RU Revista Uningá

Revista Uningá, v. 59, eUJ4327, 2022
doi.org/10.46311/2318-0579.59.eUJ4327

ISSN 2318-0579

Health Sciences and Biological I, II, III

Use of preoperative mouthwash during the pandemic: report of the Dental Clinic

Uso de enxaguatório bucal pré-operatório durante a pandemia: relato da Clínica Odontológica

Anna Julia Santiago Campanelli[1], Martina Andreia Lage Nunes[2], Debora Lopes Sales Scheffel[1], Raquel Sano Suga Terada[1], Suzana Goya[1], Carina Gisele Costa Bispo[1]

[1]State University of Maringá – UEM, Maringá, Paraná, Brazil.
[2]North Paraná State University- UENP, Jacarezinho, Paraná, Brazil.
*ajscampa@gmail.com

ABSTRACT

The angiotensin-converting enzyme receptor 2, the main target of the SARS-CoV-2 virus, is abundant in the oral cavity, making it a reservoir for the pathogenicity of the COVID-19 disease. Thus, the use of mouthwash prior to dental care has been adopted by several institutions, with chlorhexidine, cetylpyridinium chloride, povidone-iodine, and hydrogen peroxide being the most commonly described solutions. The objective is to report the experience of the Maringá State University Dental Clinic (COD-UEM) as to the adoption of a protocol for the use of mouthwash in practical activities during the pandemic. Although there are no recommendations from the Ministries of Health, the World Health Organization or scientific evidence that this practice acts preventively, as in other services, the COD-UEM, in the biosafety protocol of the plan to resume undergraduate clinical activities during the pandemic, started to adopt mouthrinses with chlorhexidine 0.12%, which can be replaced by hydrogen peroxide 1% or povidone-iodine. It was concluded, based on the experience described, that despite the scarcity of scientific evidence, the use of mouth rinses is a resource often used to reduce the number of microorganisms in the oral cavity during treatment, and it is important to consider its use until further research is conducted.

Keywords: Clinical Protocols. COVID-19. Dentistry. Pandemics.

RESUMO

O receptor da enzima conversora de angiotensina 2, principal alvo do vírus SARS-CoV-2, é abundante na cavidade bucal, tornando-a um reservatório para a patogenicidade da doença Covid-19. Assim, o uso de enxaguatório bucal previamente ao atendimento odontológico foi adotado por diversas instituições, sendo a clorexidina, o cloreto de cetilpiridínio, a iodopovidona e o peróxido de hidrogênio as soluções mais descritas. Objetiva-se relatar a experiência da Clínica Odontológica da Universidade Estadual de Maringá (COD-UEM) quanto à adoção de um protocolo de uso de enxaguatório bucal nas atividades práticas durante a pandemia. Embora não existam recomendações dos Ministérios da Saúde, da Organização Mundial da Saúde ou evidências científicas de que essa prática atue de maneira preventiva, a exemplo de outros serviços, a COD-UEM, no protocolo de biossegurança do plano de retomada das atividades clínicas da graduação na pandemia, passou a adotar o bochecho com clorexidina 0,12%, podendo ser substituído por peróxido de hidrogênio 1% ou iodopovidona. Concluiu-se, com base na experiência descrita, que, apesar da escassez de evidências científicas, o uso de enxaguatórios bucais é um recurso frequentemente utilizado para reduzir o número de microrganismos na cavidade bucal durante o tratamento, sendo importante ponderar seu uso até que pesquisas complementares sejam realizadas.

Palavras-chave: Covid-19. Odontologia. Pandemias. Protocolos Clínicos.

Received: March, 28th, 2022. Accepted: October, 03rd, 2022.

INTRODUCTION

At the beginning of the COVID-19 pandemic, different possible transmission routes for SARS-CoV-2 were considered. However, studies pointed to a mostly respiratory transmission, through droplet or aerosol-borne virions expelled by infected people when speaking, coughing, breathing, or sneezing. Coronaviruses are characterized as enveloped viruses of single-stranded RNA, and have a structure called "spike protein", which, when activated by proteases, interacts with the surface receptor called angiotensin-converting enzyme 2 (ACE2), thus allowing its entry into the cell (Carrouel et al., 2021).

