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REVIEW ARTICLE

Impact of COVID-19 in field of Dentistry

Impacto de la COVID-19 en el área de Odontología

Impacto do COVID-19 na área da Odontologia

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ABSTRACT

Introduction: COVID-19 is a disease caused by SARS-CoV-2 virus and transmitted through respiratory track. So, dentists face a great risk working directly in the oral cavity. **Objective:** systematization of the theoretical references concerning the impact of COVID-19 in dental areas. **Method:** a systematic review on the subject was carried out at the Universidad Regional Autónoma de los Andes, from September to December 2022. Of a total of 36 articles reviewed, 23 were selected according to criteria, available in PUBMED and SciELO, published in English and Spanish by different authors, and associated to the COVID-19 transmission in dentistry. **Results:** the following topics were addressed: oral diseases caused by COVID-19, changes in dental areas due to the COVID-19 pandemic, and biosecurity measures used in the dental service for ensure patient safety receiving treatment. **Final considerations:** COVID-19 has had great repercussions in dentistry, which affects the oral and general health of patients and, in turn, leads to the use of strict biosecurity measures inside and outside the dental office, so, it is essential for dentists to become empowered of the theoretical references related to the subject and also be focused on detecting lesions that may constitute primary signs of a possible presence of SARS-CoV-2, in adopt responsible behaviors and to avoid any spread of disease.

Keywords: COVID-19; SARS-CoV-2; ACE2; dentistry; biosafety

RESUMEN

Introducción: la COVID-19 es una enfermedad provocada por el virus SARS-CoV-2, que se transmite por medio de la vía respiratoria por lo cual, los odontólogos enfrentan un gran riesgo al trabajar directamente en la cavidad oral. **Objetivo**: sistematizar los referentes teóricos sobre el impacto de la COVID-19 en el área de la Odontología. **Método**: en la Universidad Regional Autónoma de los Andes, entre los meses de septiembre a diciembre de 2022 se realizó una revisión sistemática sobre el tema. De 36 artículos revisados se escogió, según criterios, un total de 23 artículos, disponibles en PUBMED y SciELO que abordan la problemática de COVID-19 en el área odontológica, de varios autores, en idioma inglés y español. **Resultados:** se abordaron los temas, tales como: enfermedades bucodentales generadas a causa de COVID-19, Cambios en el área odontológica a causa de la pandemia por COVID-19 y medidas de bioseguridad empleadas para atender al paciente en el consultorio odontológico. **Consideraciones finales:** la COVID-19 ha tenido gran repercusión en Odontología, lo que afecta la salud bucal y general del paciente, a su vez, conduce al uso de estrictas medidas de bioseguridad dentro y fuera del consultorio odontológico, por lo que resulta ineludible que los odontólogos se empoderen de los referentes teóricos en torno al tema para contribuir a la detección de lesiones que puedan constituir signos primarios que apuntan a la presencia de SARS-CoV-2, adoptar conductas responsables y evitar su propagación.

Palabras clave: COVID-19; SARS-CoV-2; ACE2; odontología; bioseguridad

RESUMO

Introdução: o COVID-19 é uma doença causada pelo vírus SARS-CoV-2, que é transmitido pelo trato respiratório, portanto, os dentistas enfrentam um grande risco ao trabalhar diretamente na cavidade oral. **Objetivo:** sistematizar os referenciais teóricos sobre o impacto da COVID-19 na área da Odontologia. **Método:** na Universidade Regional Autônoma dos Andes, entre os meses de setembro e dezembro de 2022, foi realizada uma revisão sistemática sobre o tema. Dos 36 artigos revisados, um total de 23 artigos, disponíveis no PUBMED e SciELO, que abordam a problemática da COVID-19 na área odontológica, de diversos autores, em inglês e espanhol, foram escolhidos segundo critérios. **Resultados:** foram abordados temas como: doenças bucais causadas pelo COVID-19, Alterações na área odontológica devido à pandemia do COVID-19 e medidas de biossegurança utilizadas no atendimento ao paciente no consultório odontológico. **Considerações finais:** O COVID-19 tem causado grande impacto na Odontologia, o que afeta a saúde bucal e geral do paciente, por sua vez, leva ao uso de medidas estritas de biossegurança dentro e fora do consultório odontológico, por isso é inevitável que os dentistas sejam capacitados por referenciais teóricos sobre o assunto para contribuir na detecção de lesões que possam constituir sinais primários que apontem para a presença do SARS-CoV-2, adotem condutas responsáveis e evitem sua disseminação.

