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An Article Review Step by Step About Preventive Measures to Prevent Infection by Covid-19 in Dental Clinic

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Abstract

A huge public health concern is the advent of the COVID-19 pandemic. As dentists, both our dental staff and our patients have significant roles in reducing their susceptibility to infection. The team is at a high risk of infectious infection and likely spread of viruses because of the existence of our job. One of the best strategies to combat this pandemic is to facilitate successful social isolation. As dental professionals, though, we are confronting the double task of shielding our staff and shielding our patients from exposure to the environment from all sides by ensuring that our patients continue to be able to receive urgency / emergency dental services. Both the dentist / dental staff and the patient are at a strong risk of cross-infection because of their existence, and this is for many reasons, the most two important reasons which are 1) the needed distancing between dental worker and the patient (which is about one to two meters) that we can't save it during dental treatment. 2) The dental treatment is applied inside the oral cavity which is the biggest source of contamination with the virus especially when

we use high speed hand piece with cooling water that lead to highly spread of aerosols, which are loaded by blood and saliva droplet containing viruses, that spread to the environment of dental room and surfaces.

Therefor the COVID-19 pandemic, has led to the absolute requirement for strict and effective infection control protocols beyond those that already exist within the dental setting. The purpose of this position statement is to establish a standard operating protocol for dental practice.

1 Introduction

Dentistry is one of the most exposed occupations for the COVID 19 series, as recorded in the New York Times [1]. In order to deter new diseases and the rapid dissemination of the viruses, a clinical procedure has to be developed in the operating setting. In clinical practice, the dentist, the assistant and the patient themselves can encounter oral fluids, substance contamination and dental device surfaces as sources for infection. A danger to those working or willing to communicate with these environments is the saliva and blood droplets deposited on surfaces or aerosols produced by rotating instruments or ultrasound hand-holding sections. The usage of disinfectants and personal protective equipment (PPE) therefore remains critical for proper dental career growth [2]. The rapid dissemination of SARS-CoV-2 has demonstrated that both preventive and therapeutic procedures need to be changed in dental practice. Therefore, it is important to review the references present in

the literature to improve clinical practice. In addition to that, the dental team worker should have a good knowledge and updates about the following.

- 1.1 Sign and symptoms of COVID-19 infection.
- 1.2 Behavior and remaining of COVID-19 outside the body.
- 1.3 Routes of transmissions of COVID-19.
- 1.4 Infection control precautions of COVID-19 during dental treatment.

1.1. Sign and symptoms of COVID-19

Headache, asthenia, myalgia, nasal inflammation, rhinitis, pharyngotympanic, and, in particular, dry cough and fever dyspnea, lack of taste, scent lack, are frequently reported signs. There might also be several patients with sore throat and diarrhea [3].

1.2. Behavior and remains of COVID-19 outside the body.

Human-to - human infection primarily occurs in direct interaction with symptomatic COVID-19 individuals and respiratory goutlets are the predominant means of contagion while patients sneeze or cough [4]. While the infection is more infectious while the patient signs are symptomatic, an increasing amount of data shows that even in patients with moderate or absent signs it may be spread to others [5]. It has been accepted that the virus can live in aerosol or other inanimate objects outside of living species. Studying the SARS-CoV-2 is viable in aerosols for up to 3 hours with half-life 1.5 hours [6] and was recorded by the New England Journal of Medicine [6]. The virus can live on average half-life of [5-6] hours and on plastic surfaces with a mean half-life of about [6-8] hours, on stainless steel, and this virus can thrive on those above-mentioned surfaces up to three days following application. COVID-19 may also live for a period of 2 days on paper and carton. The mean COVID-19 incubation period is between four to six days but is about 0-24 days [7].

1.3. Routes of transmissions of COVID-19

The 3 most common transmission routes [8] of COVID-19 include:

- a) Direct transmission (through cough, sneeze or droplet inhalation),
- b) Contact transmission (through the oro-nasal-ocular route)
- c) Aerosol transmission.

Asymptomatic carriers of the infection are equally capable of transmitting the virus as symptomatic patients [9]. Therefor any patient should be considered as infected patient during dental treatment and take full precautions.

