

A Method for Prevention of Spread of Novel Coronavirus (COVID-19) in a Dental Clinic

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ABSTRACT

Aim: The aim of this study is to give the clinician information related to the prevention of cross-infections in the dental clinic. In a dental office setup, there are high chances of clinician and other noninfected patients to get contaminated by saliva mixed with blood, pus, plaque, and crevicular fluid is often aerosolized and spattered, thus exposing the dental professional to potentially infectious agents mainly the novel coronavirus 2019. Prevention should be made mandatory because microorganisms are always mixed with these body materials and they cause infectious and transmissible disease. In this circumstance, it becomes mandatory for the dental professional to follow the universal precautions and treat every patient safely.

Conclusion: The dentist must hence be aware of these precautions and should mandatorily follow the infection control protocol in his dental setup.

Keywords: Coronavirus, Hand wash, Sterilization, Universal prevention, Waste disposal.

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INTRODUCTION

The novel coronavirus 2019 (COVID-19) was caused by SARS-CoV 2 a positive-sense single-stranded RNA virus from the family coronaviridae. COVID-19 outbreak of respiratory illness caused by the novel (new) coronavirus that was initially reported in Wuhan City, Hubei Province, China and which continues to spread and expand. On January 30, 2020, the International Health Regulations Emergency Committee of the World Health Organization (WHO) declared the outbreak and has been designed as a pandemic and Public health emergency of international concern.

Considering the rate and potential of spread of this disease among public health workers including the dental professionals and the dentist should be cautious enough not to become a potential carrier and protect the working area or the dental office from being a source of this disease which may lead to nosocomial infection. During the routine dental procedures to our patients, the amount of aerosol generated and the handling of sharp instruments can be a potential source of cross infection and make us the high-risk group prone to the virus attack.

TRANSMISSION OF NOVEL CORONAVIRUS

The virus is more likely to spread from person-to-person during close contacts (about 6 ft). The infection gets transmitted mainly via respiratory droplets that are generated from the infected person during coughing or sneezing, similar to how other respiratory diseases are spread like influenza. Droplets that are released from the infected person will be inhaled into the lungs or get landed in the mouths or noses of a noninfected person who is nearby or in close contact with the infected individual. And it is unclear that how a noninfected person can get COVID-19 by touching a surface or object that has the virus on it and by touching their own mouth, nose, or possibly their eye. The virus tends to bind the normal cell and hijack the cell and turns it into a virus factory. Wrapp et al.¹ identified that COVID-19 makes use of a densely glycosylated spike protein a trimeric class I fusion protein that undergoes a substantial structural rearrangement to fuse to the cell membrane (Fig. 1).

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Symptoms of COVID-19

Guan et al.³ conducted a study and found that the incubation period for this disease is 4 days. The symptoms include fever 88.7%, cough 67.8%, nausea and vomiting 5%, and diarrhea 3.8%. The median time from the onset of disease to dyspnea is 8 days.

Diagnosis

The diagnosis of COVID-19 is as given in the flowchart (Fig. 2).

Preventive Measures in Dental Clinic

During the oral examination, the patient is asked to rinse the mouth with an antimicrobial mouth rinse to reduce the microbial load in the oral cavity (Kohn et al.⁴; Marui et al.⁵). The dental procedures that are more likely to induce the chances of coughing should be performed cautiously or avoided (WHO 2020a). The use of a 3-way syringe and airtor handpiece that generates aerosol should be avoided or minimized as much as possible. If it is necessary to perform these procedures with a handpiece and 3-way syringe, the healthcare providers in the room should wear a personal protective kit which includes N95 masks, eye protection, gloves, and gowns compulsory. Air from this room should be exhausted directly to the high-efficiency particulate air filter before recirculation.