Palavras-chave: COVID-19; SARS-CoV-2; ACE2; odontologia; biossegurança

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INTRODUCTION

The emergence of a new disease known as COVID-19 exposes health professionals to the risk of contagion worldwide, where the area of Dentistry acquires great relevance due to the modes of action of this profession.[1]

This disease is caused by the SARS-CoV-2 virus. The first information about the contagion was revealed by the World Health Organization (hereinafter WHO) on January 5, 2020. From this date onwards, several events began to occur due to the spread of the virus, and on January 12, 2020, China disclosed the genetic chain of the virus causing the disease. Subsequently, on January 30, 2020, WHO announced the status of "Public Health Emergency of International Concern" and, finally, on March 11 of the same year, COVID-19 was declared a global pandemic.[2]

Currently it is known that the way of transmission of COVID-19 is through the respiratory route and by direct contact with the mouth, eyes or nose.[3] In this regard, the Occupational Safety and Health Administration (hereinafter OSHA), announced that dentists are a high risk personnel for contagion due to the type of treatments they use and that they are in contact with the place where SARS-CoV-2 proliferates the most: the nasopharynx; and the short distance they have with the patient.[4]

Therefore, in view of this risk, it is of utmost importance to improve the ways to protect both the patient and the professional,[5] which justifies that nowadays the biosafety issue has taken a preponderant place, since it is essential to know and implement the measures that help prevent the infection by COVID-19 of health professionals related to the stomatological area.[6]

It is necessary to take into account the principle of universality, so that protection and prevention measures should be applied at all times and to all patients.

On the other hand, studies[7,8,9,10] reveal that patients who have been infected by COVID-19 have presented lesions in the oral cavity, affecting several regions of the mucosa that can be related to SARS-CoV-2, which were aggravated in some cases due to the measures taken and the restrictions of services in dental offices caused by the pandemic.

In correspondence with the above, and the strong situation in which the world finds itself, due to the drastic changes in Dentistry caused by COVID-19, the authors offer the present article with the aim of systematizing the theoretical references on the impact of COVID-19 in the area of Dentistry.

DEVELOPMENT

Oral diseases generated by COVID-19

There is an enzyme called angiotensin-converting enzyme 2 (ACE2) that is present in cells of various human tissues and organs, such as lungs, liver, mouth, etc.[9] For its part, the human brain has ACE2 receptors, especially in the vasculature of the brain, neurons and neuroglia, so that these become

susceptible to attack by SAR-CoV-2, and facilitate its passage into the cells. This can cause damage to the neurons resulting in alterations in smell and taste.[10]

This enzyme helps regulate blood pressure, injury healing and inflammatory processes because it decreases the functions of angiotensin II (ANG II), which is a protein that has opposite functions to ACE2, causing damage to the lining of the blood vessel wall and at the tissue level. The ACE2 enzyme causes ANG II to be converted into other molecules that slow down the functions of ANG II itself.

