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Oral Health & Dental Care: The Era of the New Norm, COVID-19 & Pre-Treatment use of Mouthrinse

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Abstract: COVID-19 is a global pandemic and has challenged lives in every corner of the world and the health services have been pushed to extraordinary levels. With personal protective equipment supplies being challenged, an overload of unknowns and a 'new norm' looming, there is an urgent need to consider different ways of working and dentistry is not excluded. There is a current need to get the dental industry back to work, but with the burden of risk associated with some of the procedures .i.e. aerosol generating procedures, a safe and responsible return is important and additional measures such as pre-rinsing with a mouthrinse has the potential to help to reduce the viral load in the mouth.

Question: *Is introducing pre-procedural mouth rinsing in the dental setting as an adjunct to recognised infection prevention and control measures pertinent to a risk reduction?*

Key Words: *COVID-19, Mouthrinse, virus, viricidal, risk*

Introduction:

Evidenced-based practice is the fundamental cornerstone of safe and effective working. What is clear is that as a result of COVID-19 there is a need to look closer at traditional and accepted ways of working, to understand the so called 'new norm' and some of the challenges ahead. This mini review will consider the use of mouthrinse as a pre-treatment rinse/gargle prior to dental care with the notion of introducing this as one of many mechanisms that has the potential to reduce the concentration of COVID-19. Notably the intention of this mini review is not to inflate the efficacy of the common mouth rinse so that it replaces any other measures, but rather that it is recognised as a contributor to reducing the burden of risk.

Background:

COVID-19 is a global pandemic and (PHE, 2020), it is apparent from the World Health Organisation (WHO, 2019) that there are currently no drugs licensed for the treatment or prevention of COVID-19 (MHRA, 2020), however recognising that drug trials are ongoing. There are reports of many unknowns, but what is known is that it is an infectious disease and that individuals are likely to experience mild to moderate respiratory illness. It has been identified that COVID-19 is an 'enveloped virus' and is transmitted through respiratory droplets and fomites. i.e. touching of surfaces or objects (O'Donnell et al. 2020). It is also suggested that it affects those with underlying medical problems most seriously and there is evidence that it is

affecting more males than females and those of black and minority ethnic groups, as well as older individuals, but the young have also been affected.

As we look to a safe and responsible return to work and the 'New Norms' many questions will be asked, and unknowns will exist.

One of the major challenges that we face within the dental profession is the risk associated with workplace activity especially i.e. aerosol generating and exposure procedures. How and when we move towards being able to undertake such procedures, we now know should reflect a risk-based approach and meet current guidance, ensuring the safety of the patient and the team (FGDP, 2020). The practice of dentistry is likely to take on a new narrative and move through various stages in response to the needs of the patient and the team, whilst considering the COVID-19 instruction. The priority is to gain the confidence of the public and the profession in order that oral health wellness is maintained, and necessary dental care can be provided safely.

Covid-19 and the Mouth

Strategies to reduce the number of infective virus particles in mucous membranes through promoting their removal or inactivation, could contribute to reducing the risk of transmission. Emerging studies increasingly demonstrate the importance of the throat and salivary glands as sites of virus replication and transmission in early COVID-19 disease.

We also know that viral load is an important consideration related to the severity of COVID-19 (Pan et al.,2020). In this sense, it is postulated that if the pathogenic load in the mouth and throat is reduced, the amount of virus that can be expelled by the carrier is temporarily reduced, and thus reduce the risk of it infecting others

The Use of Pre-Treatment Mouthrinses

One of the many risk mitigants to consider is the use of an appropriate mouth rinse and gargle prior to any assessment, screening or treatments, in order that the viral load is at least disrupted and potentially temporarily reduced. There are some studies that have looked more closely at this, one that currently stands out is articulated in the paper by O'Donell et al., 2020

There is no direct evidence of the possible impact of pre-operative rinsing with oral antiseptics on the SARS-CoV-2 oral viral load. Additionally, the likely impact of a daily use antiseptic on the viral transmissivity is also currently unknown. However, the possible beneficial effect of using an oral antiseptic during the viral infection may be indirectly assessed by evaluating the in vitro antiviral activity of the most common agents.