ACE2 receptors are expressed in many parts of the body, which shows great possibilities of infection routes for the virus through tissues such as: mucosa, gingiva, non-keratinized squamous epithelium, and epithelial cells of the tongue and salivary glands (Vergara-Buenaventura & Castro-Ruiz, 2020). Furthermore, significant ACE2 expression was found in the salivary glands, especially in the minor salivary glands, making them potential reservoirs for COVID-19 infections (Reis et al., 2021). Therefore, a high presence of SARS-CoV-2 has been detected in saliva, especially at the beginning of the viral picture (Vergara-Buenaventura & Castro-Ruiz, 2020). Thus, the tissues of the oral cavity become a medium for infection and consequent spread of the coronavirus (Vergara-Buenaventura & Castro-Ruiz, 2020).

As soon as COVID-19 was raised to pandemic level by the World Health Organization (WHO), the Occupational Safety and Health Administration (OSHA, 2020) classified dental surgeons as being at high risk for SARS-CoV-2 contamination due to the close proximity between patient and practitioner during dental care and the inherent characteristics of dental treatment, such as aerosol production (Cavalcante-Leão et al., 2021). Aiming to minimize the risks by reducing the number of microorganisms in the oral cavity (Vergara-Buenaventura & Castro-Ruiz, 2020), it was suggested by dental associations around the world the use of mouth rinses in the preoperative period, essentially those containing in their composition chlorhexidine 0.12%, hydrogen peroxide 1% or povidone-iodine (PVP-I) 0.2%, with variations in the protocol of use, as a complementary strategy for protection of the dental team and patients (Moosavi, Aminishakib & Ansari, 2020; Mateos-Moreno et al., 2021).

Although the scientific evidence on the subject is still recent, some clinical studies, within their limitations, show positive results regarding the reduction of viral load in the saliva of patients with COVID-19 after the use of rinses (Seneviratne et al., 2020; Yoon et al., 2020). In addition, many clinical trials are ongoing that may provide further evidence for the adoption or exclusion of rinses in the context of COVID-19, and to date, thirty-four papers are listed as under development (U.S. National Library of Medicine, s.d.).

Therefore, many institutions have welcomed the use of preoperative antimicrobial mouthrinses to reduce the number of microorganisms in the oral cavity and to further protect the dental team and patients (Meethil, Saraswat, Chaudhary, Dabdoub & Kumar, 2021). This additional method is even more important in environments with large patient flow and multiple teams, as is the case of teaching clinics, where, despite the distance recommended during the pandemic, the reduction in the number of patients seen, the installation of physical barriers, care with environment ventilation, among others, it may not be possible to ensure complete elimination of the risk of patient contact with aerosols generated by the care of other people.

With scientific basis, the objective of this study is to report the experience of the Dental Clinic of the State University of Maringá (COD-UEM) as to the adoption of a protocol for the use of mouthwash in its practical activities throughout the pandemic as another resource in the arsenal of measures to reduce the risk of transmission of COVID-19.

EXPERIENCE REPORT

In April 2020, the teaching calendar for on-site courses was suspended by means of Resolution No. 004/2020-CEP of the Teaching and Research Council of the State University of Maringá. Thus, COD-UEM also had its activities temporarily paralyzed. In this period, the COD-UEM, along with the Commission of Dental Infection Control - CCIO, the coordination of the Dentistry course and other committees of the UEM began the preparation of a "Plan for Resumption of Activities of the COD-UEM in the Context of the Pandemic of COVID-19" which had a special biosafety protocol for the moment of the pandemic. After the feasibility of the return of practical activities, students, faculty and staff received training contemplating the complementary biosafety practices adopted in the new protocol in order to minimize the chances of transmission of SARS-CoV-2, and seek greater patient and professional safety during dental care.

