Biosafety in dentistry in the context of COVID-19

Bioseguridad en Odontología en el contexto de COVID-19

Biossegurança em Odontologia no contexto de COVID-19

Ingrid Estefania Huayanca Rios[1], 0000-0001-5302-4186
Johan Jonathan Martínez Vega[1], 0000-0002-3891-3898
Gonzalo Bernie Gamarra Tinoco[1], 0000-0001-7072-8564
Manuel Antonio Mattos – Vela[1], 0000-0002-5701-1961

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Abstract

Objectives: To compare the biosafety protocols of nine Latin American countries, the changes in biosafety measures during the COVID-19 pandemic, and their impact on the dental practice.
Methodology: A literature search was conducted using the keywords "coronavirus," "dentistry," "biosafety," "COVID-19," "pandemic," "dental care," and "protocols." We searched for articles on biosafety in the "COVID-19" category published between January and December 2020 in SciELO, Redalyc, SCOPUS, the Regional Portal of the Virtual Health Library (VHL), and on the official websites of the World Health Organization and the ministries of health of Latin American countries.
Conclusions: The biosafety protocols implemented in each country do not differ significantly, except for some specific measures based on a given country's specific context. We found that the economic and emotional impact of COVID-19 was negative.

Keywords: biocontainment, dentistry, protocols, pandemics, COVID-19.

[1]Universidad Nacional Mayor de San Marcos, School of Dentistry. Lima, Perú. 07011. ingrid.huayanca@unmsm.edu.pe

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Resumen

Objetivos: Comparar los protocolos de bioseguridad de nueve países de América Latina, los cambios dados en las medidas de bioseguridad bajo el contexto de la pandemia COVID-19 y su impacto en la Odontología.
Metodología: Se realizó una búsqueda bibliográfica empleándose las palabras clave ¨coronavirus¨,¨odontología¨, ¨bioseguridad¨, ¨COVID-19¨, ¨pandemia¨, ¨atención odontológica¨ y ¨protocolos¨, se buscaron artículos relacionados con bioseguridad mediante la categoría COVID-19 que fueron publicados entre enero y diciembre del 2020 en las bases de datos SciELO, Redalyc, SCOPUS, el Portal Regional de la Biblioteca Virtual de la Salud (BVS), páginas oficiales de la Organización Mundial de la Salud y ministerios de salud de países de América Latina.
Conclusiones: No se encuentra gran diferencia entre los protocolos de bioseguridad de cada país, a excepción de algunas medidas específicas que son dadas de acuerdo a su propio contexto. Se obtiene que el impacto del COVID-19 en el ámbito económico y emocional sería desfavorable.

Palabras clave: contención de riesgos biológicos, odontología, protocolos, pandemia, COVID-19.

Resumo

Objetivos: Comparar os protocolos de biossegurança de nove países de América Latina, as mudanças dadas nas medidas de biossegurança baixo o contexto da pandemia COVID-19 e seu impacto na odontologia.
Metodologia: Se realizou uma pesquisa bibliográfica se empregando as palavras clave “coronavírus”, “odontologia”, “biossegurança”, “COVID-19”, “pandemia”, “atenção odontológica” e “protocolos”, procuraram se artículos relacionados com biossegurança mediante a categoria COVID-19 que foram publicados entre janeiro e dezembro do 2020 nas bases de dados SciELO, Redalyc, SCOPUS, o Portal Regional da Biblioteca Virtual da Saúde (BVS), paginas oficias da Organização Mundial da Saúde e Ministérios de saúde de países de América Latina.
Conclusões: Não se encontra grão diferença entre os protocolos de biossegurança de cada pais, a exceções de algumas medidas especificas que são dadas de acordo a seu próprio contexto. Obtém se que o impacto do COVID-19 no âmbito econômico e emocional seria desfavorável.

Palavras-chave: contenção de riscos biológicos, odontologia, protocolos, pandemia, COVID-19.

Introduction

The SARS-CoV-2 virus has led many countries' health systems to collapse, especially in Latin America. This happened because their health systems were weak and they were developing countries whose economy depended on the great powers. This unleashed panic and alarm in their populations. The pathophysiology of this virus shows that it has a preference for the respiratory system. Once it enters the system, it triggers an abnormal inflammatory immune response with increased cytokines, which aggravates the patient and causes multiorgan damage. The primary transmission mode is the aerosol of saliva droplets produced when talking, sneezing, or coughing. Several Latin American countries have implemented biosafety measures to protect health personnel and patients. Although these measures were in place before the new virus, pre and post-pandemic biosafety measures and the protocols followed by each country have changed, as they have been adapted to the current context and how they work with

society. Many of these protocols impact dentists, as they affect their work environment and could also affect their finances and mental health since the situation creates additional costs and anxiety due to the high risk of contagion.