SARS-CoV-2, with the participation of the spike protein, binds to ACE2 facilitating cell damage. When the virus binds to the enzyme, the amount of ACE2 decreases and does not fulfill its functions, resulting in an increase in ANG II, causing inflammation, cell death, tissue damage, damage to the heart and lungs; for example, the oxygen-carrying alveoli are affected by an inflammatory process in which their cells die.[11] Consequently, parts of the oral cavity such as the tongue and salivary glands are surrounded by cells that have ACE2, and it is through this enzyme that COVID-19 has access to the sensory cells related to taste, thus causing alterations in their proper function.[1,12,13] SAR-CoV-2 binds to ACE2 through glycoprotein S, which is activated by the transmembrane serine protease 2 (TMPRSS2).[14]

Taking into consideration that taste sensation is produced by taste buds which are mostly located on the back of the tongue, at the moment of ingesting food, these buds release neurotransmitters that reach the thalamus[13] and, due to the alterations caused in the cells of the oral cavity by the action of SARS-CoV-2 on the ACE2, they can cause a dysfunctional response at the taste level and present certain diseases such as: ageusia, hypogeusia, hypergeusia and dysgeusia.[1,9] Therefore, the most frequent disorders and, at the same time, considered as part of the initial symptomatology of SARS-CoV-2, as they occur in a person in the first days of infection, is the absence of smell and taste, and the person is considered a possible carrier of the virus.[9,15]

Dysgeusia is a disorder in which the perception of flavors is altered, that is, the sense of taste; hypogeusia presents a decrease in this sense which is reversed as the person recovers from the disease, and ageusia is the total loss of taste perception.[1,13,16] In relation to the above, in a study of people who have presented alterations at the taste level due to COVID-19 the following results were obtained: 38% dysgeusia, 35% hypogeusia and 24% ageusia.[16]

On the other hand, another study showed that 91.18% of the COVID-19 positive population presented anosmia and ageusia,[12] taste problems were the most frequent in the European and American continent, specifically in the North, while in Asia it is less common.[16]

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At the same time, there are factors that intervene in the prevalence of these disorders such as, for example: the female gender is more prone to have these disorders due to its level of hormones and non-specific immunity to viral diseases, which is shown in a study conducted in Spain,[12] where 70% of the population that presented taste disorders were women.

Another factor is the origin of the person; it was demonstrated by means of a study[16] where different populations were evaluated that taste disorders occurred in 53% of the North American population, 50% in Europe and 45% in the Asian population. This shows that the population of Europe and North America has a greater tendency to present taste problems than Asians. This is due to the fact that the Asian population presents greater variations in the genetic coding related to ACE2 in the tissues, that is, the angiotensin converting enzyme 2 is manifested in a different way in relation to other populations.

It is also considered that COVID-19 may cause secondary lesions resulting from deterioration of systemic health or due to COVID-19 treatments. In this regard, ulcerated lesions have been described on the hard palate, tongue and lips, which could be a primary reaction to SARS-CoV-2. In addition, opportunistic fungal infections, recurrent oral herpes simplex virus infection, nonspecific oral ulcerations and gingivitis, xerostomia related to decreased salivary flow as a result of impaired immune system and susceptible oral mucosa may occur in coronavirus-positive patients, which may interfere with the dynamics of the oral microbiota balance.[1,9,16]

Changes in Dentistry due to the COVID-19 pandemic

The COVID-19 pandemic has posed great challenges to dental professionals worldwide. This branch of the medical sciences has been compromised, since dental procedures require analysis or interventions at the oral cavity level in which there is contact with blood, saliva and body fluids and, at the same time, the use of certain instruments that generate aerosols, which is why, given the characteristics of the dental environment, the risk of cross-infection between patients and dentists is high.[1,17]

In correspondence with the above and in accordance with WHO recommendations, several biosecurity procedures are applied worldwide on a mandatory basis to reduce the contagion of both the professional and the patient within the dental office.[8] Therefore, efforts are made to perform only emergency treatments and surgeries such as: pulpitis, gingivitis, problems after exodontia, periodontitis,[8,18] etc. Cases of people with cancer who need dental care are also accepted.[18]

In addition, in search of alternatives through the use of information and communication technologies (ICT) to counteract the limitations of dental services derived from the pandemic, measures were chosen in several countries to avoid face-to-face visits to the dental office:

Telemedicine: telemedicine can also be applied in dentistry and is called teleodontology, which allows the diagnosis and treatment of certain problems in the oral cavity, it helps to guide and educate the patient without the need to attend the dental office in person.