This review considers the agents most frequently recommended for pre-treatment rinsing in the current protocol and looks at the evidence supporting their use:

1.5% Hydrogen peroxide (H_2O_2)

Studies, including a recent systematic review, report that coronavirus 229E and other enveloped viruses are inactivated by hydrogen peroxide at concentrations around 0.5% (Kampf 2020, Omidbakhsh 2006). However, these studies look at the disinfectant effect on surfaces and not the oral environment where hydrogen peroxide is rapidly inactivated due to the presence of host- and bacteria-derived catalase activity in saliva and other endogenous peroxidases (Kraus, 1958). To date anti-viral properties have only be seen in vitro.

Also, to be considered is the practicality of gargling using a formulation that 'foams up' and the impact on patient compliance.

Available mouthrinses of which H_2O_2 is a primary active ingredient: Colgate Peroxyl.

1% Povidone Iodine (P1)

Povidone-iodine (PVP-I) mouthwash has been widely studied in relation to broad spectrum antimicrobial and viricidal actions. There have been limited studies on the efficacy of PVP, however one, using the 0.23% concentration used in Japan found that it rapidly inactivates SARS-CoV, MERS-CoV, influenza virus A (H1N1) and rotavirus in vitro (Eggers, 2018). A second study also showed that PVP-I (0.23%) is equivalent to 70% ethanol in inactivating SARS-CoV in vitro (Kariwa, 2006).

It should be noted that this mouthwash is not available in the UK, although may still be purchased in Germany and other countries. As a 1 % solution, PVP-I is available in Hong Kong, Korea, Singapore, Malaysia, Philippines and Taiwan.

According to Howe (2020) both of the above have good virucidal properties, but poor microbial substantivity, with benefits being lost rapidly as saliva flow may replace the virus.

Available mouthrinses of which P1 is a primary active ingredient: None known.

Cetylpyridinium Chloride (CPC)

Cetylpyridinium Chloride (CPC) is a Cationic quaternary ammonium compounds with demonstrated anti-bacterial, anti-plaque and anti-gingivitis products. Notably, according to Popkin et al. (2017), there are both vitro and in vivo studies that show CPC with in vitro EC50 being 5-20 µg/ml to have a viricidal and preventative activity against some viruses, including strains of Coronovirus by altering and disorganising the lipid membrane. CPC does not cure or prevent individuals becoming infected but has the potential to help reduce the burden of risk.

Mukherjee et al. (2017) conducted in a pilot, double-blind, randomized, placebo-controlled clinical trial, a CPC-formulated and inhaled product was evaluated to prevent the onset of upper respiratory tract infections, caused by influenza virus, respiratory syncytial virus, human metapneumovirus, rhinovirus and adenovirus. It was observed that in treated patients they suffered viral infections with less severity and duration of viral episodes

CPC is used in medicated oral rinses at concentrations 0.025-0.075% w/v (250-750 µg/ml) in the UK and has been shown to be substantive for 3-5 hrs after use.

Available mouthrinses of which CPC is a primary active ingredient: PerioAid Active Control, VITIS Gingival and VITIS Orthodontic.

Chlorhexidine

Chlorhexidine is a biguanide antiseptic and disinfectant with action against a wide range of gram-positive and gram-negative bacteria, optional anaerobic, aerobics and yeasts. In terms of anti-viral activity there is insufficient evidence to support the efficacy of CHX, however a recent meta-analysis evaluate the efficacy of preprocedural mouthrinses in reducing the number of microorganisms disseminated by means of the aerosol generated via dental procedures, demonstrated that mouthrinses with chlorhexidine, and cetylpyridinium chloride significantly reduced the number of colony-forming units in dental aerosols (Marui et al. 2019).

Available mouthrinses of which CHX is a primary active ingredient: Corsodyl, Curasept & PerioAid Intensive Care.

Conclusion

The use of an antiseptic mouthrinse, both as a single pre-procedural use, or as a daily use during a limited period of time, may impact the transmission and/or pathogenicity of SARS-CoV-2, since they have the potential to disrupt the virus envelope and may reduce the oral viral load:

- decreasing disease severity
- decreasing the risk of transmission – both via aerosols during dental treatment but also as droplets generated when breathing, speaking and sneezing.

In the absence of direct evidence from well-designed clinical trials we must look to the available indirect evidence and make informed decisions, considering the mouth rinse and gargle as an adjunct to recognised infection prevention and control guidance.

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