This review compares the biosafety protocols of nine Latin American countries, the changes in biosafety measures in the COVID-19 pandemic, and their impact on dentistry.

Methodology

A literature search was conducted using the keywords "coronavirus," "dentistry," "biosafety," "COVID-19," "pandemic," "dental care," and "protocols." We searched for articles on biosafety in the "COVID-19" category published between January and December 2020 in SciELO, Redalyc, SCOPUS, the Regional Portal of the Virtual Health Library (VHL), and on the official websites of the World Health Organization and the ministries of health of Peru, Chile, Argentina, Colombia, Ecuador, Brazil, Paraguay, Bolivia, and Uruguay. We selected articles on the COVID-19 pandemic that included the actions taken by the government of each Latin American country, including new dental practice protocols. We excluded articles that were not scientifically rigorous or provided no relevant information (clinical cases, editorials, scientific notes, interviews, and historical reviews).

COVID-19 modes of transmission and/or infection in dental practice

COVID-19 is more virulent than MERS-CoV and SARS-CoV.[1] Transmission occurs from person to person (direct contact)[2] via droplets containing the virus and produced by infected people. This transmission mode, also called "direct," occurs when talking, sneezing, laughing, spitting, and other actions that disseminate infected saliva. When the virus enters the body, it causes respiratory distress, dry cough, coryza, odynophagia, fever, respiratory failure, pneumonia, kidney failure, and death if not treated in time. The virus also spreads through indirect transmission, which does not occur through direct contact, i.e., when people do not interact simultaneously. According to Araya-Salas, the virus can remain on inert surfaces up to 9 days after the infected person expels the droplets with the virus. In this period, another person can be infected if their oral mucosa, nasal or ocular conjunctiva is exposed to that environment, and it can also be transmitted through fomites. This high infectiousness and 3.4% mortality rate has caused concern among health professionals.[1-3]

The importance of biosafety in the dental practice

The World Health Organization (WHO) defines biosafety as a set of rules and measures to protect the health of personnel when performing their duties, patients, and the environment from biological, chemical, and physical hazards.[4] Before the existence and development of the COVID-19 pandemic, dental professionals already had biosafety protocols in place given the high exposure to microorganisms in the oral cavity, which can cause infections when there is an occupational accident during a dental procedure.[2] The study conducted by Ramos Lages illustrates this point. The author evaluated the knowledge of students from two universities in Brazil on infections due to exposure to biological material in accidents during dental practice. The study found that accidents are quite frequent. However, the institutions that have a protocol and biosafety committee to address this type of situation have greater knowledge of Personal Protective Equipment (PPE), fewer accidents, and improved monitoring of immunity against infectious diseases such as hepatitis B.[5] Additionally, the study con-

ducted by Martins at the School of Aracatuba among academics and cleaning staff found a high number of accidents with biological material, lack of knowledge of the protocols to be followed after such exposure, and lack of preventive measures.[6] This shows us that biosafety measures have always been necessary to reduce the spread of diseases to which patients and dentists are constantly exposed. However, not many people implemented them or had sufficient knowledge about them, as seen in the study conducted by Lee Garcés et al. among dental practitioners in a clinic in the province of Guantánamo: most of them were not trained in the subject.[7] Therefore, dental practitioners need ongoing training to reduce this knowledge gap. To this end, biosafety courses should be included in the studies programs of undergraduate and graduate schools.

Protocols in Latin America: a comparison between countries

Latin American countries have implemented new biosafety measures during the COVID-19 pandemic. They have been grouped into specific protocols. These protocols were developed for the field of dentistry to reduce infections among patients, dentists, and their entire healthcare team.

This review compared the protocols of nine South American countries: Paraguay, Uruguay, Peru, Chile, Argentina, Colombia, Ecuador, Brazil, and Bolivia, which were issued by the ministry and/or department of health of each country.

