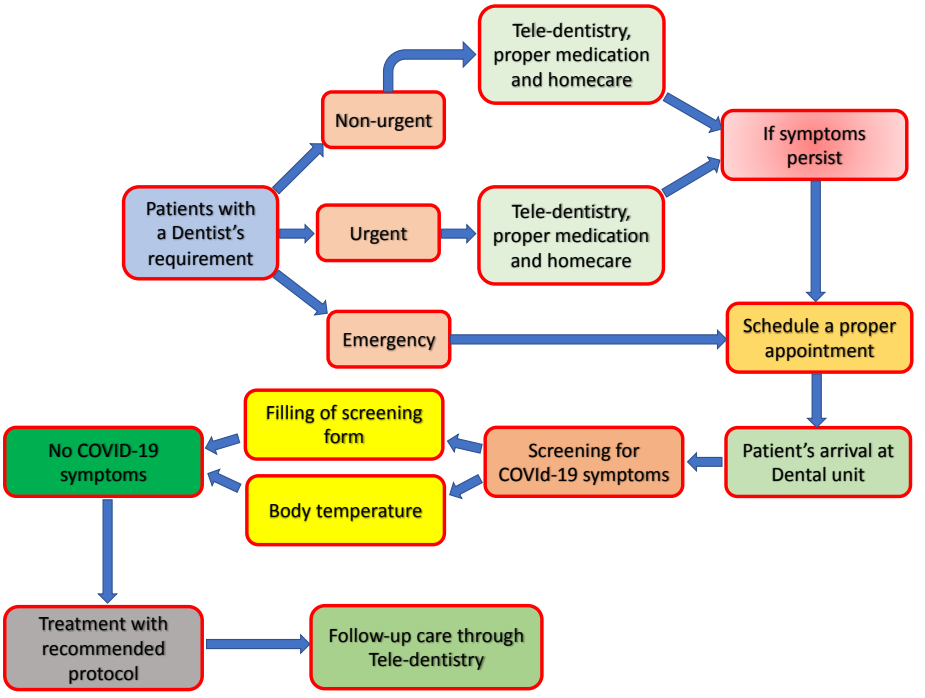

Figure 2. Flow chart showing the proper management of dental problems during COVID-19 pandemic

It is highly recommended to follow proper steps as highlighted in figure 2 to minimize the cross infection of COVID-19 among patients and the staff. In case of positive response, it is strongly recommended not to make any appointment [Figure 2]. The patient should be informed about the possible risks of infection. It is also important to inform the patient about the personal hygienic measures to be followed. It is recommended to report the concerned authorities about the case for further investigations. An appointment should be scheduled only if the patient case is urgent depending on the availability of the equipment and the availability of disposable materials. It is highly recommended to assess the need before planning of patients to visit the dental clinic, especially for most vulnerable subjects like patients with cardiovascular, respiratory, immune system diseases or elderly patients.[12] The appointments should be properly managed spread over time, maintaining distance in the waiting room [Figure 2]. At least 2m distance should be maintained in all places including operation room with at least 15 minutes stay.[4] The entry in operating room should be without electronic devices, bags and overcoats, left in waiting room. Hand sanitizers should be always available for the patients and companions, at the entrance of the dental clinic. Some more safety measure posters should be pinned on the walls of clinic for the staff to minimize the spread of this viral infection [Figure 3].

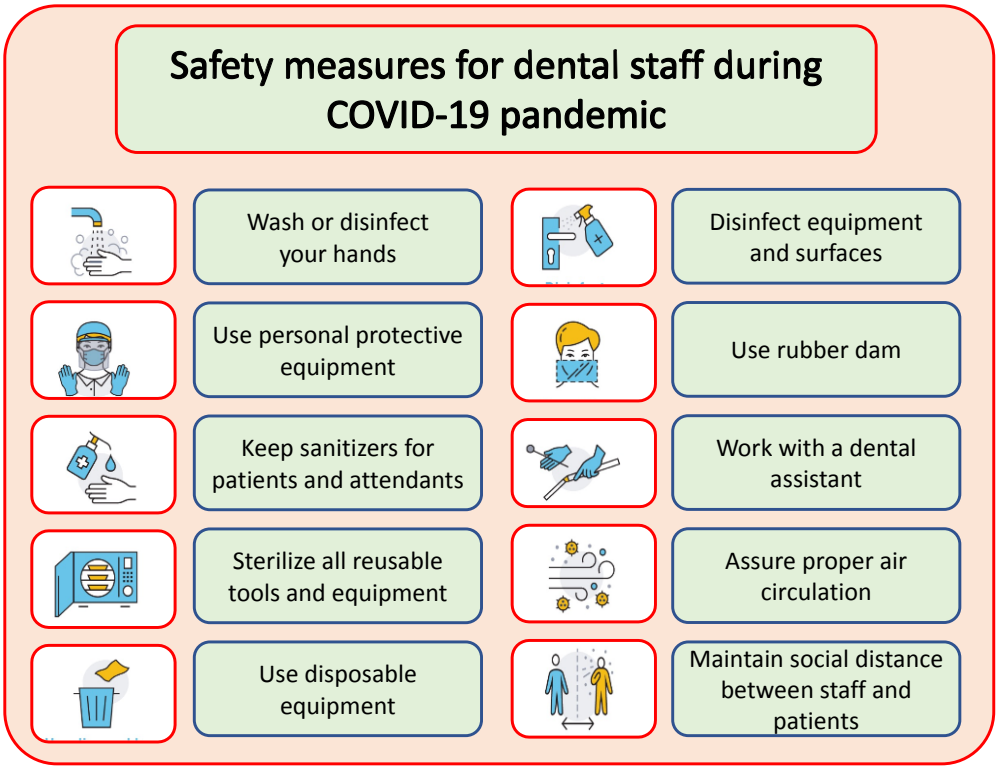

Figure 3. Important safety measure labels for dental staff and clinic during the current COVID-19 pandemic