Among the several measures implemented were the reduction in the number of patients seen per student, care with the ventilation of the environments, distance between the service stations, the use of specific personal protective equipment (PPE), reduction of aerosol emission, the performance of virtual triage (through a message application) with questions about the presence of signs and symptoms of influenza syndrome prior to scheduling the patient and also, in person, before the patient's admission to the clinic, among others. In this context, the use of mouthwash before the appointments, which before was done systematically, most of the time only for more invasive procedures such as oral surgeries, is now recommended for all patients.

Although the protocol provided for the possibility of using three mouthwashes, as shown in Table 1. The 0.12% chlorhexidine solution was the one preferably used in practice. The clinical step was easily inserted into the clinical routine. For infant patients or patients with special needs with difficulties to perform mouth rinses, it was foreseen to clean the oral cavity with mouth rinses and sterile gauze at the beginning of the appointment.

Table 1
Mouthwash protocol used at the UEM Dental Clinic during the pandemic period.

Options	Solutions	Time of use
1ª	Chlorhexidine 0,12%	1 minute
2ª	Hydrogen Peroxide 1%	1 minute
3ª	Povidone iodine 0,2%	30 seconds

Source: The authors.

DISCUSSION

The Pedagogical Project of the Dentistry Course of the Department of Dentistry of the State University of Maringá (UEM) has, in its curricular matrix, the disciplines of Integrated Clinic I, II and III, for the third, fourth and fifth years, respectively, which encompass all the intramural clinical activities required for graduation. Thus, the clinical care activities for the community start in the third year of the course. In order to resume the practical activities in the pandemic period, the need arose to establish a new biosafety protocol, along with the training of students, faculty and staff, the preparation of environments, patient screening, the careful use of PPE, immunization, etc. This paper highlights a complementary step, easily implementable and low-cost in the search for greater safety in the COD-UEM during the pandemic period: the use of mouthwash in pre-dental care.

Considering the scenario of a school clinic, where more than one patient can be in care at the same time, that presymptomatic patients have high viral load and are likely to transmit the disease (Ravindra et al., 2022), that even patients who present negative results for nasopharyngeal exudate evaluated by PCR may present SARS-CoV-2 in saliva (Lamas et al., 2022) and the use of equipment

that results in droplet splashing and aerosol generation, which were shown to be possible means of generating infection with the COVID-19 virus (Reis et al., 2021), the systematic use of mouth rinses was proposed, regardless of the procedure to be performed. According to Meethil et al. (2021), when infection control measures-such as preoperative mouthrinses-are used correctly, aerosolized saliva in dental care is no longer a factor that expressly amplifies the risk of SARS-CoV-2 transmission, making it moderately low, i.e., standard infection control practices are shown to be sufficient as protection for the patient and the exposed professional.

Of the rinses presented in the biosafety protocol of the UEM Dental Clinic, the first choice was 0.12% chlorhexidine digluconate (Table 1). Chlorhexidine is a broad-spectrum antiseptic, considered the gold standard in dentistry, which acts against Gram-positive and Gram-negative bacteria, aerobes, facultative anaerobes and fungi. In vitro studies indicate efficiency of CHX against viruses with lipid envelope, such as influenza A, parainfluenza, herpes virus 1, cytomegalovirus and hepatitis B (Vergara-Buenaventura & Castro-Ruiz, 2020). Its use has been shown to be an important procedure for symptom improvement in patients with COVID-19, as well as decreasing the risk of infection to health care workers who are in direct contact with them (Moosavi et al., 2020).