This innovative technology complements certain procedures that cannot be performed due to the pandemic. Thanks to this tool, person-to-person contact is avoided and the distance required to avoid the spread of the virus is increased.[19,20]

Teleodontology includes:[19,20]

a) Tele-guidance or telediagnosis: this allows the professional to make diagnoses and, at the same time, guide patients. Photos and information are exchanged between the patient and the dentist.
b) Telemonitoring: replaces frequent physical monitoring of the patient. It helps to monitor and follow step by step the progress of the disease, the therapy used and the patient's results.
c) Teleconsultation: it is the most used; by means of it, data can be exchanged between dentists to have a better diagnosis and provide a better treatment in a fast and precise way. The patient can continue with his or her treatment.
d) Teletriage: the patient's symptomatology is known by means of an intelligent cell phone.

These mechanisms can be easily established, since they are generated by digital means through which photos can be sent or video calls and text messages can be made. WhatsApp has been the most widely used; however, teleodontology has certain limitations, since most of the time the dental patient needs to be treated in person.

In addition, procedures were established that must be carried out before attending a face-to-face consultation:

- Triage is performed before attending a dental appointment in a face-to-face manner.[17]
- Surveys related to COVID-19, in which it is made known if the patient has respiratory signs related to the coronavirus, if he/she has had contact with infected or possibly infected persons.[18]
- Epidemiological history: this should include information about the patient, whether he/she has traveled in the last two weeks, whether or not he/she has been close to people who have tested positive for SARS-CoV-2 or people who have had symptoms in the last two weeks.[8]
- Clinical manifestations: here it should be considered if the patient has presented fever or respiratory symptoms, a leukocyte and red blood cell test should be performed to know if these are in normal or decreased quantities.[8]

The aforementioned transformations were undertaken to limit the risk of cross-infection, since they allow to classify the risk of infection by COVID-19 and to establish a level of priority of treatments to confront the pandemic, as well as to serve as health promoters in the communities to prevent the spread of the virus.

Biosafety measures used for patient care in the dental office

Biosafety measures in the health area are not a topic recently chosen by the pandemic, since they must be used on a daily basis due to the strong exposure of the professional to microorganisms, viruses and bacteria from which he/she can contract a disease. However, due to the difficult situation humanity is going through, these measures are considered indispensable to prevent the SARS-CoV-2 virus infection.

In dentistry, these biosafety standards are rigorously, excessively and compulsory, as they are the only effective way to combat the pandemic, which has not yet stopped.

Therefore, the following biosafety measures for the dental professional are adopted:[6,8,17,18]

- Four-handed work: with an assistant dentist.
- Hand washing: to remove dirt, organic debris and bacteria. It is advisable to do it with soap and water for 20 seconds to one minute with plenty of bubbling. If gloves are used, hands should also be washed before and after use.
- Use of alcoholic substance: it is a faster method that eliminates all types of microorganisms.
- Do not touch your face: especially your mouth, eyes or nose if your hands are dirty.
- Use alcohol gel: it inhibits the virus. Its formula should contain ethanol (60%) or alcohol (75%).
- Do not use accessories: the dental professional or the assistant should remove chains, watches, rings, earrings, etc.
- Use personal protective equipment (PPE): in the use of PPE it should be considered that they cannot be used for long periods of time and reuse should be avoided to prevent self-contamination.[17] In the case of needing to reuse them, they should be disinfected by ultraviolet light.[21]

PPE includes:[6,8,18]