Triage

Triage is done electronically in all the countries evaluated, either by phone or virtually. Questions are asked to assess whether the patient has symptoms of the disease or has been in contact with a diagnosed person. If everything is all right, the patient should be seen in person, as long as the situation falls within the urgencies or emergencies provided for in each country's protocols. The process is different only in Peru and Bolivia, where triage can be performed at the health center if there is an impromptu dental visit.[8,9] All countries indicate that the patient should attend alone and comply with the necessary safety measures, except for Brazil, where a support person may accompany children, very ill patients, or patients with special needs.[10]

Patient care

All countries state that once the patient is equipped with the necessary PPE and enters the office, they should use mouthwash before any procedure to reduce the viral load. However, rinse type and duration vary in each country. Brazil and Paraguay require 1% or 1.5% hydrogen peroxide for 30 seconds and then 0.12% chlorhexidine.[10,11] In Argentina, Chile, Ecuador, Colombia, Bolivia, Peru, and Uruguay, 1% hydrogen peroxide, 0.12% chlorhexidine, or 0.2% povidone can be used for 30 seconds to 1 minute: only one of them is necessary.[8,11-16] Bolivia is the only country that indicates cleaning the patient's skin with diluted DG-6 or soap and water.[9]

All countries agree on decreasing the use of high-speed handpieces due to the large amount of particulate matter produced.[9-16]

Handwashing

All the protocols agree on using soap and water for effective handwashing; however, there are some variations in time, technique, and use of 70% alcohol. In Ecuador, Brazil, and Colombia, the time indicated is a minimum of 60 seconds [9,10,12] without a specific technique; Bolivia does not specify time but does indicate using an antiseptic after washing.[9] Regarding techniques, Argentina implements the technique suggested by the

Ministry of Health of the City of Buenos Aires, which completes handwashing with alcohol.[12] Uruguay uses the World Health Organization (WHO) technique, which recommends a duration of between 30 and 40 seconds, as does Chile.[13,16] Peru suggests the WHO technique, indicating a minimum time of 20 seconds.[8]

Handwashing is indicated in all countries before and after patient care.

Personal Protective Equipment (PPE)

This is one of the most critical biosafety barrier measures. The following elements are indicated:

- Exclusive work clothing and footwear
- N95 or surgical mask
- Waterproof gown
- Protective goggles
- Face shield
- Gloves
- Surgical cap
- Shoe covers

The countries that indicate this PPE are Chile, Ecuador, Uruguay, Paraguay, Brazil, Peru, and Bolivia.[8-11,13,14,16] Colombia does not indicate the use of protective goggles, and Argentina does not mention the use of surgical caps.[12,15] All countries agree on double gloving and changing masks every two hours, as indicated by the WHO. This equipment should be worn by dentists, patients, and the assistants in charge of the dental office and/or clinic.

Waste management

Waste disposal measures are not uniform in the countries evaluated, so each country will be mentioned separately.

In Paraguay, the following items must be available for waste disposal: a container with a black plastic bag for non-pathological waste, a container with a white plastic bag for waste containing biological material, a container with a red plastic bag for biological and/or anatomical material waste, a container for sharp waste. All disposable materials should be sprayed with 0.1% sodium hypochlorite disinfectant in the garbage can.[11]

In Peru and Uruguay, COVID-19 biosafety protocols indicate that the measures set forth by the Ministry of Health must be implemented, i.e., no modifications are made.[8,16]

In Peru, waste must be classified into three categories: class A as biohazardous waste, class B as special waste, and class C as common waste. Each type of waste is taken to a central or final storage place where all the waste coming from the intermediate or primary storage is stored. It is kept there until transported to the treatment or definitive disposal site.[17] In Uruguay, we found no document providing further details on these measures.

In Chile, waste disposal measures include intraoral radiographs: the plastic protectors covering the radiographs must be discarded. The trash can should be sprayed with 0.1% sodium hypochlorite to decontaminate the waste. The personnel in charge must not take off the PPE until everything has been decontaminated.[13]

Argentina states that office garments must be transported to the washing area in a closed bag and washed without other garments at a temperature higher than 60°C. They also stipulate that N95 respirators must be used for a maximum of 15 days.[13]

Colombia follows the regulations of the Ministry of Health and Social Protection and the Ministry of Environment and Sustainable Development, which state that waste must be separated and deposited, washed, and disinfected. Personnel must have PPE for handling waste when there is a hazard at the time of handling.[15]

Brazil indicates that waste from suspected or

confirmed cases of COVID19 should be placed in red bags and replaced when they reach 2/3 of their capacity or at least once every 48 hours, regardless of volume. They should be identified with the symbol of the infectious substance. These bags shall be placed in containers made of washable, break-resistant material and have an opening system that does not require manual contact. This waste must be treated before its environmentally sound final disposal. Waste from regular dental care should be specified as category A1.[10]