In a recent literature review, Chen et al. (2022) point to the controversy in the literature regarding the effectiveness of chlorhexidine against SARS-CoV-2. However, they presented one work *in vitro* (Jain et al., 2021) and two clinical studies that pointed to the ability of chlorhexidine to reduce the viral load of saliva (Eduardo et al., 2021) and oropharynx (Huang et al., 2021) of patients with COVID-19. Furthermore, Yoon et al. (2020) demonstrated that there was a transient decrease in viral load for two hours in patients who rinsed with 15 mL of 0.12% chlorhexidine, which would contribute to reduce cross-contamination during dental care. However, it is important to recognize that the exceptional moment experienced during the pandemic brought the need for rapid studies, often performed with small samples and with limitations, thus further studies are needed to improve the quality of scientific evidence regarding the effectiveness of rinses, especially chlorhexidine, in controlling the spread of COVID-19.

In the protocol used at UEM, in addition to chlorhexidine, for other indications such as allergic reactions or specific indication of each specialty of dentistry, the use of 1% hydrogen peroxide or PVP-I solution was also initially foreseen (Table 1). Other institutions also chose to use hydrogen peroxide to combat COVID-19. The Military Police of the State of Rio de Janeiro - PMERJ (2020) proposed a protocol for health units, bringing as an option of substance for rinsing the hydrogen peroxide 1%, for 30 seconds (Bezerra, Conde, Maia & Reis, 2020). Moreover, the Health Secretariat of the Paraná State Government (2020) recommended as a preventive measure the mouth rinse also with hydrogen peroxide 1% to 1.5%, 9mL for 30 seconds (Paraná State Government Health Secretariat, 2020).

An *in vitro* study showed that 3% hydrogen peroxide was able to inactivate adenovirus types 3 and 6, adeno-associated virus type 4, rhinovirus 1A, 1B, and type 7, myxovirus, influenza A and B, respiratory syncytial virus, long strain, and coronavirus strain 229; in that same study, coronaviruses and influenza were found to be the most sensitive to its action within 1-30 minutes (Vergara-Buenaventura & Castro-Ruiz, 2020). Hydrogen peroxide targets the viral lipid envelope of both viruses, and more particularly SARS-CoV-2 (O'Donnell et al., 2020). It releases oxygen free radicals and disrupts the lipid membrane (Peng et al., 2020). Thus, because SARS-CoV-2 is vulnerable to oxidation, pre-procedure mouthrinses containing oxidizing agents, such as 1% hydrogen peroxide, have been suggested to reduce salivary viral load (Vergara-Buenaventura & Castro-Ruiz, 2020).

According to what was established by the Health Secretariat of the Paraná State Government (2020), the Municipality of Maringá (2020) adopted as a protocol the use of hydrogen peroxide 1% for one minute, and added, subsequent to this, the use of chlorhexidine 0.12% for the same time. This association between chlorhexidine and hydrogen peroxide is done in order to minimize their side effects and add their beneficial properties, so that chlorhexidine would facilitate the entry of hydrogen peroxide through the bacteria cell wall and thus, it could harm the intracellular organelles (Reis et al., 2021).

However, an *in vitro* study demonstrated that hydrogen peroxide affects the cytotoxicity of chlorhexidine, thus, the use of 0.2% chlorhexidine concentration combined with 3% hydrogen peroxide was suggested (Mirhadi et al., 2014). Although this association is recommended, based on its antimicrobial action, no study related to the action against viruses, specifically, has been done so far (Reis et al., 2021). However, as time went by and more studies were published, hydrogen peroxide was showing low effectiveness against SARS-CoV-2. So that in his literature review, Chen et al. (2022) listed only one study (Eduardo et al., 2021) that showed reduction of viral load in saliva for up to 30 minutes after application of hydrogen peroxide against five works that pointed out the ineffectiveness of the substance against SARS-CoV-2. Thus, the use of hydrogen peroxide for the purpose of preventing transmission of COVID-19 has been discouraged, maintaining the preference for chlorhexidine.