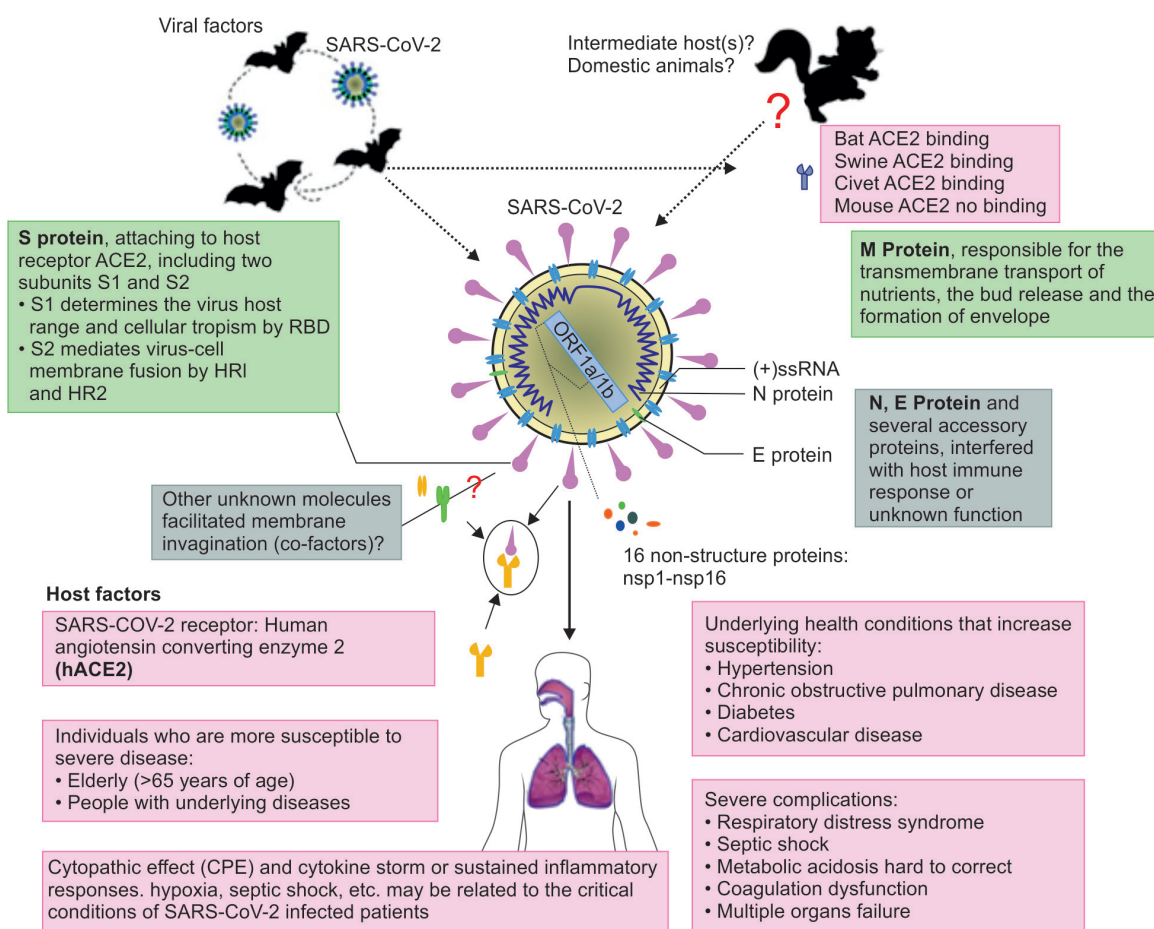


Fig. 1: Virus and host factors influencing pathogenesis (adapted from Guo et al.²)