1.4. Infection control precautions of COVID-19 in dental setting

“In order to curtail the spread of COVID-19, several medical clinics including dental chirurgics and hospitals have limited patients' access to immediate, unreduced services by reducing their clinical operation. Dentists are particularly at high risk for SARS-Cov-2 infection since they cannot sustain an emotional duration of more than one meter, whereas saliva, blood and other body fluids are exposed during surgery. In addition, aerosol” [10] can be produced by several dental procedures. For this reason, there should be several precautions:

- 1.4.1. Patient screening (Telescreening).
- 1.4.2. Disinfection of dental room, surfaces, equipment, dental chair and instruments sterilization before reaching the patient to the dental office.
- 1.4.3. Good ventilation for dental room.
- 1.4.4. Using of disposal wear and covers for dental team and patient (PPE).
- 1.4.5. Hand hygiene.
- 1.4.6. Appointment planning and waiting room organization.
- 1.4.7. Patient's entry.

- 1.4.8. Evaluation of dental staff worker every day and access modalities for them.
- 1.4.9. Using items that decrease transmission of COVID-19 through the environment during clinical procedures.
- 1.4.10. Disinfection of laboratory items.
- 1.4.11. Post-operative room disinfection.
- 1.4.12. Dental unit water line.
- 1.4.13. Management of medical waste.

1.4.1. Patient screening (Telephone screening):

A mobile examination of every patient before having an appointment for a procedure is the safest approach to eliminate the risk of COVID-19 infection in the dental clinic. That helps in the identification of patients with weak symptoms with COVID-19 before reaching the dental department via telephone survey. In 88 per cent of COVID-19 positive patients fever exists [11] according to study reported in The New England Journal of Medicine by China Researchers (NEJM). If the body temperature of a limited number of infected patients is normal, a telephone survey may be performed using a questionnaire that identifies the most prevalent symptoms of SARS-CoV-2 infection.

1. Have you been hospitalized with COVID-19 in the last 30 days? When indeed, have two negative SARS-CoV-2 swab tests confirmed you recovered?
2. Have you ever experienced fever over 37, 3 degrees or seen any signs of dry coughing, pharyngeal discomfort, respiratory stiffness, exhaustion, vomiting, myalgia, diarrhoea or general sickly?
3. In the last 14 days, have you missed your sense of taste or smell?
4. Were you in contact with people who screened COVID-19 favorably in the last 14 days?
5. Have you seen or been in touch with people in the past 14 days from places with a strong epidemiological risk?
6. Did you attend gatherings lately, including conventions, lectures, or meetings that had been attended in 14 days by a significant number of people?

If fever has been identified within 14 days, clear epidemiological connections, health indications or COVID-19 effects (in the case of regular body temperature), non-urgent procedures may not be planned for at least 14 days and patients are advised to keep in touch with their general practitioners. It is therefore advisable, beginning the day before the appointment and postponing the appointment for at least 14 days if this reaches 37.3 ° C, to allow the patient to calculate their body temperature every 8 hours.

When treating a verified, probable, or suspected COVID-19 patient with an immediate need, properly qualified and prepared health care staff should be given to handle the patient in a public hospital. It is mandatory to designate at the end of the day at dentistry / clinic (perhaps in a negative or well-ventilated room), utilizing a dental rubber barrier, prevent any procedures that generate aerosol and reduce intervention time. All disposable products, including patients and personnel, shall be disposed of in a separate bag for personal protective equipment (PPE).

1.4.2. Disinfection of dental room, surfaces, equipment, dental chair and instruments sterilization before reaching the patient to the dental office:

Since COVID-19 stays present on surfaces for many hours, anything contaminated by patients and workers must be disinfected daily. Door handles and taps, for example, washing and disinfecting waiting room chairs and PCs, mouse cupboard, drawers, file cabinets, a fridge, a cooler handle, an autoclave handle, a water handle tab and anything that is exposed to polluted environments in the dental space. For instance. At the end of the working day, 1% solutions of hypochlorite should be used to sanitize floors and other surfaces.

Other approaches such as ozone disinfectant systems may be considered to boost sanitization by integrating the same antiseptic power with improved surface distribution of a liquid sanitiser [12].

1.4.3. Dental room ventilation:

The continuous air exchange works on the basis of air suction, ventilation and sanitary technologies, such as fixed machines with plasma ion cluster equipment, UV lights or compact air cleaners with high-efficiency particulate air filters [13,14]. In rooms or dental clinics lacking clear openings, the usage of these machines is essential. An additional high-volume evacuator may also help to minimize the accumulation of aerosols and droplets, particularly with ultrasonic scalar usage, during a dental operation.

Windows with a minimum opening of two square meters guarantee an effective space air exchange for a space of 20 square meters in 10min. The door to the therapy must be narrow during operations, particularly when air conditioning systems are turned on to prevent dispersal in other environments [15].