With regard to PVP-I, although its use was initially provided for in the biosafety protocol of the COD-UEM, the authors are not aware that it has actually been used in practice. PVP-I is a water-soluble complex of iodine and polyvinylpyrrolidone, which can be used as a pre-surgical skin antiseptic and mouthwash (Vergara-Buenaventura & Castro-Ruiz, 2020). Its antimicrobial action occurs after free iodine dissociates from polyvinylpyrrolidone, and thus penetrates microbes to oxidize nucleic acids and disrupt proteins, which will cause microbial death (Carrouel et al., 2021). In this way, PVP-I damages the virus by disrupting various metabolic pathways and disrupting the cell membrane (Nagatake, Ahmed & Oishi, 2002). Viruses with a lipid envelope are more susceptible to its mechanism of action than non-lipid viruses (Reis et al., 2021).

Oral hygiene products based on PVP-I are considered safe, since they report a prevalence of 0.4% of allergy cases, do not cause discoloration of the teeth and tongue, nor taste alterations (Vergara-Buenaventura & Castro-Ruiz, 2020). In addition, its use does not irritate the oral mucosa during prolonged use (Cavalcante-Leão et al., 2021). As an oral rinse in the pre-dental procedure, PVP-I has its well-demonstrated efficacy in leading to a significant reduction in the viral load of SARS-CoV and MERS-CoV viruses in both droplet and aerosol forms (Moosavi et al., 2020). Also, previous investigations have shown that PVP-I antiseptic has higher virucidal activity when compared to other commonly used antiseptics such as chlorhexidine and benzalkonium chloride (Vergara-Buenaventura & Castro-Ruiz, 2020).

A recent study suggested using PVP-I 0.23% in patients with COVID-19 for at least 15 seconds pre-procedure to reduce the salivary viral load (Vergara-Buenaventura & Castro-Ruiz, 2020). Reduction of viral load in saliva was also observed by Lamas et al. (2022) in an *in vivo* test with the participation of four patients. With the same number of COVID-19 positive patients, with the use of 15 mL of PVP-I 1% as a mouthwash, for one minute, Carrouel et al. (2021) also demonstrate significant reduction of SARS-CoV-2 load. However, it is important to note that this substance is contraindicated for patients with iodine allergy, thyroid disease, pregnancy or treatment with radioactive iodine (Carrouel et al., 2021). The adverse effects most commonly related to the use of PVP-I are: temporary burning sensation, local irritation and itching (Reis et al., 2021).

In addition to the substances already mentioned, it is worth mentioning N-hexadecylpyridinium chloride (CPC), a cationic quaternary ammonium compound that is soluble in water and aqueous solutions, non-oxidizing or corrosive and highly cationic at neutral pH (Herrera, Serrano, Roldán & Sanz 2020). Some side effects have been observed when used for mouth rinsing, such as: it could cause a burning sensation on the tongue and the appearance of extrinsic stains, with the interaction of food colorants. Studies have shown its effectiveness against viral pathogens such as HPV, oral manifestations of HIV, and control of HSV-1 (Reis et al., 2021). In addition, its effect has also been analyzed in patients with influenza, and may reduce the duration and severity of cough and sore throat. Thus, there are hypotheses that CPC may have a reducing action on SARS-CoV-2 transmission, due to its lysosomotropic mechanism of action and its ability to destroy viral capsids (Vergara-Buenaventura & Castro-Ruiz, 2020).

The present study had some limitations, such as the scarcity of references on the subject and the predominance of in vitro studies over in vivo studies. Thus, we emphasize the need for quality

randomized clinical studies that assess the real effect of rinses, especially chlorhexidine, in fighting SARS-CoV-2 transmission, thus ensuring the scientific support necessary for the practice currently adopted at COD-UEM to be maintained, even in the post-pandemic period, in order to control cross-infection.

CONCLUSION

Based on the experience described here, we conclude that despite the scarcity of scientific evidence, the use of mouth rinses is a simple, low risk, and low-cost strategy for complementing the other biosafety strategies established before and during the pandemic to minimize the risks of SARS-CoV-2 transmission during dental care.