While recording the medical history of a patient, the results of the telephone triage about the suspicious and actual symptom, any potential contact with risk area residing people and patient's transit/permeance is highly significant. The patient should be informed that in case of cough, covering the nose and mouth is very important by using a tissue paper. The tissue paper should be disposed of immediately in a properly covered special waste container. The patient should was and disinfect the hands immediately. The fresh air flow and frequency is very important in the waiting room. The windows could be opened, taking care of air influx, or medical-grade air purifier should be used. Any material used for the patient treatment should be considered as waste. A proper disposal procedure is highly recommended to ensure no cross contamination and good infection prevention. The good quality PPE should be always used as described by the instructions and must be disposed of as a special waste. The integrity of the PPE should always be checked. The medical cap should always be used. The hand hygiene needs to be thoroughly observed.

Before performing the hand hygiene procedures, it is strongly suggested to remove all jewelry put on hands and wrist, finger nails should be short and clean. The nail products and artificial nails are not recommended at all. All abrasions and cuts should be covered with waterproof dressing. The contaminated items should be regularly removed from the operating and waiting rooms and should be

sanitized commonly. All the doctors and other staff should be informed that in case of any symptoms of COVID-19 infection, in last 14 days, they should not attend the dental office and should report it to concerned authorities.[8]

Specific measures

As a dental clinic consists of separate sub-units, it is important to differentiate between specific precautions as follows:

Precautions at operative areas

The implementation of some of the important procedures include: The surface of all instruments and equipment should be protected by single-use disposable covers, which should by disposed of after its use. Only necessary materials should be kept in the operating areas. A regular use of hydroalcoholic disinfectants should be performed to clean the operative surfaces. The exposure of body parts should be avoided by using a uniform with long sleeves and shoes. A disposable overcoat/lab coat should be used. The patient should mouth rinse for 30 sec with 1% H_2O_2 or 1% Iodopovidone.[3] To avoid the coughing or vomiting stimulation, the preference should be given to extra-oral radiological examination over intra-oral ones.[15]

Precautions from the methods that lead to aerosol or droplets production

Some of the procedures need to be adopted in addition to the ones described above include: After each use between one patients and the next, regular sterilization and replacement of low and high speed hand-pieces should be followed. It is strongly recommended to use dental units with anti-reflux system and 3-way turbine.[6] For the eye protection, the use of protective glasses and RPDs or full visors should be used. Surgical masks with full visors can be used, if it is not available.[3,16] When possible, the application of rubber dam should be used for the production of aerosol.[17,18] The PPE must be used and replaced while completing each operating phase. In addition, it is very important that all damaged protective devices need to be replaced.

Respiratory protective devices

The respiratory protective devices protect a wearer from biological, chemical and radioactive materials. The US National Institute for Occupational Safety and Health (NIOSH) has classified these devices into nine categories as N95, N99, N100, P99, P100, R95, R99, and R100 [19],based on particulate filtering face-piece respirators (FFRs). Furthermore, European standard (EU) classifies FFRs into three classes as FFP1, FFP2, and FFP3. The surgical masks are routinely used to block particles like droplets as it can filter 0.04-1.3 μm particles in size. The surgical masks are used to protect the patients from respiratory and salivary secretions of healthcare workers. The FFP2 and FFP3 masks can provide a tight seal as it is appropriate barriers against aerosols.

Common mistakes

A proper recommended sequence of PPE removal should be followed always. Some common mistakes can happen continuously, if proper attention is not taken. The mask should not be removed while the contaminated gloves are worn, instead remove the gloves first and then then mask should be removed by holding the strings. Gloves should be properly inspected before use and a double pair of gloves gives an additional protection. The gloves should be removed by a proper procedure without contaminating the hands. The gloves should by touched at only the outer part by rolling down from wrist to fingers. The same pair of gloves should not be used for several patients and for several operations. Hands should be washed properly before using the new pair of gloves. Full face shield or protective goggles are must to protect face and eyes from infective aerosols and droplets. The protections must be disposed of or properly sterilized for different operations. Dental uniform full length sleeves should be used which should be changed every day. Before washing the uniform, it should be disinfected with 500 mg/ml chlorine solution for minimum 30s.[18] Surgical gown worn over the uniform is must for each procedure to minimize the contamination risks, which should be disposed of after each visit. The gown should be removed first by properly folding it with contaminated side inside, before the contaminated gloves are removed. The dental uniform should be removed immediately in case of any contamination.

Conclusion

The SARS-CoV-2 pathogen poses a severe danger in almost all dental procedures and it could impact this profession profoundly due to the way this viral infection spreads. The predominant generation of aerosol and droplets at dental clinics can easily help the viral infection spreading. Any negligence at dental units can lead to cross-infection including SARS-CoV-2 related risks. The possibility of infection from asymptomatic patient should never be underestimated. A proper used of PPE by all the staff at dental unit is highly recommended. A proper management of patient starting by pre-treatment telephonic triage, screening of patient, appropriate schedule to avoid crowding is highly recommended. In this article most appropriate suggestions and procedures were discussed to minimize the common risks of infections, which can occur at every aspect of dental practice.

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