



REVISION ARTICLE

Biosafety in Dentistry before and during the COVID-19 pandemic

Bioseguridad en odontología antes y durante la pandemia de COVID-19

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ABSTRACT

Introduction: in the case of dentistry, biosafety focuses on the procedures that's hould be followed within the dental office in order to ensure the health and safety of both the dentist and his assistants, as well as the patient. These biosafety procedures in dentistry involve immunization strategies and also the prevention of exposure of dentists, assistants and patients to infectious materials.

Objective: to describe the changes in biosafety measures in dentistry worldwide determined by the detection of the SARS-CoV-2 virus.

Methods: to carry out this research, 27 articles were consulted on the subject obtained from searches in databases such as Elsevier through Science Direct, Google Scholar and Scielo, of which 14 as a bibliography, with a predominance of articles published during the last five years and others due to their relevance.

Development: biosafety protocols before the appearance of Covid-19 were focused on avoiding occupational accidents, occupational diseases and cross-infections. Hand washing was widespread among health professionals and was not very common among the general population. After the detection of Covid-19, cleaning and biosafety conditions within the dental practice were improved, more informed patients, effective cleaning staff, mandatory hand washing rules, temperature taking, instruments for each patient, strict sterilization rules and general cleaning of areas.

Conclusions: before performing a treatment the patients hould rinse the mouth for one minute with hydrogen peroxide at 0,5 % -1 % (be careful when preparing it to avoid mucosal burns) or with Povidone at 0,2 % (be careful with those allergic to iodine).

Keywords: Containment of Biohazards; Covid-19; Dentistry.

RESUMEN

Introducción: en el caso de la odontología, la bioseguridad se centra en los procedimientos que se deben seguir dentro del consultorio odontológico con el fin de garantizar la salud y seguridad tanto del odontólogo y sus asistentes, como del paciente. Estos procedimientos de Bioseguridad en odontología involucran estrategias de inmunización y también la prevención de la exposición de dentistas, asistentes y pacientes a materiales infecciosos.

Objetivo: describir los cambios en las medidas de bioseguridad en la odontología a nivel mundial determinados por la detección del virus SARS-CoV-2.

Métodos: para realizar esta investigación se consultaron 27 artículos sobre el tema, obtenidos de búsquedas en bases de datos como Elsevier a través de Science Direct, Google Académico y Scielo, de ellos fueron utilizados 14 como bibliografía. Predominaron los artículos publicados durante los últimos cinco años y otros por su relevancia.

Desarrollo: los protocolos de bioseguridad antes de la aparición del Covid-19 estaban enfocados en evitar accidentes laborales, enfermedades propias de la profesión e infecciones cruzadas. El lavado de manos se difundía para los profesionales de la salud y para la población en general no era muy común. Luego de la detección del Covid-19 se mejoraron las condiciones de limpieza y bioseguridad dentro de la práctica odontológica, pacientes más informados, personal de limpieza eficaz, normas obligatorias lavado de manos, toma de temperatura, instrumental para cada paciente, normas estrictas de esterilización y limpieza de áreas de forma general.

Conclusiones: antes de realizar un tratamiento el paciente se debe enjuagar la boca durante un minuto por peróxido de hidrógeno al 0,5 % o 1 % (tener precaución al prepararlo para evitar quemaduras en mucosa) o con Povidona al 0,2 % (tener cuidado con alérgicos a yodo).

Palabras clave: Bioseguridad; Covid-19; Odontología; Consulta Odontológica.

INTRODUCTION

The first outbreak of Covid-19 pneumonia where the etiologic agent was identified as SARSCoV-2 originated in Wuhan city, China in late December 2019. Some correspondence was found with the previous epidemics of severe acute respiratory syndrome coronavirus known as SARS-CoV generated in 2003 and Middle East respiratory syndrome (MERS) that occurred in 2012. The causative virus, which belongs to the Corona viridae family, had the designation severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), while the disease is referred to as Covid19.⁽¹⁾

The World Health Organization (WHO) declared the Covid19 epidemic a public health emergency of international concern and distress on January 30, 2020. The characterization of "pandemic" implies the spread of the epidemic in different countries, or throughout the world and, therefore, causes a large number of people to be affected. Since the appearance of Covid19 it has posed a threat to world health due to its short spread and contagiousness, in addition to the respiratory complications that generally manifest themselves in patients with other chronic underlying conditions.⁽²⁾