REFERENCES

Agência Nacional de Segurança Sanitária. (2020). Orientações para serviços de saúde: medidas de prevenção e controle que devem ser adotadas durante a assistência aos casos suspeitos ou confirmados de infecção pelo novo coronavírus (SARS-CoV-2). *Nota técnica GVIMS/GGTES/Anvisa nº 04/2020*. Atualizada em 25/02/2021.

Bezerra, A. R., Conde, D. C., Maia, A. B. P., & Reis, V. P. (2020). Odontologia em tempos de Covid-19: revisão integrativa e proposta de protocolo para atendimento nas unidades de saúde bucal da Polícia Militar do Estado do Rio de Janeiro – PMERJ. *Revista Brasileira de Odontologia, 77*.

Carrouel, F., Gonçalves, L. S., Conte, M. P., Campus, G., Fisher, J., Fraticelli, L., … Bourgeois, D. (2021). Antiviral activity of reagents in mouth rinses against SARS-CoV-2. *Journal of Dental Research, 100*(2), pp. 124-132. doi: 10.1177/0022034520967933

Cavalcante-Leão, B. L., Araujo, C. M., Basso, I. B., Schroder, A. G., Guariza-Filho, O., Ravazzi, G. C., ... Stechman-Neto, J. (2021). Is there scientific evidence of the mouthwashes effectiveness in reducing viral load in Covid-19? A systematic review. *Journal of Clinical and Experimental Dentistry*, *13*(2), pp. 179-189. doi: 10.4317/jced.57406

Chen, M. H., & Chang, P. C. The effectiveness of mouthwash against SARS-CoV-2 infection: A review of scientific and clinical evidence. *Journal Formosan Medical Association*, *121*(5), pp. 879-885. ID: covidwho-1458570

Eduardo, F. P., Correa, L., Heller, D., Daep, C. A., Benitez, C., Malheiros, Z., … Bezinelli, L. M. (2021). Salivary SARS-CoV-2 load reduction with mouthwash use: a randomized pilot clinical trial. *HELIYON, 7*(6). doi: 10.1016/j.heliyon.2021.e07346

Herrera, D., Serrano, J., Roldán, S., & Sanz, M. (2020). Is the oral cavity relevant in SARS-CoV-2 pandemic? *Clinical Oral Investigations, 24*(8) pp. 2925-2930. doi: 10.1007/s00784-020-03413-2

Huang, Y. H., & Huang, J. T. (2021). Use of chlorhexidine to eradicate oropharyngeal SARS-CoV-2 in COVID-19 patients. *Journal of Medical Virology*, *93*(7), pp. 4370-4373. ID: covidwho-1147396

Jain, A., Grover, V., Singh, C., Sharma, A., Das, D.K., Singh, P., … Ringe, R.P. (2021). Chlorhexidine: an effective anticovid mouth rinse. *Journal Indian Society Periodontology, 25*(1), pp. 86-88, 2021. ID: covidwho-1040151

Lamas, L. M., Dios, P. D., Rodríguez, M. T. P., Pérez, V. D. C., Alvargonzalez, J. J. C., Domínguez, A. M. L., ... Posse, J. L. (2020). Is povidone iodine mouthwash effective against SARS-CoV-2? First *in vivo* tests. *Oral Diseases*, *28*(Suppl. 1), pp. 908-911. doi: 10.1111/odi.13526

Mateos-Moreno, M. V., Mira, A., Ausina-Márquez, V., & Ferrer, M. D. (2021). Oral antiseptics against coronavirus: *in-vitro* and clinical evidence. *Journal Hospital Infection, 113*, pp. 30-43. doi: https://doi.org/10.1016/j.jhin.2021.04.004

Meethil, A. P., Saraswat, S., Chaudhary, P. P., Dabdoub, S. M., & Kumar, P. S. (2021). Sources of SARS-CoV-2 and other microorganisms in dental aerosols. *Journal of Dental Research*, *100*(8), pp. 817-823. doi: 10.1177/00220345211015948

Mirhadi, H., Azar, M. R., Abbaszadegan, A., Geramizadeh, B., Torabi, S., & Rahsaz, M. (2014). Cytotoxicity of chlorhexidine-hydrogen peroxide combination in different concentrations on cultured human periodontal ligament fibroblasts. *Dental Research Journal (Isfahan), 11*(6), pp. 645-648.