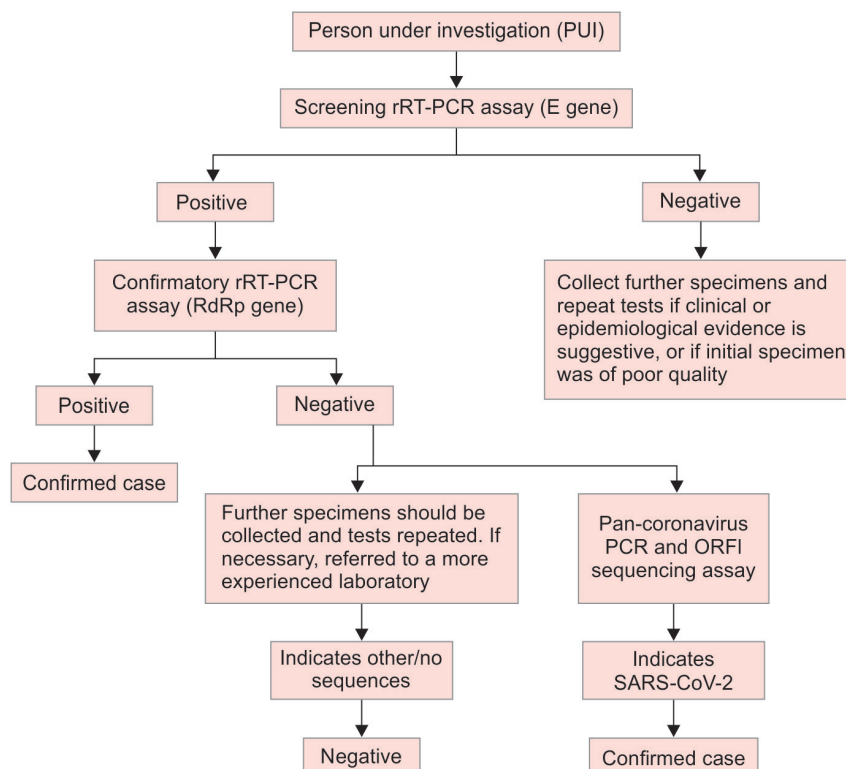


Fig. 2: Laboratory procedure following the specimen collection

According to Vandenberghe et al.⁶ intraoral x-ray radiographic technique which is commonly using in dental imaging can stimulate saliva secretion and coughing. Therefore, it is advisable to perform extraoral dental radiographic techniques such as the use of panoramic radiography and cone-beam computed tomography which are appropriate and are safe alternatives during the outbreak of COVID-19.

During the treatment of dental emergency cases to minimize the release of aerosol or spatter, it is advised to use rubber dams⁷ and high-volume saliva ejectors.

Personal Protective Equipment (PPE)

PPE is equipment or specialized clothing worn by a healthcare worker for protection against a hazard. PPE should be in accordance with the OSHA regulations which are as follows:

- CATEGORY 1—Involve exposure to blood, body fluids, or tissues. The employees in this category are instructed to use appropriate protective measures, e.g., dentist, dental assistant, dental hygienist, lab technician.
- CATEGORY 2—Involve no exposure to blood, body fluids, or tissues; however, unplanned category 1 tasks may occasionally be required. The employees in this category should be provided with appropriate protective measures readily available, e.g., workers who may help clean up the office, handle instruments or impression materials, or send dental materials to the laboratory.
- CATEGORY 3—Involve no exposure to blood, body fluids, or tissues, e.g., receptionist.

Sterilization

Common methods that are employed in office sterilization in dentistry include:

- Autoclaving: Long cycle—121°C for 15 minutes at 15 psi, short cycle—134°C for 3 minutes at 30 psi.
- Instruments sterilized are stainless steel instruments, handpieces, cloth goods, glass slabs, dishes, plastic suction tips.
- Chemoclaves: It consists of the use of a combination of liquid chemicals (with <15% water). The parameters for sterilizing are 131°C for 30 minutes at 20 psi
- Instruments sterilized are hand instruments, handpieces, carbon and diamond burs, orthodontic wires, endodontic instruments.
- Hot air oven 160 to 170°C for 1-hour instruments disinfection.
- Instruments and operator surfaces can be classified as
 - o Critical: Instruments that penetrate tissue or touch bone, e.g., scissors, forceps, elevator, scaler. These must be autoclaved.
 - o Semicritical: Instruments that touch mucous membrane but do not penetrate, e.g., mouth mirror probes, tweezers, amalgam carrier. Can be either autoclaved or subjected to high-level disinfection
 - o Noncritical: Instruments that contact only intact skin, e.g., spatula, mixing slab, and protective eyewear. These should be subjected to intermediate-level disinfection.

