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Armamentarium for Reduction of Transmission of COVID-19 Infection in Dental Operatory

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ABSTRACT

The Pandemic of Novel Corona Virus Disease which emerged in December 2019 in WUHAN city is having an overshadowing impact on everyone's life. Its mode of spread is primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. Research labs are joining forces to find a therapy and a preventive vaccine. Preventive and extraordinary safety measures are crucial to reducing the spread of SARS-CoV-2(severe acute respiratory syndrome coronavirus 2) among health care professionals (HCP). HCP performing or assisting aerosol-generating procedures are classified as 'very high exposure risk' workers. Dentists are one among higher risk HCP as they deal with oral cavity problems. This is because most of the procedures are involved with aerosol production in dentistry and saliva is the best medium for the dwelling of Covid-19. So, along with the use of standard preventive measures in reducing the transmission of COVID -19 it is essential for dental offices to change the operating modes. As we all know 'Prevention is better than cure' In this article, we reviewedauxiliary armamentariums required for prevention of transmission of Covid-19 infection to be used by dental health care professionals while providing urgent dental care to the patients. Currently, in the absence of a rapid diagnostic device with high sensitivity/ specificity and without an effective therapy or vaccine against SARS-CoV2, it is strongly recommended to treat each patient as a COVID-19 positive. So that Appropriate safety measures will protect both dental professionals and patients in transmitting this pandemic disease.

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INTRODUCTION

Corona virus disease 2019 (COVID-19) clinically manifest as the severe acute respiratory syndrome coronavirus 2 (SARS-COV-2) [1]. dental professionals are at greater risk as their treatment deals with oral cavity problems and saliva is the best medium for dwelling of COVID-19 viruses. Dental patients and professionals are at high risk to expose covid -19 infections, because of Dental procedures using drills or ultrasonic devices cause aerosol release, thus, most often exposure to saliva (droplets, aerosols), blood, working position with patients, face to face communication can spread disease and also contaminates the dental clinical environment [1 -6].

The routes of transmission of COVID-19 in dental practice are:

- 1. airborne spread
- 2. Contact spread
- 3. contaminated surface spread

Although many routine precautionary measures to reduce the transmission of COVID-19 infection; there are some other armamentarium required for prevention of transmission of COVID-19 infection. In this article we discussed various

auxiliary armamentarium required for prevention of transmission.

1. AUTOMATIC HAND SANITIZER DISPENSERS [7]

Generally, manually operated hand sanitizers were dispensed in dental clinical premises. [Figureure 01] In this type, the risk of contaminated surfaces can be a potential source of corona virus transmission. Therefore, electrically operated with sensor attached automatic hand sanitizer dispensers is more advantageous.



Figure 01

2. NON-CONTACTINFRA-RED THERMAL DEVICE [1-8]

Patients reporting dental clinics may or may not exhibits the classicclinical features of covid-19 infections, in both conditions the use of non-contact infrared thermometer helps to record the body temperature with maintaining a distance of 3-15cm away from the patient.[Figure 02] The advantages are:

- a. Most comfortable to patient and operator
- b. Does not come in contact with patient body
- c. Helpful in mass screening [2].



Figure 02

N99 -(FFP3) FACE MASK WITH (PAPR'S) POWDERED PURIFYING RESPIRATORS [1,3,7,9]

N95 masks are also called as a respiratory mask and N99 mask made up of millions of microfibers of polypropylene layered on top of each other that have been permanently electrostatically charged. [Figureure 03] N95 means that mask can filter off at least 95% of particles which are 0.3microns, while N99 means it can filter off 99% of these particles. The corona virus is between 0.06-0.14 microns in diameter [3].