- Gloves: they can be sterile or not. It is said that using two gloves on each hand helps to reduce the risk of contagion since direct contact with the patient's body fluids or blood is avoided.
- Mask: they provide protection to the mouth and nose. The type of mask used depends on the work to be done and the patient's condition. Surgical masks are recommended. The masks should not be handled while they are being used and at the time of removing them should be done carefully with a subsequent hand washing; if they are single-use, they should be discarded immediately.
- Respirators: they are reusable and can be half-face or full-face. They provide better protection since they create an airtight seal and purify the air inhaled through filters.
- Goggles: used for eye protection, protecting the mucous membranes from bioparticles, sprays and droplets.
- Face shield: provides protection to the mucous membranes of the nose, mouth and eyes, as it covers the entire face.
- Apron: it should be made of plastic material and disposable.
- Caps: they must be disposable caps.
- Shoes: in case they are not available, it is advisable to use shoes that can be washed or disinfected.

Other biosafety measures in relation to the dental office related to instruments, equipment, surfaces, environment, waiting room are:[8,17,18,21]

- Use ejectors: these help to reduce the microdroplets produced by patients.
- Equipment for suctioning: they should be intense in order to reduce the amount of aerosols produced in the middle of a dental treatment.
- Retractable handpiece: it avoids aspiration and expulsion of residues and droplets.

- Avoid using the triple syringe: in order not to produce bioparticles when in contact with salivary flow, instead of this syringe it is recommended to use cotton to dry the area being treated.
- Use rubber dam: the dentist uses thin latex sheets on the patient in order to avoid cross-infection, since these sheets reduce the presence of microorganisms in the environment by about 0.9m.
- Use bioabsorbable threads: they are used in the case of a surgical procedure where it is necessary to make sutures in order to reduce the number of visits to the office.
- Disposable instruments.
- Only use instruments that are necessary: remove unnecessary objects, since they can carry microorganisms.
- Newspapers or entertainment objects should no longer be placed in the waiting room.
- Perform cleaning and disinfection before and after attending the patient: these procedures should be performed on inert surfaces such as: equipment and instruments, salivary trays, dental chair, lamps, handles, seats, floor, desk, computers, pens, etc. (Chlorine compounds can be used in portions of 500mg/l, hydrogen peroxide (0.5%), ethanol (70%) in small areas or sodium hypochlorite (0.1%) which has been a substance that has had good effects on SARS-CoV-2. For the dental chair, a wet cloth with chlorine (2000 mg/l) or ethanol (75 %) can also be used; if chlorine is used, the excess should be removed with a soft cloth and if alcohol has been used, do not remove the excess, just let it dry. The areas that have not been soiled can be cleaned with detergent and water. These procedures are necessary, since the virus that causes COVID-19 can remain in these areas for hours or even days.
- Distance between dental chairs: should be 2 m or more.
- Have good ventilation: in a place without ventilation, disease can spread faster. Systems that allow air to escape should be used to eliminate or reduce the amount of aerosols produced during dental treatment. In the case of having air conditioners, it should be considered that these only extract and do not recirculate the air, and new filters should be used every week.
- It is recommended that the lighting in the dental office be natural light, since there have been reports that if the sun's rays act between 7 and 14 minutes, they help to eliminate the COVID-19 virus in areas that are not permeable.
- It is recommended to attend only one person, even if there are two armchairs without any barrier in the same office.
- Maximum capacity: the place where the patient waits to be seen should not be congested; for this purpose, only see patients by appointment; space out the time periods between appointments to avoid contact with the next patient to be seen.
- Dispenser: place small bottles of antibacterial gel with 70% alcohol concentrations at the entrance of the office.[21]

Likewise, the biosecurity measures for the patient are: [17,18]

- Use mouthwashes: before being operated on, the patient should rinse for 15 seconds with mouthwashes containing cetylpyridinium chloride (0.12%), hydrogen peroxide (1%) or iodopovidone (0.23%), since these are oxidative and make the virus susceptible. Chlorhexidine 0.12%, which is the most common for oral hygiene, is not very effective against SARS-CoV-2.