Finally, Bolivia adheres to the protocol outlined in the Biosafety Standards in Dentistry, which follows the regulations for managing the solid waste produced in health facilities. Waste should be classified as infectious (class A), special (class B), and common (class C). All bags should be labeled according to the type of biohazard and should be made of single-use low-density polyethylene. The bags go through a process before collection and external transport for final disposal.[9]

Disinfection and cleaning

All countries agree on the disinfectants used to decontaminate offices and/or equipment. In this case, the recommended solutions are sodium hypochlorite for fumigation, floors, shoes, and 70% alcohol for equipment.[8-16] In Bolivia, no particular concentration is indicated for sodium hypochlorite,[9] unlike Argentina, Chile, and Paraguay, where 0.1% sodium hypochlorite is recommended.[11-13] Peru recommends soapy water, quaternary ammonium, 62% - 71% ethanol, hydrogen peroxide, and 0.1% sodium hypochlorite. Protective barriers are also recommended after disinfection to cover clinical contact surfaces and to change them between patients.[8]

Colombia also recommends a disinfectant solution based on quaternary ammonium salts for 30 seconds and then rinsing with running water.[15] Finally, disinfectants are used according to their effectiveness and simplicity in Ecuador. An intermediate-level disinfectant should be applied, such as sodium hypochlorite and 70% ethyl alcohol, and the insulating material must be vinyl-type plastic or aluminum foil.[14] Special attention must be paid to surfaces potentially contaminated with blood, saliva, and organic matter, including those near the patient: the reflector and its support, the dental chair, the table with instruments, suction hoses, faucet handles, handpiece hoses, and other surfaces that are frequently touched. All these elements should be disinfected every time a patient leaves the office, so there should be at least one hour between patients. This appears in the protocols of all the countries evaluated.

Sterilization of dental instruments

Most countries have different guidelines regarding instrument sterilization: some provide specific indications while others adhere to their pre-pandemic biosafety technical regulations.

Paraguay and Uruguay state that all the instruments should be autoclaved, and their sterilization should be verified. Uruguay also recommends environmental or UV disinfection.[11,16]

Colombia specifies the sterilization of high and low-speed parts, orthodontic forceps, and scalers, which should be autoclaved between patients.[15]

Ecuador recommends sterilization according to the type of instruments used, classified as follows [14].

- Trays and boxes: moist heat sterilization.
- Burs and burnishers: moist heat sterilization.
- Handpieces: moist heat sterilization.

- High-speed parts: moist heat sterilization.
- Radiographic film: use overglove during development.
- Treatment or restoration leftover material: dispose of after the procedure.
- Leftover anesthetics: dispose of after the procedure.

Peru recommends the sterilization process be assigned to someone with specific training. Enzymatic detergent should be used for the instrument cleaning process; then, each instrument should be wrapped and packed in containers for heat sterilization. Handpieces should be disinfected with heat and according to the manufacturer's instructions.[8]

In Bolivia, instruments are sterilized according to pre-pandemic protocols. There are various methods: autoclaving (the most recommended one), microwaves, radiation, and chemical disinfection.[9]

Care protocols in various associations, departments, and dental centers in Chile and Argentina provide no guidelines on instrument sterilization.[12,13]

The sterilization process also has a potential biological risk, as demonstrated by Sánchez et al. in their study on workers in a sterilization area in the province of Guantánamo, Cuba. After completing the study, preventive measures were proposed to reduce the potential spread of diseases at work. Accordingly, the relevant personnel must be fully trained, as highlighted in some country protocols, and have sufficient knowledge to reduce the probability of accidents with biological material.[18]

Discusion

Changes in dental biosafety

Health professionals should take universal precautions and consider any patient as a carrier of pathogenic microorganisms regardless of their economic status, religion, sexual orientation, etc. This becomes even more important in the current SARS-CoV-2 pandemic, which has led to modifications in biosafety measures in the health sciences (Table 1). Dentistry is one of the professions that is highly exposed to virus infection, so it must prioritize the biosafety of personnel and patients.[19-24]