There is very no proof of the ability to affect the dissemination of COVID-19 with the usage of air conditioning systems. In order to clear up the contagion environment inside a restaurant, three families sitting at tables were included in a Chinese study [16]. There was around 1 m width from each table and air conditioning was accessible in all rooms of the restaurant. Therefore, where the usage of ventilation or air conditioning systems is required, this result is important to remember. However, the aerosol formed during dental care may be managed in the operational areas by this phenomenon. By transferring the circulation, for instance, to the open window, a quicker air movement can occur, and a smaller level of aerosol deposition can be accomplished in a closed environment. The major reasons for the spread of infection by droplets are the path of airflow when air conditioning is used.

If air conditioning systems are required, regular filters and hydroalcoholic materials exposed to the air must be washed and sanitized. Air conditioners may remove detergents with hazardous materials that can scatter in the environment. It is better the systems with Ultra-Low Penetration Filters. Maintenance must be carried out according to the manufacturer's guidelines for central air conditioning systems and recirculation should be omitted to discourage future virus movement into other areas. An air exchange is still advised after each treatment.

1.4.4. Using of disposal wears and covers for dental team and patient:

The surgeons ready for the disposable personal protective equipment (PPE) while the patient is planning to join the clinical region.

It has already been apparent from Chinese initial findings that COVID-19 may be transmitted through overt or indirect interaction with the body's fluids or outlets of ocular, oral and nasal mucosal membrane [17]. The usage of PPE as goggles or safety lenses, completely protected lining, breathing masks, gloves and headgear caps is also quite significant. The dentist may reach the dental department / clinic wearing a surgical mask, then put on shoe coverings instantly, dump the mask in a special closed jar and scrub his hands for at least 1 minute using the hydroalcohol disinfectant or hot water and soap. The PPE wearing working series is as follows.

-- To secure washable rubber socks, use plastic shoe coverings.

- Wear an EU FFP2 / NIOSH N95 or EU FFP3 / NIOSH N99 heavily filtered non-valve breather that ensures the fit of the face. Commonly used surgical masks do not completely shield the respiratory infection agents smaller than 1 μm from inhalation [18]. In the event of emergency care with a verified or suspected COVID-19 case, usage of the FFP3 respirator may be made.
- Carry total eye safety medical headgear, contacts or visors.
- Surgical hand sanitization with a 60 second hydro-alcoholic solution, hand washing at a minimum temperature of 30 ° C under warm water and with disinfectant liquid soap solutions with respect to time of operation. Be sure to clean the toes, fingertips, wrists, legs, braces and sections of the forearms carefully; then dry vigorously under running water (dabbing). In the same skin fractionation process, often wash hands for 60 seconds with a hydroalcoholic solution.

- Wear the first couple of latex or nitrile gloves (for a reduced surface porosity, the nitrile gloves are better).
- Wearing a water-resistant sweater and a second set of jetty gloves.

The patient, previously equipped with appropriate PPE, is seated on the dental chair unit that has been previously prepared with a removable barrier to protect its non-sterilizable parts. Patients must remove their surgical masks at the beginning of the clinical procedure and wear them again at the end.

1.4.5. Hand hygiene:

Before and after the dressing of PPE, operators can sanitize their palms. According to Spanish findings, repeated surgical washes with soapy disinfectants may cause skin lesions and alteration of the flora of the bacteria, allowing for staphylococci colonization and gram-negative bacilli colonization. Hand purification, on the other side, appears to be accepted well after repeated cleaning, with hydroalcohol gel at concentrations between 62 per cent and 70 per cent. The usage of soapy solutions relative to drunken handsanitis incidents of Touch dermatitis have also been more commonly recorded [19].

Application of approximately 5 m liters of alcohol gel in the hand of the WHO hand-crubbing technique for operating procedures is needed on perfectly clean dry hands, on palm and rub the skin surfaces of the hands and forearms approximately 60 seconds before the substance is fully evaporated. The emollients and alcohol they produce may contribute to acute discomfort or burning feelings if the hands are decreased. In the event of blood and biological infection, surgical hands shall be needed to wash under hot water and soap [20]. We prescribe that the hands be sanitized regularly with alcoholic sanitizing solutions and that surgical hand washing be limited only in cases of infection.