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- Distancing: should be separated at least 1.5 m from other people at all times.
- Use of mask: you should remove it only when the dentist or assistant instructs you to do so.
- Entering the office: you should not carry objects in your hands, especially telephones, this is done so that the patient does not become infected in the office. You must enter alone; if it is a child or has a special disease can accompany a person taking into account that all the time must wear a mask.
- Cases to be treated: the patient should consider that in pandemic peak he/she can only attend the office in case of urgency or emergency.
- Treatment: the dentist must perform a treatment to avoid having any complication in which another appointment would be needed.
- Hand hygiene: wash your hands or use alcohol (70%). This should be done before and after being seen.
- Interrogation: questions such as: Do you have or have you had fever in the last few days? Did you have breathing problems or cough?
- Radiography: if this procedure is necessary in any case, only radiographs in which salivation is not produced should be performed, i.e. those that are done extraorally such as panoramic radiographs.

Biosafety measures have also been designed to care for patients who have tested positive for SARS-CoV-2 or are likely to be positive: [6,17,18,23]

- Care will be provided only if it is an emergency case.
- The work of the dentist together with an assistant is implemented.
- The cleaning and disinfection procedures should be repeated twice on all surfaces, whether on the dental instruments or in the waiting room. After these procedures, wait 30 minutes before seeing another patient; and if aerosols have been produced, the waiting time is 3 hours or preferably see the patient in another office.
- Health personnel should use PPE, with filtering face masks, among the recommended ones are N95, FFP2 or FFP3. This mask should be disposed of.
- Perform a triage to the patient where the temperature is recorded, if in the case is accompanied by someone; this procedure is also done to that person.
- If drugs are sent to relieve pain or to counteract infections, paracetamol, metamizole or amoxicillin should be chosen. Ibuprofen should not be used in people who have tested positive for this disease because of increased CEA2.
- Preferably, give the patient the last shift of the day; this would avoid processes that generate particles, giving precise recommendations so that the treatment done does not have complications, avoiding new appointments.
- The dental professional and the assistant, after dental care, should take a COVID-19 test.
- Disposal of waste: personal protective equipment should be disposable and the containers in which the waste is to be placed should be correctly marked; these containers should be emptied when the waste exceeds half of them and this should be done no more than 2 days after the first use.
- Waste should be classified as solid-liquid-medical or biological.

- Disposable instruments used in patients with COVID-19 should be placed in bags, disinfected and disposed of immediately.

All of the above makes it explicit that COVID-19 has revolutionized dental care worldwide, which merits a greater effort by professionals to achieve quality and efficiency in the service provided, in correspondence with the current context, which is a universal challenge.

FINAL CONSIDERATIONS

COVID-19 has had great repercussions in dentistry, which affects the oral and general health of the patient and, in turn, leads to the use of strict biosafety measures inside and outside the dental office. Therefore, it is essential that dentists become empowered with the theoretical references on the subject in order to contribute to the detection of lesions that may constitute primary signs that point to the presence of SARS-CoV-2, adopt responsible behavior and avoid its propagation.