Table 1: Main changes in dental biosafety measures

Biosafety measures	Before the COVID-19 pandemic	During the COVID-19 pandemic
Waiting room	• They made appointments and attended in person. • Crowding	• Pre-triage (on the phone and/or the internet). • Constantly ventilated area . • Distanced seats (2 m). • Alcohol and/or alcohol-based gel dispenser (hands and footwear). • Mandatory use of masks.
Both the practitioner and the assistant are protected	Mandatory use by the dentist the assistant: • Mask • Gloves • Disposable cap • Disposable gown	Mandatory use by the dentist and the assistant: • N95 Mask • Shoe covers • Disposable cap • Disposable gown • Gloves • Face and eye protection

Patient care	• Use of a triple syringe (aerosols) • Patients did not wash their hands before dental care. • Patients did not wear PPE during the dental visit	• The use of a triple syringe (aerosols) is not recommended. • Use of mouthwash (povidone iodine or hydrogen peroxide) • Four-hand operation. • Correct handwashing technique (1 min). • Changing gloves after every patient .
Disinfectants	For dental office environments: • 0.1% sodium hypochlorite (bleach) for 10 minutes. For instruments: • Autoclaving.	For dental office environments: • 0.1% sodium hypochlorite (bleach) for 10 minutes • Soapy water, quaternary ammonium, 62%-71% ethanol. For instruments: • Autoclaving.

Impact of COVID-19 on dental practice

As the dental practice is a health science, it is characterized by direct contact with patients. This contact should be reduced as much as possible in the SARS-CoV2 pandemic. Before the pandemic, dentists were already at risk of infection and had to be careful. However, many of these infections could be avoided with a thorough dental history.

The dental practice involves a high risk of disease transmissibility since it involves fluids like saliva because the aerosols produced by the high-speed handpiece can come into direct contact with the dentist and/or patient, exposing them to infection.[25] This is why each country has implemented biosafety protocols that must be respected to protect all the participants in health care.

Currently, as the virus has an incubation period of approximately two weeks, many patients do not know they carry it, which forces us to consider all of them potentially infectious. Therefore we must follow an evaluation guide that reviews clinical manifestations followed by a questionnaire that allows us to make treatment decisions, considering that the case is an urgent or emergency case.[26] This classification of the dental processes aims to postpone the visits that can wait until the quarantine period is completed to reduce potential new infections. As a result, the number of patients seen in a dental office is much lower than before the pandemic, which causes concern among professionals in this field, as seen in the study conducted by Castro-Rodríguez[27] among several dentists of different specialties in Peru. The study shows concern about the consequences of the pandemic since dental offices were temporarily closed and the disease was spreading dramatically. The financial impact of COVID-19 on dentists can still be seen after months of social isolation, as it has reduced their income due to the low number of patients and the reduced workload because they were not included in the first line of defense. There is also the emotional impact of knowing that seeing patients might entail becoming infected.

As mentioned above, basic protective measures should be taken, such as eye and face protection, masks, caps, gowns, and shoe covers, to protect the health of those involved in a regular dental visit. Additionally, instruments that can be disposed of or sterilized

must be used, and the correct disposal protocol must be in place.[28] Protective measures will provide patients with security against contagion and emotional security since they might lack the necessary knowledge on biosafety issues and be unable to take the necessary precautions to protect themselves from infection. There is also a preconception and fear towards patients who carry an infectious disease: they always check that the professionals wear their PPE and the surrounding hygiene and work environment.[29] In other words, if patients see that the dentist or the dental office where they are treated does not comply with the general measures set forth by the ministry of health, they will not trust the dental clinic, which will harm the practitioner's reputation. In turn, health personnel should wear their PPE rationally, as concluded by Santos' study,[30] where health personnel are urged to implement strategies to minimize the need for PPE and guarantee its appropriate use. Dentists need to implement more protective measures, which creates additional costs. This adds to the income reduction due to the low number of patients, which has a strong financial impact on practitioners and their families. Patients might complain or feel uncomfortable if they have to bear the additional cost in the fees they pay. An agreement on the fees must be reached considering the current contracting economy.

The new biosafety protocols must be implemented effectively and involve training dentists, assistants, and cleaning staff. Some studies show that these professionals have sufficient knowledge on the subject, as in the study conducted by Silva[31] in the Unified Health System of the Municipality of Arcoverde in Pernambuco, where positive results were obtained. However, it is also likely that knowledge is insufficient to put this into practice, as observed in the study conducted by Hernandez.[32] Although the students knew about biosafety measures, these were not reflected in practice. In turn, a study conducted by Lee Garcés[7] on dentistry personnel showed that they did not have the necessary knowledge of biosafety protocols. All this indicates that training is essential and must be frequent to be effective, and even more so in the context of a pandemic. The study conducted by Giraldo[33] on the experience in virtual training on biosafety measures reflects that most dentists are interested in training on this subject, especially now that the world is forced to live with the SARS-CoV2 virus, and virtual tools have become very useful when confined. Training is important. However, it impacts dentists financially, as they must invest more in training for them, their assistants, cleaning staff, and receptionists to guarantee and provide quality health service. The measures above are some of those included in most dental practice biosafety protocols in South American countries, which require dentists to invest their time, knowledge, and money.

