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COVID – 19 OUTBREAK : MANAGING INFECTION RISKS AMONG PROSTHODONTISTS DURING IN-PERSON DENTAL CARE - A REVIEW

KEY WORDS: Coronavirus, Covid-19, Dental care

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ABSTRACT

The Severe Acute Respiratory Syndrome Coronavirus2 (SARS-CoV-2) is a novel coronavirus □rst identi□ed in Wuhan, China, and the etiological agent of Coronavirus Disease-2019 (COVID-19).This infection spreads mainly through direct contact with Flügge micro droplets or core droplets that remain suspended as aerosol. Since the infection typically enters through mouth, nose and eyes, dentistry is at highest risk of infection due to the frequent production of aerosol and the constant presence of saliva. A speci□c protocol should be applied to reduce the risk of infection . This protocol should be implemented by application of personal protective equipment such as masks, protective goggles, gowns, helmet, gloves, caps, face shields and is strongly recommended for prosthodontists.

INTRODUCTION-

In late 2019, epidemics of coronavirus disease 2019 (COVID19) started from Wuhan, China and have become a major challenging public health concern for not only China but also countries around the world (Phelan et al. 2020). On January 8, 2020, a novel coronavirus was officially announced as the causative pathogen of COVID-19 by the Chinese Center for Disease Control and Prevention (Li et al. 2020). As of March 30, 2020, according to the World Health Organization (WHO), 2019-nCoV has involved 201 countries. There were many reports related to a live-animal and seafood market, supporting that the pathogens were transferred from animals to humans, rapidly evolving into transmission from human to human.[1] The pathogen was classified as 2019 Novel Corona Virus (2019-nCoV), and the disease was named Corona Virus Disease 2019 (COVID-19). Considering the aerosol generating nature of dental procedures, the proximity of the operating field, to the upper respiratory tract and the number of patients seen per day; dental professionals are at a higher risk for spreading COVID-19 without careful planning and appropriate guidance.

What is Covid 19?

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).). It is a single-stranded RNA virus (+ssRNA) of 60–140 nm, belonging to the Coronavirus genus(subgenus sarbecovirus, Ortho coronavirinae subfamily).

TRANSMISSION OF VIRUS-

The transmission of SARS-CoV-2 occurs primarily via respiratory droplets from coughs and sneezes within a range of about 1– 2 m and by direct contact. The droplet source can be nasopharyngeal or oropharyngeal. Larger droplets (> 5 □m), may lead to viral transmission to nearby subjects, whereas smaller droplets (< 5 μm) contaminated with airsuspended viral particles may provide the long-distance transmission.[5] Indirect contact via contaminated surfaces is another likely cause of infection. Viral carriage in salivary fluids is a key , additional risk factor for aerosol-generating procedures that routinely take place in prosthodontic practice, providing possible hazards for the staff and patients.[6]

Symptoms:

The common clinical symptoms of the patients suffering from COVID-19 are high grade fever, cough, shortness of breath, myalgia (muscle pain), tiredness and abnormal chest CT. Disease onset can cause progressive respiratory failure because of alveolar impairment and even death. Older age and the presence of underlying comorbidities such as hypertension, diabetes, cardiovascular and cerebrovascular disease are commonly correlated with worse prognosis .[3]

Incubation Period – The incubation period of COVID-19 could be as long as 14 d, which is the commonly adopted duration for medical observation and quarantine of (potentially) exposed persons (Backer et al. 2020; Li et al. 2020).[5]

DIAGNOSIS

The diagnosis of COVID-19 can be made based on the history of travel to or residence in affected area 14 days prior to the onset of symptoms, laboratory tests (e.g., reverse transcriptase polymerase chain reaction [RT-PCR] tests on respiratory tract specimens) clinical symptoms, CT imaging findings.[1]

Infection Control Protocols

SARS-CoV-2 can persist on surfaces for a few hours or upto several days, depending upon the type of surface, the temperature , or the humidity of the environment (WHO 2020c). A recent study indicates that copper and paper can allow the virus to survive for 4 to over 24 hours. On the other hand, the infectious charge can be drastically reduced only after at least 48 hours for steel and 72 hours for plastic. Hence, the virus remains longer on steel instruments, disposable materials. In the light of this reflection, fundamental action to be taken is to promote the maintainance of good hand hygiene by using an alcohol-based rub (ABHR) or soap and running water. Thorough disinfection of all surfaces, the use of personal protective equipment including masks, gloves, gowns, and protective glasses or face shields for the prevention of the spread of the virus.[5]

Recommended measures for treatment

1.Tele-screening and scheduling appointments-

During the outbreak of COVID 19, primary telephone screening to recognize suspected patients of COVID-19 infection can be remotely done during scheduling appointments. Questions related to any travel history to

COVID-19 infected regions and the existence of febrile respiratory illness (FRI) symptoms such as cough and fever could be asked. In the event of a positive response to these questions, patients must not be treated in-person except as needed for emergency or urgent care that cannot be delayed.[1]