Epidemiological data show that all ages are susceptible to Covid19. Health care workers are exposed to contaminated fluids/aerosols through close contact with the faces of SARS-CoV-2 infected patients; dentistry being a risk profession due to contact with blood, saliva, etc., as

well as the use of devices such as high and low speed parts and ultrasound. This represents an unprecedented occupational risk of morbidity and mortality.⁽³⁾ For this reason, international health organizations have been responsible for briefly establishing recommendations concerning the care of patients by the health team, especially in the area of dentistry.

Among the recommendations to avoid contagion of pathogens transmitted by blood and saliva, implemented since the 80's (although they were difficult to be accepted by some professionals), given the discovery of some infectious diseases such as HIV and Hepatitis, were the following: explore medical histories, use protective eyewear, use new gloves with each patient, sterilize handpieces and instruments after each patient, employ surgical masks, place needles in puncture-resistant containers, wrap equipment, cover surfaces that are difficult to disinfect, and use plastic faces hields.⁽⁴⁾

Currently, dentists and dental assistants working with patients suspected and/or infected with Covid-19 should consider mandatory isolation in the following conditions: those with unprotected close contact with Covid19 positive patients, and in case they present: fever, cough, shortness of breath and other symptoms. In this case, they should be immediately isolated and receive appropriate medical care.⁽⁵⁾ The reality of developing countries is different from those of the first world, so today it is known that in many countries with economic difficulties, the massive outbreak is being faced from the dental point of view with general clinical dentists, who before the pandemic, performed all types of treatments.⁽⁵⁾

Vaccines are still being administered worldwide, but it will take time until the majority of the population is protected. In the meantime, biosecurity measures are essential to stop the spread and transmission of the disease.

The importance of knowing the protocols of care, including those of other countries, in the face of this emergency is emphasized because the dental environment is more susceptible to cross-infection between dental personnel and patients. It is essential to adopt and improve universal measures of personal barrier protection, proper hand hygiene, cleaning, disinfection, sterilization of the environment and materials.⁽⁶⁾

The objective of this review was to describe the changes in biosecurity measures in dentistry determined by the detection of SARS-CoV-2 virus.

METHODS

In order to carry out the present investigation, the scientific literature related to the bio security measures established by the WHO as the governing body in the field of health worldwide in the years before and after the Covid-19 pandemic was studied by consulting the Elsevier databases through ScienceDirect, Google Scholar and Scielo.

Of the 27 articles selected, 14 were used as bibliographic references, with a predominance of articles published during the last five years and others due to their relevance. The inclusion criteria for the articles to be selected were: studies on dental personnel and patients who attended the dental office before and during the Covid19 pandemic, studies that addressed biosafety protocols, studies that reported on the changes made in dental care in terms of safety measures, published in English or Spanish.

DEVELOPMENT

Biosafety consists of standards that are used by both dental personnel, patients, physical spaces and materials that are necessary for dental care with the objective of preventing chemical, mechanical and physical risks thus protecting health.

The emphasis of the biosafety protocols was focused on avoiding occupational accidents, occupational diseases and cross-infections. Hand washing was widespread for health professionals, and the general population was not very common. During the visit to the dental office, it was normal for patients to wait in crowds, without any mandatory protection, and of ten upon arrival at the clinical office they had to take an appointment.^(7,8,9,10,11)

In research carried out in this field decades ago, emphasis was placed on the prevention of infectious diseases, diseases of the profession, and for the prevention of occupational accidents, protection was focused on dentists and dental assistants in the office, patients only used bibs to protect them in case of fluids and liquids.

Table 1. Characteristics of documents and protocols used in dental care. Protective equipment, Equipment, materials, instruments and facilities: disinfection, Additional measures in pre- and clinical care.