Pandemic viruses are a health and social risk that affects different areas of life. Consensual biosafety measures should be consolidated in the training of future health professionals to face and prevent many complications.

Conclusions

SARS-CoV-2 is a highly virulent and contagious virus, so appropriate and efficient risk containment is essential, especially since the dental practice entails a high risk of exposure.

Dentists usually resort to biosafety equipment to prevent various infectious diseases. In these pandemic times, its appropriate use must be improved.

Changes and new biosafety measures have emerged in dental care, which must be

followed to ensure the right level of care. The protocols issued by various health authorities are a sensible guide for risk containment in dentistry since they adapt to the needs and contexts of each country; therefore, they should be taken into account in all dental care settings.

The new biosafety measures proposed in the COVID-19 pandemic have a negative financial impact given the additional expenses involved in their implementation.

References

1. Guiñez-Coelho M. Impacto del COVID-19 (SARS-CoV-2) a Nivel Mundial, Implicancias y Medidas Preventivas en la Práctica Dental y sus Consecuencias Psicológicas en los Pacientes. Int. J. Odontostomat. [Internet]. 2020 Sep [Cited: 2021 Feb 02]; 14(3):271-278. Available from: https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0718-381X2020000300271&lng=es.

2. Aquino Canchari CR. COVID-19 y su repercusión en la Odontología. Rev Cubana Estomatol [Internet]. 2020 [Cited: 2021 Feb 2]; 57(1): [approx. 3 p.]. Available from: http://www.revestomatologia.sld.cu/index.php/est/article/view/3242

3. Araya-Salas C. Consideraciones para la Atención de Urgencia Odontológica y Medidas Preventivas para COVID-19 (SARS-CoV 2). Int. J. Odontostomat. [Internet]. 2020 Sep [Cited: 2021 Feb 02] ; 14(3): 268-270. Available from: https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0718-381X2020000300268&lng=es

4. World Health Organization. Manual de bioseguridad en el laboratorio. Geneva (Switzerland): WHO; 2005 [Cited 2021 Feb 02]. Available from: http://www.who.int/topics/medical_waste/manual_bioseguridad_laboratorio.pdf

5. Ramos Lages SA, Feitosa dos Santos A, da Silva Junior FF, Gomes da Costa J. Formación en odontología: El papel de las instituciones educativas en la prevención de accidentes con exposición a material biológico. Cienc Trab. [Internet]. 2015 Dec [Cited: 2021 Feb 02]; 17(54):182-187. Available from: https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0718-24492015000300005&lng=es

6. Martins RJ. Exposición a material biológico en el entorno laboral: conocimiento y adopción de conductas preventivas. 2018 [Cited: 2021 Jan 13]: 92. Available from: https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1021323

7. Lee Garcés Y, Guilarte Cuenca M, Toranzo Peña O, García Guerra A, Ramos de la Cruz M. Nivel de conocimientos sobre bioseguridad en Estomatología. Rev Inf Cient [Internet]. 2017 [Cited: 2021 Feb 02]; 96(2):[approx. 8 p.]. Available from: http://www.revinfcientifica.sld.cu/index.php/ric/article/view/18

8. Ministerio de Salud. Manejo de la atención estomatológica en el contexto de la pandemia COVID-19. [Internet]. 2020 [Cited: 2020 Dec 06]. Available from: https://cdn.www.gob.pe/uploads/document/file/716209/DIRECTIVA_SANITARIA_N_100-MINSA-2020-DGIESP.pdf

9. Gobierno Autónomo Departamental de la Paz. Protocolo de bioseguridad para la atención en odontología durante la pandemia del coronavirus (COVID-19). [Internet] 2020 [Cited: 2021 Feb 02]; 58. Available from: https://www.sedeslapaz.gob.bo/sites/default/files/atenci%C3%B3n%20en%20odontolog%C3%ADa%20DURANTE%20%28COVID19%29.pdf