2. Patient arrival protocol-

Patients should be instructed for hand sanitization and proper hand washing as soon as he/she enters the clinic. Enactment of precheck triages should be done to measure and record the body temperature of every staff and patient via a non-contact forehead thermometer or cameras with infrared temperature sensors and pulse oximeter device should be considered even if the patient answers no to the COVID symptoms questions as a routine procedure. Elective dental treatments for patients with a fever over 100.4°F (or 38°C) and/or signs of respiratory disease should be postponed for at least 2-3 weeks.[1] Pre procedural mouth rinse of 1% hydrogen peroxide or 0.2% povidine iodine must be made mandatory to reduce the microbial load of the oral cavity for each and every patient before commencing the dental procedure . Remind the patient that, in case of necessity, it is mandatory to cough by covering their mouth and nose, possibly with a tissue.The tissue must be disposed of immediately in a special waste container. Following this, they must proceed to wash and disinfect hands.[6]

Personal Protective Equipment (PPE)

1. Protective glasses and face shields: Owing to the fact that, infectious droplets could readily attack human conjunctival epithelium, COVID-19 can be transferred by contact with the mucous membranes lining the eyes. Hence, protective glasses or face shield should be used during the treatment to cover the eyes from aerosols and debris produced throughout the treatment and should be disinfected between patients visits.[1]

2. Face masks: In the covid 19 era , where pathogen measures around 120 nm (0.12 □m) and aerosol particle sizes range from 3–100 nm, Respiratory Protective Devices such as a National Institute for Occupational Safety and Health - certified N95, European Standard Filtering Face Piece 1 (EU FFP1), European Standard Filtering Face Piece 2 (EU FFP2) should be used. The FFP1 and FFP2 masks are available with or without an exhalation valve, and FFP3 masks always have a valve. Considering that the air flow is filtered in the inhalation phase, but not filtered during exhalation (which is expelled from the valve), the infection risk is moved from operator to patient in that case.[3]

Reduce Aerosol Production

Arther et al suggested the use of disposable (single use) instrument where possible. It is emphasized to minimize the use of aerosol generating high speed airotor handpieces, ultrasonic instruments and 3-way syringes along with saliva ejectors to reduce the production of droplets and aerosols during the outbreak.[9]

- Slow speed micromotors with contra angle hand-pieces should be preferred.
- High vacuum extra oral suctions used in conjunction with high speed saliva ejectors, should be made mandatory to minimize aerosol dissemination.
- Furthermore, handpieces must be equipped with anti-retraction anti-re□ux devices to avoid contaminations, thus improving the risk of cross-infections.[7]

The 4-handed technique is beneficial for controlling infection. The use of saliva ejectors with low or high volume can reduce the production of droplets and aerosols (Kohn et al. 2003; Li et al. 2004; Samaranayake and Peiris 2004.[5]

SPECIFIC MEASURES:

- It is of utmost importance to maintain strict sanitization and disinfection protocols for the dental lab as well as the lab technicians.
- Dental office and the waiting area should be well ventilated at all times along with spaced out seating of patients.
- Using rubber dam during crown preparation should be taken into consideration.[1]
- All prosthodontics material such as dental prosthesis, impressions etc when removed from the patient's mouth should be completely disinfected by an intermediate-level disinfectant.[1]
- Choose and modify trays to have the proper size for making the impression to prevent coughing or gagging. Using oral mucosa anesthesia to the throat is a good option for extremely sensitive patients.[9]
- Techniques of dental implant placement surgery with ow-velocity protocols and the absence of saline irrigation can be used to decrease the aerosol production. Advances in technologies such ascomputer-aided design/computer-aided manufacturing and three-dimensio nal printing systems and use of surgical guides can shorten dental implant surgical time and in turn the time of exposures.[10]

DISINFECTION

Table -1

Disinfection of dentures at home		
Soaking of denture in 3% Hydrogen Peroxide for 30 mins	Soaking in 0.2% Chlorhexidine gluconate for 10 mins (More potent than Sodium hypochlorite)	100% Vinegar (acetic acid) for 6-8 hours

Table - 2

Disinfection of impressions		
Alginate- 0.5% Sodium Hypochlorite or iodophors or 2% Glutaraldehyde	Zinc-oxide eugenol impression paste – 2% Gluteraldehyde or Chlorine compounds	Elastomeric impression materials – 2% Gluteraldehyde or Cidex

Table - 3

Disinfection of trays and cast		
PREFER DISPOSABLE TRAYS- metal trays to be autclaved	Plastic trays/ Bite rim 2% Gluteraldehyde solution for 10 mins	Dental casts & die can be immersed in Sodium Hypochlorite for 10 mins

After each patient's visit; surfaces, equipments including hand pieces should be thoroughly disinfected particularly around the operating sites using surface sanitizers (confirmed against COVID 19) that includes 62%–71% ethanol, 0.5% hydrogen peroxide, and 0.1% (1 g/L) sodium hypochlorite should be done.

Disinfection of laboratory equipments surfaces and prostheses

It is of prime importance that dental impressions, casts, prosthesis or appliances should be thoroughly disinfected prior to handling both at the clinic or operatory, on acceptance of the work at the lab and prior to delivery.[1,11]

- Dental prostheses should be stored in diluted mouthwash and not in disinfectant before insertion.
- Laboratory surfaces can be disinfected using the disinfectant spray or surface wipes.
- Separate polishing attachments should be kept for all cases coming in the lab.
- The lathe machine , articulators should be cleaned and disinfected daily.

CONCLUSION

The primary moral response is to save lives, COVID-19 pandemic is associated with increased possibility that Dental clinicians will be exposed to COVID-19 infected patients. Considering this, we need to support each other in our professional family, reduce patie nt contact, restrict the generation of aerosols and use the best protective measures.

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