1.4.6. Appointment planning and waiting room organization:

As COVID-19 is mainly spread via respiratory goutlets among people, it is very necessary to schedule separate (one after one) appointments of patients, so that patients do not crowd at once in dental office. Furthermore, arranging of appointments is necessary to guarantee that a minimum interpersonal interval of 2 m is maintained by the number of patients in the waiting room [7]. The duration of each treatment may take at least 30 minutes to eliminate a significant number of patients occupying the waiting area. For the development department, this increased period can be acknowledged.

The most susceptible in case of COVID-19 infection are aged or numerous chronic systemic disorders. It is also advised that your meeting be held in the early part of the working day [21]. To boost hygiene, the ornaments, books, newspapers and posters have to be withdrawn from the waiting room and since COVID-19 has been able to exist on paper and carton for up to two days [6].

If the reception desk is open, the workers can be covered from droplets by places with plexiglass separators. A surgical maze and jetable gloves should be worn by the receptionist who may relieve each patient. During administrative and reimbursement processes, it is liable for sanitizing any item in touch with patients.

1.4.7. Patient's entry:

The patients also need to wear a dental mask and to be accompanied, if appropriate, by the partner or the relatives. It is important to avoid particular artifacts. Patients and nannies appear to be viewed as patients and are expected to stay for the whole time of the patient's medication.

The patient shall be issued instructions by a detailed prescription upon schedule; the glove-fitting operators' room must be provided with a filter facial Part 2 (FPP2) respiratory mask, a viewfinder and a secure robe. The first step is by using an infrared thermometer to measure your patient's body

temperature and minimize contact with your patient's body surfaces. If the patient's body temperature is above 37.3 ° C, in fact during emergency care, it is best to postpone the appointment.

The patient is advised before joining the dental clinic to remove all overcoats, shoes and containers in arranged areas. You should request a certain closed container and hydroalcohol solutions in the mouth of the operating mask. The patient must remain in the sat room in order to obtain the therapeutic space until he is requested. The patient has a hat, a jacket belt, a sheet and an operation mask. Patients may wear the provided PPE at the conclusion of the clinical procedure.

1.4.8. Evaluation of dental staff worker every day and access modalities for them:

All dentists, including dentists, oral care staff, aides, receptionists, etc., can test their body temperature every day, at least in the morning and in the evening. The patient does not go to work and health tests should be triggered if the body's temperature is greater than 37.0 ° C.

The employees may put their uniforms and other personal belongings in separate lockers in a private locker room and carry washable uniforms and footwear. At the conclusion of the treatment, they require a fresh hydroalcoholic solvent to sanitize their side. Both dentists must have a physical gap of at least 1,5 m between them and must still carry an operating mask. You must stop remaining at the same time in traditional food and relaxing areas, etc., even for specifically defined purposes.

1.4.9. Using items that decrease transmission of COVID-19 through the environment during clinical procedures.

It is very important to notice that decreasing transmission of COVID-19 through the environment during clinical procedure can be done by.

- a. Disinfect and covering dental chair, chair handle, chair light and light handle with a disposable cap after each patient.
- b. Using mouthwash for the patient before and after dental treatment.
- c. Using rubber dam.
- d. Saliva suctioning.
- e. Good aspiration.
- f. Using high-speed hand piece with anti-retracted valve.
- g. Triple syringe should be restricted.
- h. Intra oral X-Ray should be restricted.
- i. High-volume evacuation device could help to reduce aerosol formation and droplet emissions during a dental procedure.

A preliminary clinical evaluation of COVID-19 in saliva of 92 per cent (11 of 12) of the examined patients was performed at the Li Ka Shing Medicine Faculty of the University of Hong Kong [22]. In order to minimize the existence of viruses in saliva, some scholars have recommended to rinse at least 30 seconds with 1 percent mouthwash centered on hydrogen peroxide solutions, 0.2 percent povidone [23]. There there have been reports of high vulnerability of COVID-19 to oxidizing agents in vitro, no studies have been performed for their actual in vivo efficacy or for the potential consequences of mouthwashing through utilizing this material. According to the recommendations of the National Health Commission of the People's Republic of China, Diagnosis and Treatment of Novel Coronavirus Pneumonia (5th edition), for COVID-19 oral washings containing chlorhexidine have been inoperative [24].

It is highly advised that aerobics and likely contaminated biological content be included in therapeutic procedures. The usage of rubber barrages has shown a substantial reduction of airborne particles within 1 m of the operational range by 70 per cent in a Samaranayake analysis [25]. During the COVID-19 outbreak the usage of quick handpieces without anti-retraction valves should be restricted by the possibility of aspiration of viruses and Bacteria in air and water tubes which could lead to cross-infection for dental device contamination [26]. Only when specifically appropriate should triple syringes be used carefully.