10. Ministerio de Saúde. Guia de orientacoes do atendimento odontologico no contexto da pandemia final. [Internet] 2020 [Cited: 2021 Feb 02]. Available from: http://www.saude.ba.gov.br/wp-content/uploads/2021/01/guia-de-orientacoes-do-atendimento-odontologico-no-contexto-da-pandemia_final.pdf

11. Federación Odontológica de Paraguay. Manual SARS-CoV-2 Odontología durante la Cuarentena Inteligente. [Internet] 2020 [Cited: 2021 Feb 02]. Available from: https://www.fdiworlddental.org/sites/default/files/media/documents/sars-cov-2_odontologia_durante_la_cuarentena_inteligente.pdf

12. Ministerio de Salud Buenos Aires. Protocolo para la Atención Odontológica durante la Emergencia Sanitaria por Pandemia COVID-19 para aplicación en efectores de la Red Pública de Salud [Internet] 2020 [Cited: 2021 Feb 02]. Available from: https://www.buenosaires.gob.ar/sites/gcaba/files/protocolo_atencion_odontologica_en_consultorios.pdf

13. Federación de Sociedades Científicas de Especialidades Odontológicas de Chile. Protocolo Atención Odontológica Post COVID19 [Internet] 2020 [Cited: 2021 Feb 02]. Available from: http://www.colegiodentistas.cl/inicio/wp-content/uploads/2020/05/fesodech-protocolo-de-atenci%C3%B3n-covid19.pdf

14. Ministerio de Salud Pública. Protocolo para Atención Odontológica en Emergencias y Urgencias Odontológicas durante la emergencia sanitaria por COVID-19. [Internet]. 2020 [Cited: 2021 Feb 02]. Available from: https://www.salud.gob.ec/wp-content/uploads/2020/04/PROTOCOLO-PARA-ATENCI%C3%93N-ODONTOL%C3%93GICA-EN-EMERGENCIAS-Y-URGENCIAS-ODONTOL%C3%93GICAS-DURANTE-LA-EMERGENCIA-SANITARIA-POR-COVID-19.pdf

15. Ministerio de Salud y Protección Social. Lineamiento de Bioseguridad para la prestación de servicios relacionados con la Atención de la Salud Bucal durante el periodo de la pandemia por SARS-CoV-2 (COVID-19). [Internet] 2020 [Cited: 2021 Feb 02]. Available from: https://www.minsalud.gov.co/Ministerio/Institucional/Procesos%20y%20procedimientos/GIPS31.pdf

16. Ministerio de Salud Pública. Protocolo Básico de Atención Odontológica [Internet] November 2020 [Cited: 2021 Feb 02];8. Available from: https://www.gub.uy/ministerio-salud-publica/sites/ministerio-salud-publica/files/documentos/noticias/Protocolo_B%C3%A1sico_de_Atenci%C3%B3n_Odontol%C3%B3gica_01.pdf

17. Norma técnica de salud: "gestión integral y manejo de residuos sólidos en establecimientos de salud, servicios médicos de apoyo y centros de investigación" [Internet]. 2018 [Cited: 2021 Jul 17]. Available from: https://docs.bvsalud.org/biblioref/2019/01/970188/rm_1295-2018-minsa.pdf

18. Sánchez E, García A, Duvergel I, Domínguez E, Bonnane C. Prevención de riesgos biológicos en central de esterilización. Rev Inf Cient [Internet] 2017 [Cited: 2021 Feb 02]; 96(1):57-64. Available from: https://www.medigraphic.com/pdfs/revinfcie/ric-2017/ric171g.pdf

19. Falcón-Guerrero BE, Falcón-Pasapera GS. Medidas para Prevenir el COVID-19 en el Consultorio Dental. Int. J. Odontostomat [Internet]. 2020 Dec [Cited: 2021 Feb 02]; 14(4): 468-473. Available from: https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0718-381X2020000400468&lng=es

20. Sigua-Rodríguez EA, Bernal-Pérez JL, Lanata-Flores AG, Sánchez-Romero C, Rodríguez-Chessa J, Haidar Ziyad S, et al. COVID-19 y la Odontología: una Revisión de las Recomendaciones y Perspectivas para Latinoamérica. Int. J. Odontostomat. [Internet]. 2020 Sep [Cited: 2021 Feb 02]; 14(3):299-309. Available from: https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0718-381X2020000300299&lng=es

21. González Espangler L, Lafargue Gainza F, Borges Toirac MA, Romero García LI. La atención a pacientes con problemas bucales durante la COVID-19: un reto para los profesionales del sector de la salud. MEDISAN [Internet]. 2020 Aug [Cited: 2021 Feb 02] ;24(4):593-609. Available from: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1029-30192020000400593&lng=es Epub 09-Jul-2020