Moosavi, M. S., Aminishakib, P., & Ansari, M. (2020). Antiviral mouthwashes: possible benefit for COVID-19 with evidence-based approach. *Journal of Oral Microbiology, 12*(1), 1794363. doi: 10.1080/20002297.2020.1794363

Nagatake, T., Ahmed, K., & Oishi, K. (2002) Prevention of respiratory infections by povidone-iodine gargle. *Dermatology (Basel, Switzerland)*, *204*(Suppl. 1), pp. 32–36. doi: 10.1159/000057722

O'Donnell, V. B., Thomas, D., Stanton, R., Maillard, J. Y., Murphy, R.C., Jones, S. A., & Sattar, S.A. (2020). Potential role of oral rinses targeting the viral lipid envelope in SARS-CoV-2 infection. *Function (Oxford)*, *1*(1), zqaa002. doi: 10.1093/function/zqaa002

Prefeitura do Município de Maringá, Secretaria Municipal de Saúde, Diretoria de Assistência e Promoção à Saúde, Gerência de Saúde Bucal. Retorno Do Atendimento Eletivo Odontológico Nos Serviços De Saúde Próprio Do Município De Maringá Durante Contingente Covid-19. (2020). *Nota técnica 012/2020.*

Ravindra, K., Malik, V. S., Padhi, B. K., Goel, S., & Gupta, M. (2022). Asymptomatic infection and transmission of COVID-19 among clusters: systematic review and meta-analysis. *ScienceDirect - Saúde pública, 203*, pp. 100-109. doi: 10.1016/j.puhe.2021.12.003

Reis, I. N. R., Amaral, G. C. L. S., Mendonza, A. A. H., Graças, Y. T., Correa, M. C. M., Romito, G. A., & Pannuti, C. M. (2021). Can preprocedural mouthrinses reduce SARS-CoV-2 load in dental aerosols? *Medical hypotheses*, *146*, 110436. doi: 10.1016/j.mehy.2020.110436

Resolução N.º 004/2020-CEP, 7 de maio de 2020. (2020). Suspende o calendário letivo de disciplinas presenciais do ano 2020 da Universidade Estadual de Maringá, em regime de excepcionalidade e adota outras providências.

Secretaria da Saúde do Governo Estadual do Paraná. (2020). Orientações referentes ao atendimento odontológico nos serviços públicos frente à Covid-19. *Nota orientativa 39/20202.*

Seneviratne, C. J., Balan, P., Ko, K. K. K., Udawatte, N. S., Lai, D., Ng, D. H. L., … Sim, X. Y. J. (2021). Efficacy of commercial mouth-rinses on SARS-CoV-2 viral load in saliva: randomized control trial in Singapore. *Infection*, *49*(2), pp. 305–311. doi: 10.1007 / s15010-020-01563-9

U.S. National Library of Medicine (s.d.) *Clinical-Trials.*

Universidade Estadual de Maringá. (2021). Anexo 4, Protocolo Biossegurança Cod-Uem, Plano De Retomada Das Atividades No Contexto Da Pandemia De Covid-19. *Departamento de Odontologia*.

Vergara-Buenaventura, A., & Castro-Ruiz, C. (2020). Use of mouthwashes against COVID-19 in dentistry. *The British Journal of Oral & Maxillofacial Surgery*, *58*(8), pp. 924–927. doi: 10.1016/j.bjoms.2020.08.016

Yoon, J. G., Yoon, J., Song, J. Y., Yoon, S. Y., Lim, C. S., Seong, H., … Kim W.J. (2020). Clinical significance of a high SARS-CoV-2 viral load in the saliva. *Journal of Korean Medical Science*, *35*(20), e195. doi: 10.3346/jkms.2020.35.e195