REFERENCES

1. Falcón-Guerrero BE, Falcón-Pasapera GS. Repercusiones en la Cavidad Oral Causadas por la Infección con COVID-19. Int J Odontostomatol [Internet]. 2015 [cited 24 Oct 2022]; 15(1):23-26. Available in: http://ijodontostomatology.com/es/articulo/repercusiones-en-la-cavidad-oral-causadas-por-la-infeccion-con-covid-19/
2. Roco-Bazáez JA, Roco-Bazáez JA. Impacto de la Pandemia por COVID-19 (SARS-CoV 2) en la Educación Odontológica: Scoping Review. Int J Odontostomatol [Internet]. 2021 Mar [cited 21 Oct 2022]; 15(1):10-3. DOI: http://dx.doi.org/10.4067/S0718-381X2021000100010
3. Lenguas-Silva AL, Mateos-Moreno MV, García-Vicent G, Lamas-Oliveira M, Martín-Morales JF, Valdepeñas-Morales J, *et al*. New Rules for Teaching in Dental Schools in the COVID-19 Era. Int J Odontostomatol [Internet]. 2021 Mar [cited 27 Oct 2022]; 15(1):36-42. DOI: http://dx.doi.org/10.4067/S0718-381X2021000100036
4. Medeiros MS, Santos HLF dos, Barreto JO, Freire JCP, Dias-Ribeiro E. COVID-19 pandemic impacts to Dentistry. RGO, Rev Gaúch Odontol [Internet]. 2020 Ago [cited 21 Oct 2022]; 68. DOI: https://doi.org/10.1590/1981-86372020000202020079
5. Gispert Abreu EÁ, Chaple Gil AM. Gestión de la atención de salud bucal en tiempos de la COVID-19. Rev CubanaEstomatol [Internet]. 2020 Dic [cited 21 Oct 2022]; 57(4). Available in: https://bit.ly/3LMhYVg
6. Morales Navarro D. Acciones del personal de salud del área estomatológica en relación a la COVID-19. Rev Cubana Estomatol [Internet]. 2020 Mar [cited 18 Oct 2022]; 57(1). Available in: http://scielo.sld.cu/scielo.php?script=sci_abstract&pid=S0034-75072020000100011&lng=es&nrm=iso&tlng=es
7. Brandão TB, Gueiros LAM, Melo TS, Prado-Ribeiro AC, Boas do Prado GV, Santos-Silva AR dos, *et al*. Insights and challenges in the

management of oral lesions in COVID-19 patients. Oral Surg Oral Med Oral Pathol Oral Radiol [Internet]. 2021 Ene [cited 19 Oct 2022]; DOI: https://doi.org/10.1016/j.oooo.2021.01.026

8. Falcón-Guerrero BE, Falcón-Pasapera GS. Medidas para Prevenir el COVID-19 en el Consultorio Dental. Int J Odontostomatol [Internet]. 2020 Dic [cited 28 Oct 2022]; 14(4):468-73. DOI: http://dx.doi.org/10.4067/S0718-381X2020000400468
9. Brandão TB, Gueiros LA, Melo TS, Prado-Ribeiro AC, Nesrallah ACFA, Prado GVB, *et al*. Oral lesions in patients with SARS-CoV-2 infection: could the oral cavity be a target organ? Oral Surg Oral Med Oral Pathol Oral Radiol [Internet]. 2021 Feb [cited 18 Oct 2022]; 131(2):e45-51. DOI: https://doi.org/10.1016/j.oooo.2020.07.014
10. Zahra SA, Iddawela S, Pillai K, Choudhury RY, Harky A. Can symptoms of anosmia and dysgeusia be diagnostic for COVID-19? Brain Behav [Internet]. 2020 Nov [cited 10 Oct 2022]; 10(11):e01839. DOI: https://doi.org/10.1002/brb3.1839
11. Sriram K, Insel PA. A hypothesis for pathobiology and treatment of COVID-19: The centrality of ACE1/ACE2 imbalance. Br J Pharmacol [Internet]. 2020 Nov [cited 27 Oct 2022]; 177(21):4825-44. DOI: https://doi.org/10.1111/bph.15082
12. Barón-Sánchez J, Santiago C, Goizueta-San Martín G, Arca R, Fernández R. Afectación del sentido del olfato y el gusto en la enfermedad leve por coronavirus (COVID-19) en pacientes españoles. Neurología [Internet]. 2020 [cited 21 Oct 2022]; 35(9):633-8. DOI: https://doi.org/10.1016%2Fj.nrl.2020.07.006
13. Aranda Rubio Y, Cuesta Castellón G, Neira Martín B, Gómez-Pavón FJ. Disgeusia post-COVID-19: nueva causa de negativa a la ingesta en el paciente anciano. Rev Esp Geriatr Gerontol [Internet]. 2022 [cited 19 Oct 2022]; 57(1):57-8. DOI: https://doi.org/10.1016%2Fj.regg.2021.05.008
14. Otazú F, Pallarolas C, Vigo E, Velazquez S, González E, Villalba F, *et al*. Perfil epidemiológico de pacientes con COVID-19 en albergues de Ciudad del Este durante el inicio de la pandemia de Paraguay. Rev Salud Púb Paraguay [Internet]. 2021 Jul [cited 15 Oct 2022]; 11(1):33-40. DOI: https://doi.org/10.18004/rspp.2021.junio.33
15. Ninchritz-Becerra E, Soriano-Reixach MM, Mayo-Yánez M, Calvo-Henríquez C, Martínez-Ruiz de Apodaca P, Saga-Gutiérrez C, et al. Evaluación subjetiva de las alteraciones del olfato y del gusto en pacientes con afectación leve por COVID-19 en España. Med Clin (Barc) [Internet]. 2021 Ene [cited 11 Oct 2022]; 156(2):61-4. DOI: https://doi.org/10.1016%2Fj.medcli.2020.08.004
16. Amorim Dos Santos J, Normando AGC, Carvalho da Silva RL, Acevedo AC, Luca Canto G de, Sugaya N, *et al*. Oral Manifestations in Patients with COVID-19: A Living Systematic Review. J Dent Res [Internet]. 2021 Feb [cited 17 Oct 2022]; 100(2):141-54. Available in: https://doi.org/10.1177/0022034520957289
17. Herrera-Plasencia PM, Enoki-Miñano E, Ruiz-Barrueto MA. Riesgos, contaminación y prevención frente al COVID-19 en el quehacer odontológico: una revisión. Rev Salud Púb [Internet]. 2020 Oct [cited 18 Oct 2022]; 22(5). Available in: https://doi.org/10.15446/rsap.v22n5.86065
18. Velásquez-González A, Sepúlveda-Verdugo C, Ortuño-Borroto D, Barrientos-Morales C. Recomendaciones para Resolución de Urgencias Odontológicas en Atención Primaria de Salud Durante la Pandemia de SARS-CoV-2. Int J Odontostomatol [Internet]. 2020 Dic [cited 22 Oct 2022]; 14(4):548-54.