Some scholars suggest that intraoral X-ray imaging should be prevented during the COVID-19 outbreak as it may induce emetic reflections and coughing, and lead to aerosol production, spreading and the creation of biologically contaminated enhancements [23, 27]. However, intraoral X-ray techniques can be known to produce a 3 to 5 times smaller radiation exposure than the Panoramic and 40, as the Cone Beam Computable Tomography (CBCT)[28]. Note must be taken to discourage the inappropriate usage of x-rays. If intraoral imaging is required, sensors must be covered twice in order to avoid perforation and must be disinfected adequately following usage to prevent cross-contamination.

In order to stop diarrhea and vomiting reflexes, both tooth and surgic operations should be performed cautiously [24]. In contrast with standard "analog" methods for dental printing, for example, it's easier to use an intraoral scanner.

1.4.10. Disinfection of laboratory items:

For example: corn and bridge, disposable denture, orthodontic equipment, castings, trays, impressions, all laboratory specimens should be disinfected. Until injecting into the mouth of your user, both of these materials should be cleaned and disinfected using 70 percent ethanol disinfectant, where the laboratory samples are submerged (15–20) minutes in a disinfectant. When the patient is shocked, deeply polluted with saliva and blood gout, which can be thoroughly cleaned by a water tab (never with triple syringe) and finally soaked in disinfectant as mentioned before to sure to remove or dissolve all organic materials. My opinions about the impression materials that should be used with less or no dimensional change are heavy body and light body edition silicon type like 3M or Zirmagh.

1.4.11. Post-operative room disinfection:

At the end of the dental treatment, the patient must remove his disposable gown and other PPE, which must be carefully manage and dispose of in the same way as for the dental operators. In addition, it is obligatory for the operator to throw all disposable PPE (gloves, masks, protective gowns, headgear, shoes) inside special double-layered garbage bags, spraying them with a 0.5% hypochlorite solution, which will sealed with a knot and temporarily stored in a closed container with a pedal opening. The discarded equipment will then finally throw out, respecting all the given directives of medical waste disposal.

Following the test conducted by the Institute for Hygiene and Environmental Medicine of the University of Greifswald in Germany on the persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agent. The sanitizing of goggles and visors must be done by wiping them with 62–71% hydro alcoholic solutions or leaving them to soak for at least 1 min in a 1% hypochlorite or 0.5% hydrogen peroxide aqueous solution [29]. The same disposal procedure must also be applied to the PPE given to the patients. Effective Sequences for the Removal of PPE are as follow

- Sanitize hands, which are still protect with the first pair of gloves.
- Remove shoe covers and disposable gown.
- Remove second pair of gloves.
- Sanitize hands with a hydro alcoholic solution.
- Remove headgear, goggles, and respirator mask.
- Sanitize hands and forearms with a hydro alcoholic solution.
- Recommended shower at the end of the working day.

1.4.12. Dental unit water line:

Other steps can involve washing dental water lines with a hypochlorite solution of 0.5% before usage, since viruses and bacteria may contaminate wastewater. COVID-9 has been shown to stay in aerosol suspended for up to three hours; thus, a full clinical air change is required for each treatment,

particularly if airborne infections are administered at high speeds or ultrasound (6).

1.4.13. Management of medical waste.

Transportation to the temporary storage region of the medical establishment should be timely for medical waste (including discarded shielding instruments during use). In compliance with the Dental Instrument Desinfection and Sterilization Procedure, the reusable device and products should be pre-treated, washed, sterilized and appropriately preserved. Medical and household waste is called contagious medicinal waste through the care of patients with alleged or documented COVID-19 infection. Health bags and "gooseneck" bags can be included in double-layer yellow paint.

3. Conclusion:

- Dental preventive strategies against COVID-19 include phone and a clinical study focused on the latest signs and wound test, body temperature assessment, 1% hydrogen peroxide oral rinses and the application of a particular PEP.
- The mitigation steps include:
 - The usage of dental hand sections, the application of a rubber dam and a large-volume cannula for aspiration is critical for the right clinical procedure.
 - FFP2 (or N95) and FFP3 airflows offer health workers more safety against infectious respiratory infections in contrast to surgical masks.
 - The strongest of surface disinfectants are ethanol between 62 and 71 percent and sodium hypochlorite between 0.1 and 0.5 percent.
 - If dentists and dental staff are closely adhering to the appropriate guidelines, the potential for COVID 19 infection may be smaller.

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