Figure 03

4 TRIPLE PROTECTION GOWNS AND FACE SHIELDS [2,3,6,8]

Gowns are the second most used piece of PPE, following gloves, in the health care setting. Isolation gown covers the torso and clothing, and poses a physical barrier to the transfer of micro-organisms and other materials. [Figure 04] They were made of 100% or 1:1 cotton and polyester. The fabric used in manufacturing these gowns mainly based on single use gown(disposable) or multiple time use gown reusable). Triple layered protection gowns and headcaps are recommended to prevent fomite based transmission. This is mandatory for the clinicians who perform aerosol generating procedures on patients with suspected or confirmed covid-19 cases and are advised to wear full face shields or visors not just eye protection. These protections should also be used

whenever patient condition is unknown. Proper donning and doffing of PPE should be followed to prevent transmission of novel corona virus.







Figure 04

5. **HEPA FILTERS** [5,6,8]

High-efficiency particulate air (HEPA). High efficiency particulate absorbance particulate and arrestance.[Figure:5] Filters meeting the HEPA standard must satisfy certain levels of efficiency. Composed of mat of randomly arranged fibers. These fibers are typically composed of fibreglass and possess diameters between 0.5 and 2.0 micrometres. The key factors affecting its functions are fiber diameter, filter thickness, and face velocity. The air space between HEPA filter fibers is typically much than 0.3micrometers.so in dental greater environments where there are more aerosol generating procedures are done, the droplets become aerosolised particles and this lie in a very fine mist in the air for a longer periods.



Figure 05

6. ARBAT SAFETY BOX FOR TRAUMA CARE [10]

This is recently designed safety box for performing difficult bronchoscopy in procedures in suspected or confirmed COVID-19 patients.[Figure:6] This box mainly helps in prevention of aerosol transmission from patient to doctors and other health care workers during surgical procedures. And this box can be easily disinfected and reusable.



Figure 06

7. PLASMA AIR STERILIZERS [6,7,9]

Plasma is 4th state of matter.A gas composed of electrically charged ions and electrons rather than neutral atoms.[Figure:7] This didn't destroy the virus but rather altered its ability to infect. Plasma air sterilisers can run continuouslyfor air disinfection in an environment with more human activity.So these can be used in office rooms and waiting rooms.



Figure 07

8. FOGGER MACHINE [10]

A fog machine, fog generator, or smoke machine is a device that emits a dense vapour that appears similar to fog or smoke. [Figure 08] This artificial fog is most commonly used in professional entertainment applications, but smaller, more affordable fog machines are becoming common for personal use.

Fog is created by vaporizing proprietary water and glycol-based or glycerin-based fluids or through the atomization of mineral oil. Fogger machine with sodium hypochlorite can be used efficiently in sterilizing the frequently contacting surfaces like dental chairs, door hangers,tables, cloths. These can be repeated 2 to 3 times a day in clinic to minimize the transmission of COVID-19 virus in dental clinic.



Figure 08

9. PERSONAL PROTECTIVE EQUIPMENT

It is mandatory to use personal protective equipment in health care system to prevent transmission of covid-19. [Figure:9]There are various PPE designs according to the level of protection needed.



Figure 09

10. HAZMAT SUIT

Apart from current respiratory protocol for the aim of facial surgeons there is a level 2 hazmasuit free from atmospheric air breathing to protection from virus.[Figure 10] This can be specially useful for the surgeons who deals with aerosol generating procedures and emergency dental treatment for COVID positive patients.



Figure 10

CONCLUSION

Proper Personal protective care and maintenance of environmental surfaces by using various disinfecting procedures is fundamental in reducing transmission of infection control. Use of special armamentarium acts as adjunct to standard infection control protocol will aid in reduction of transmission in this pandemic.

AUTHORS CONTRIBUTION

All authors contributed to the study. YSS Sruthi and v chakradhar performed literature search and participated in manuscript design, PSHL Parvathi and P Vinay Kumar participated in manuscript design and wrote the manuscript, BL Rao supervised the project and reviewed the article for spelling and grammar. All authors proofread the final manuscript.

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CONFLICT OF INTEREST

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