DOI: http://dx.doi.org/10.4067/S0718-381X2020000400548

19. Ghai S. Teledentistry during COVID-19 pandemic. Diabetes Metab Syndr [Internet]. 2020 Oct [cited 27 Oct 2022]; 14(5):933-5. DOI: https://doi.org/10.1016/j.dsx.2020.06.029
20. Telles-Araujo GT, Caminha RDG, Kallás MS, Santos PS. Teledentistry support in COVID-19 oral care. Clinics [Internet]. 2020 Jun [cited 21 Oct 2022];75. Available in: https://doi.org/10.6061/clinics/2020/e2030
21. Castillo-Pedraza MC, Serpa-Romero XZ, Wilches-Visbal JH. La odontología frente a la pandemia por Covid-19: medidas y prácticas a implementar. Rev Esp Salud Púb [Internet]. 2020 [cited 21 Oct 2022]; 94:0-0. Available in: https://medes.com/publication/152296
22. Vieira JCF. Equipo de Bajo Costo con Sistema de Compresor y Presión Equilibrada para Proteger al Dentista Profesional Contra el Aerosol Contaminado Durante la Pandemia COVID-19. Int J Odontostomatol [Internet]. 2020 Dic [cited 2 Nov 2022]; 14(4):523-8. DOI: http://dx.doi.org/10.4067/S0718-381X2020000400523
23. Boin-Bakit C, Melián-Rivas A, Boin-Bakit C, Melián-Rivas A. La atención Odontológica a Pacientes COVID-19 Positivo ¿Qué hacer ante una Urgencia? Int J Odontostomatol [Internet]. 2020 Sep [cited 21 Sep 2022]; 14(3):321-4. DOI: http://dx.doi.org/10.4067/S0718-381X2020000300321

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