Author	Country	Year	Protective	Equipment, materials, instruments and facilities: disinfection	Additional measures in pre-clinical and clinical care
Ushiña y cols.	Ecuador	2020	Surgical gown, Disposable gown, Disposable gloves, Over gloves, Respirator, Protective goggle or visor. -For the patient: Disposable bib, Disposable cap -Field for operative work -Triple syringe, ultrasonic equipment (before directing it at patient's mouth).	-Waterlines (at the beginning of the working day and after each patient). -Spittoon (At the beginning of the day, and after each patient). -Floors, non-metallic surface furnishings, walls and equipment (in the visible presence of oral secretions and contaminated with blood). -Suction and surgical ejector (daily and after suction). -Instruments in general: burs, burnishers, diagnostic equipment, files, trays, high and low speed pieces, etc. (Sterilize in moist heat). -Patients should ideally	-Washing and disinfection of hands of both the dentist and the patient.

				<p>be treated in offices with adequate ventilation. Natural ventilation considered "adequate ventilation".</p> <ul style="list-style-type: none"> - Ensure availability of hand hygiene products/supplies (clean water, soap, disposable towels, 70% alcohol gel). These should be available at the point of care. 	
Pérez y cols.	México	2020	<p>Surgical cap, well-fitting-close goggles, latex or nitrile gloves, disposable shoe covers, facemask, N95 FFP2 mask without exhalation valve, long-sleeved gown</p>	<ul style="list-style-type: none"> - The instruments maintain their washing and sterilization protocol, which goes from the placement of the instruments in the ultrasound and then in sterilization bags. - It is recommended to plasticize keyboards and buttons of computer equipment, autoclave or other machinery to avoid contamination and facilitate cleaning by means of disinfectant solutions. - It will be recommended to the patient application of Alcohol Gel 70%. - Greater natural ventilation of the area is recommended. 	<p>-Before performing any procedure, it is recommended to use mouthwashes orrinses for thermometer</p>
Lang, H.	Spain	2020	<p>Tightfitting eye protection with frame or full face protection (screen), FFP3 self-filtering mask, Double gloves (the second with</p>	<p>Cleaning, disinfection and sterilization of instruments. Follow the corresponding chemical and autoclave sterilization protocols.</p> <ul style="list-style-type: none"> -The area must be properly ventilated naturally. -Have 70 % alcohol or 	<ul style="list-style-type: none"> -Wash hands with soap and brush for 40 seconds. - Every patient entering the clinic should wash their hands. -Before starting, the patient is rinsed with 1 % hydrogen peroxide. Chlorhexidine is not effective against coronavirus. Povidone

			long cuff), Waterproof overalls covering the head, or failing that: waterproof long-sleeved gowns, Waterproof shoes or booties.	gel dispensers available to ensure disinfection.	0,2 % rinses are risky for patients allergic to iodine.
Tovar y cols.	Colombia	2020		<ul style="list-style-type: none"> -Clean and disinfect, x-ray equipment, dental unit, unit lamps, light curing lamps, and any other equipment that has been used in care according to manufacturer's instructions. -Perform the processes of cleaning, disinfection and sterilization of instruments according to the protocols that the dental service must have according to the habilitation process. -There should be good ventilation throughout the place. -Antibacterial gel should be available for hand disinfection. 	<ul style="list-style-type: none"> - The dentists should first perform proper hand washing. -The patient's hands should be washed before entering the dental office; -Before starting dental procedures, it is suggested to use rinses with chemical plaque controllers such as chlorhexidine or Povidone Iodide (2,0 %) or hydrogen peroxide (1,5 %), for one two minutes. -Temperature is taken on admission.
Ather y cols.	United States	2020	Disposable gown, mask or respirator, goggles or face shield, disposable gloves	<p>Clinic staff should ensure that animate surfaces are disinfected.</p> <ul style="list-style-type: none"> -Preparation of materials and instruments in advance and environmental cleaning and disinfection procedures should be followed, after completion of clinical care. -Ensure natural ventilation. - Upon admission of each patient, alcohol should be available for proper disinfection. 	<p>Wash hands or use an alcohol-based hand sanitizer. In the same way, patients perform this procedure. Pre-procedure mouth rinse with 0,2 % Peroxide mouth wash.</p>