22. Ramírez-Velásquez M, Medina-Sotomayor P, Morocho Macas A. Enfermedad por coronavirus 2019 (COVID-19) y su repercusión en la consulta odontológica: una revisión. Odontol Sanmarquina [Internet]. 2020 May 06 [Cited: 2021 Feb 02];23(2):139-46. Available from: https://revistasinvestigacion.unmsm.edu.pe/index.php/odont/article/view/17758

23. dos Santos KF, Barbosa M. COVID-19 y Odontología en la práctica actual. REAS [Internet]. 28 Nov. 2020 [Cited: 2021 Feb 02]; 12(11):e5113. Available from: https://acervomais.com.br/index.php/saude/article/view/5113

24. Badanian A. Bioseguridad en odontología en tiempos de pandemia COVID-19. Odontoestomatología [Internet] 2020 [Cited: 2021 Feb 02]; 22(Suppl 1):4-24. Available from: http://www.scielo.edu.uy/scielo.php?script=sci_arttext&pid=S1688-93392020000200004&lng=es

25. Bustamante Andrade MF, Herrera Machuca J, Ferreira Adam R, Riquelme Sanchez D. Contaminación Bacteriana Generada por Aerosoles en Ambiente Odontológico. Int. J. Odontostomat [Internet]. 2014 Apr [Cited: 2021 Feb 02]; 8(1):99-105. Available from: https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0718-381X2014000100013&lng=es

26. Bermúdez-Jiménez C, Gaitán Fonseca C, Aguilera Galaviz L. Manejo del paciente en atención odontológica y bioseguridad del personal durante el brote de coronavirus SARS-CoV-2 (COVID-19). Rev ADM. 2020;77(2):88-95. Available from: https://www.medigraphic.com/cgi-bin/new/resumen.cgi?IDARTICULO=93101&id2=

27. Rodríguez Y, Valenzuela-Torres O. Repercusiones de la pandemia de COVID 19 en la atención odontológica, una perspectiva de los odontólogos clínicos. Rev Habanera Cienc Médi. [Internet]. 2020 Aug [Cited: 2021 Feb 02] ; 19(4):e3410. Available from: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1729-519X2020000500005&lng=es

28. Boin-Bakit C, Melián-Rivas A. La atención odontológica a pacientes COVID-19 Positivo ¿Qué hacer ante una urgencia? Int. J. Odontostomat [Internet]. 2020 Sep [Cited: 2021 Feb 02]; 14(3):321-324. Available from: https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0718-381X2020000300321&lng=es

29. Younes T, Freddo S, Alencar D. Biossegurança em Odontologia: o ponto de vista dos pacientes. Arq. Odontol. [Internet]. 2017;53:1-10. Available from: http://fi-admin.bvsalud.org/document/view/p5gaw

30. Soares SSS, Souza NVD de O, Silva KG, César MP, Souto J da SS, Leite JCR de AP. Pandemia de Covid-19 e o uso racional de equipamentos de proteção individual. Rev Enferm UERJ. 2020;28(0):50360. Available from: https://www.e-publicacoes.uerj.br/index.php/enfermagemuerj/article/view/50360/34044

31. Francince L, Referino da Silva A, De Lima Soares M, et al. Conhecimento e uso da biossegurança por profissionais de saúde bucal do SUS do Sertão Pernambucano. Arq. Odontol. [Internet]. 2020 Jun 24 [Cited: 2021 Feb 02]; 56. Available from: https://periodicos.ufmg.br/index.php/arquivosemodontologia/article/view/19831

32. Hernández A, Montoya J, Simancas M. Conocimientos, prácticas y actitudes sobre Bioseguridad en estudiantes de Odontología. Rev Colombiana de Invest en Odontología 2012 [Cited: 2021 Feb 02];3(9):148–157. Available from: https://acfo.edu.co/ojs/index.php/rcio/article/view/109/221

33. Giraldo M, Ochoa J, Vélez C. Experiencia de capacitación virtual sobre bioseguridad en odontología en tiempos de la COVID-19. Universidad CES. Rev. Act odontol. Colombia 2020 [Cited: 2021 Feb 02]; 10(Supl. Covid-19): 47-59. Available from: https://revistas.unal.edu.co/index.php/actaodontocol/article/view/89313#textoCompletoHTML

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