

Cost-effective Methods of Approaching a Dental Unit for Covid-19 Pandemic

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Abstract

With the alarming rise in Covid-19 cases across the globe and the high risk of dental professionals to the Sars-Cov-2 virus, there is an urgent need to think out-of-the-box solutions for managing a dental setting. Physical barriers and infection control measures must be placed to prevent the rapid spread of virus in a dental unit. The paper discusses the various cost effective ways of utilizing resources at a dental premise that can help the dental professionals to prevent the spread of the Sars-Cov-2 virus.

Keywords: Covid-19, Dental Clinic, Physical barriers, Sneeze Shields, Sars-Cov-2 virus, Visors.

INTRODUCTION

With the worrying rise in the number of Covid-19 cases across the world, there is a palpable need to address innovative ways of preventing the spread of the virus at the workplace. Amongst the personnel who face the maximum risk of Covid-19 infections, are the dental professionals. The profession and the vicinity of the professional at the workplace premise often dictate one's susceptibility to infectious diseases.¹⁻³

Following the infection control protocol at the dental premises is crucial to sail through the Covid-19 pandemic. Given the potential for contagious transmission of the Sars-Cov-2 virus, the dental units must be re-designed to prevent the viral spread. Novel efforts in containing the viral spread in medical profession were addressed globally such as the use of train coaches as make shift hospitals in India, and drive through testing clinics in South Korea. Digital tools and media have been hugely successful in knowledge sharing and in overcoming the social distancing challenges in every discipline.⁴ In the following sections, various cost effective ways of addressing the Sars-Cov-2 virus in a dental setting is discussed.

THE ELBOW CARE

Typically, the entrance to the dental department has the most common design of door handles that generally accommodates hands to hold onto and

open the doors. Amidst the Covid-19 pandemics, a number of new designs have been proposed to enable elbow support, shown in Fig. 1.^{5,6}

Elbow support helps through avoiding use of hands or fingers to be in contact with the handles and hence, can help in reducing the touch and prevent the spread further. 3D printed handles customized for the available door handles can be produced to achieve non-contact handling.



Fig. 1 Elbow handle attached to the door handle

SNEEZE SHIELD

A sneeze shield is a Plexiglas acrylic shield, shown in Fig.2 is a physical barrier used to bind the airborne droplets from a person's coughing, sneezing or speaking. The shields are typically made of polycarbonate, and are designed when the six feet social distancing rules cannot be followed strictly at workplaces.⁷ the

sneeze shield could be placed at the reception desk of a dental clinic and hence, keeps the receptionist or the dentist away from the approaching patient. Though sneeze shields can be put in place at the workplace, use of basic hygiene protocols such as wearing of mouth masks and hand hygiene must not be undermined.



Fig.2 Sneeze shield at a reception desk

POP TUBES FOR SUCTION

Pre-procedural povidone iodine mouth wash with the use of aerosol reducing units such as high volume evacuators (HVE), rubber dam and the use of anti-retraction valves in dental hand-pieces can effectively reduce the aerosol splatter in the dental unit.⁸⁻¹³ HVE is a suction device that helps to remove air a specific volume of air for a specific time period, such as 2.83 m³ per minute. HVE is effective in removing the contaminated dental aerosols by about 90% and reducing the colony forming units. The device must be held at a good distance (approximately 6–15 mm) from the aerosol generator such as the hand-piece. However, HVEs have limitations such as requirement of four handed dentistry, difficulty in handling the bulk suction hose and the attachments. HVE devices attached to the operating instrument and various “dry field” devices that attach to an HVE have been commercialized in the dental market but are expensive.¹⁴⁻¹⁹

Pop tube suction can be used as an aerosol reducing unit with a funnel cones, placed within 10 inches of the patient sitting on the dental chair. Though may not be a substitute for high volume

suction, however, it is cost effective while treating patient one on one patient. Its effectiveness in reducing the aerosols compared to the HVEs must be further explored.

COLOR SPRAYS FOR DISINFECTION

Color sprays are typically used with an air compressor for the purpose of coloring or painting surfaces, shown in Fig.3. In a dental setting, color sprays can be connected to the compressor hose and the disinfectant can be used instead of the color paint. The disinfectant spray can reach the most inaccessible surfaces on the dental chair and the surrounding clinical and house-keeping surfaces. Its clinical effectiveness, in reducing the colony forming units of the microbes must be investigated further.



Fig.3 Color spray gun for disinfection

HANDLES FOR DENTAL UNITS

Though a typical dental unit must be ergonomically designed to prevent cross-infection, few premises still follow the hand handles instead of the foot or elbow handles for wash basins. These errors can be converted by installing acrylic holders attached to the handles to further prevent hand touch and cross-contamination. Barriers for light handles such as plastic wraps or foils and acrylic extensions for elbow handle can also be designed for the same. Push through handles can be designed for the instrument trays as often instrument trays are pulled through during the dental procedures. Technological innovations such as contact less sensors on the trays can be more effective in reducing the number of fomites.

DO IT YOURSELF VISORS

A4 acetate sheet used for overhead projector presentations is a popular tool used as regular face mask. Its cost effectiveness and easy to use from the general office stationery makes it do it yourself by any individual. Though its effectiveness in protection, cross-contamination and comfort of the user is yet to be tested, it can act as a potential physical barrier to spread of the viral transmission.⁴

PLASTIC BARRIERS

Plastic barriers with zipper doors between the dental chairs and the anterooms can help to reduce the aerosols generated from ultrasonic scaling and aerator procedures. They were proven as effective barrier in containing the particles in dental clinics. Such plastic barriers are cheap, easy to install.²⁰ A biosafety barrier consisting of a layer of PVC film attached to a sheet of polypropylene mounted on a frame in a dental chair proved effective in reducing dispersion from the dental drill suggesting that the barrier may be a viable option to optimize biosafety in the dental environment.²¹

CONCLUSION

Various cost effective ways of utilizing resources at dental premises that help the dental professionals to prevent the spread of the Sars-Cov-2 virus is summarized.

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