Surfaces to be barriered: This includes light handles of electrical or mechanical controls of the dental unit, and headrest and armrest unit controls of the dental chair. High-speed handpiece couplings and hose, slow speed motor, coupling, and hose. Air/water syringe saliva ejectors, handpiece, and hose. X-ray unit handles and cone bite blocks of the panoramic X-ray unit intraoral digital sensors Radiovisiography equipment.

Table 1: Waste category treatment and disposal

Category	Waste	Disposal methods
Category 1	Generated human anatomical waste (human tissues, organs, body parts)	Incineration/deep burial
Category 2	Generated animal waste (animal tissues, organs, body parts carcasses, bleeding parts, fluids, blood)	Incineration/deep burial
Category 3	Generated microbiology and biotechnology waste (waste from lab cultures, research and infectious agents from research and industrial lab)	Incineration/deep burial
Category 4	Sharps (needles, syringes, scalpel, blades, glass)	Incineration/disinfection treatment/mutilation
Category 5	Medicines and cytotoxic drugs	Incineration/destruction and disposal in secured landfill
Category 6	Solid waste (blood and body fluids)	Autoclave/chemical treatment/burial
Category 7	Solid waste (disposable items)	Autoclave/chemical treatment/burial
Category 8	Generated liquid waste (waste generated from lab, and washing, cleaning, housekeeping, and disinfecting activities)	Disinfection/chemicals/discharge into drains
Category 9	Incineration ash	Disposal in municipal landfill
Category 10	Chemical waste	Chemical treatment/secure landfill

Dispose of Contaminated Waste Safely

Clinical wastes that are generated in the dental clinic which includes blood-soaked gauzes, cotton rolls, extracted teeth, tissue waste, and contaminated sharps such as needles, surgical blades, etc., should be placed in a leak-proof containers or bags that are color-coded or labeled. These containers or bags are tightly sealed and disposed safely as mentioned in (Table 1) to prevent leakage during handling, storage, and transport.

Color Coding and Type of Container

YELLOW (plastic bag) Categories 1, 2, 3, and 6

RED (disinfected container/plastic bag) Categories 3, 6, and 7

BLUE/WHITE (plastic bag, puncture-proof container) Categories 4 and 7

BLACK (plastic bag) Categories 5, 9, and 10 (Table 1)

Infection Control Program for Dental Assistant

The staff must be trained based on following OSHA regulations.

This includes the proper use of universal protection procedures which include PPE, the meaning of color-coding, biohazard symbol, precautions to follow in handling contaminated articles or infectious waste and action required, and who to contact if unplanned and proper work practices and their limitations.

DISCUSSION

Due to the rampant increase in the spread of SARS-CoV-2 as a pandemic increases the likelihood and risk for the dental healthcare professionals who treat this subset of the patient population. To minimize the spread of the virus and its associated diseases, universal precautionary measures are crucial. As further precautions, careful prescreening of patients and additional measures are necessary if treatment of patients with confirmed COVID-19 is deemed necessary.

CONCLUSION

Dentists as healthcare professionals have the duty to protect the general and public population and maintaining a high standard of proper infection control and care. This new emerging pandemic SARS-CoV-2 threatens the worldwide population and can become a more common communicable infection and less pathogenic, and it is predicted to persist in the population as a less virulent infection with milder symptoms, if it follows the same evolutionary pattern of the other coronavirus infections (i.e., SARS-CoV and MERS-CoV). Thus, it is important to make informed clinical decisions and be aware and help in educating the general population to prevent panic in these circumstances and while promoting their health and well-being of the patients during these challenging situations.

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