				povidone-iodine may reduce the coronavirus load in saliva. Another alternative would be to use 0,5-1 % hydrogen	
Biosafet y Standar ds Control Commis sion	Argentina	2021	Ideal: double gloves per patient, n95 masks, cap, eye protection, waterproof disposable gown and shoe covers)	<ul style="list-style-type: none"> - Define reception area, triage and disinfection of patients, bathrooms, administration, waiting room. -Verify hygiene and protection of equipment (turbine, halogen lamp, etc.). Continue according to whether or not the piece can be sterilized in autoclave, with the parameters indicated by the manufacturer. -There should be natural ventilation in all areas. -Place alcohol or gel dispensers to be used upon admission. 	<ul style="list-style-type: none"> -Ideally: the patient enters and is accompanied to wash hands and face. Health personnel apply liquid soap and should perform a 40-second technique. -Patient's health triage: take remote temperature and general and current medical history. The patient can perform the following pre-treatment doses with: POVIDONE- IODONE 0,2 % for 1 minute. CHLOREXIDINE 0,12 % for 1 minute, undiluted, salivate, do not swallow. CETHYL PYRIDINIUM CHLORIDE 0,05 % for 1 minute, undiluted, salivate, do not swallow .
Vera and cols.	Perú		Gown, mask, respirator (N95 or similar), gloves, goggles or eye protection.	<p>Mechanical cleaning and removal of fall foreign matter in the environment on surfaces and objects, using: manual or mechanical washing. Use of enzymatic detergent for surface cleaning.</p> <ul style="list-style-type: none"> -Extend them measures for disinfection, packaging, sterilization and storage of instruments and material. The WHO recommends the use of moist heat (autoclave), and discards the use of heat-drying (stove). -The waiting room and reception area should be ventilated. -Alcohol dispensers should be available and should be used at the 	<ul style="list-style-type: none"> - The dentists should perform a thorough hand washing for 40 seconds. -The patients should wash their hands before treatment. -Before performing a treatment, the patients should rinse his mouth for one minute with hydrogen peroxide at 0,5 % -1 % (be careful when preparing it to avoid mucosal burns) or with Povidone at 0,2 % (be careful with those allergic to iodine) or cetylpyridinium at 0,05 %-0,1 %. -The temperatures should be measured in every patient.

				time of admission.	
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Ushiña y et al.,⁽⁶⁾ in the guide and protocol elaborated, explain that dental personnel should use a disposable gown, gloves, respirator mask, as well as protective goggles and shoe covers, all of which are mandatory. They also emphasize the cleanliness of the equipment and instruments used during the practice. These same recommendations are also mentioned by Tovar (et al.). the strict use of disposable gown.

Lang, H, ⁽¹¹⁾ finds great importance in the use of double gloves, being these second one with a longer cuff than the first stone, as well as the use of overall covering the head. Ather, et al.,⁽¹³⁾ in their review, agrees with the regulation on the use of gloves, facemask or protective goggles, and disposable gown, but do not mention the use of disposable shoe covers. Another review considers ideal the use of double gloves per patient, chin straps or mask n95, masks, cap, eye protection, disposable waterproof gown and, of course, shoe covers.

There are aspects that coincide in all these reports, protocols and reviews carried out, such as: correct disinfection of areas, equipment and instruments according to the protocols established by the manufacturers, or those recommended by the different regions or countries from where they were elaborated. In addition, it is essential that the environment and infrastructure have adequate and natural ventilation, since, in very closed environments, the virus spreads more easily through the air.

Have containers with 70 % alcohol or antibacterial gel available inside the office or reception areas for the use of patients and, of course, professionals. Likewise, handwashing of both the professional and the patient to be treated is important because it prevents other diseases (apart from Covid-19) and the spread of infections to other people. All protocols express these aspects. The taking of temperature with a digital thermometer at the entrance, prior to the patient's care, is also included in the different protocols.

Ideally, before performing any dental procedure or check-up, the patients should rinse with solutions such as Povidone 0,2 % or hydrogen peroxide 1 %, as most protocols and reviews agree. However, Vera (et al.) and the Biosafety Standards Control Commission added 0,5 % as another option for rinsing.^(14,15) Also, Tovar y cols,⁽¹²⁾ and the Biosafety Standards Control Commission,⁽¹⁴⁾ mention that chlorhexidine can also be used for this purpose, but Lang, H. ⁽¹¹⁾ states that it is not effective against Covid19.

The studies analyzed on biosafety in dentistry before and during the Covid-19 pandemic show the differences in the protocols, since in emergencies we should have a prior agreement with each patient before any treatment in order to carry out adequate management, taking into account the characteristics of the pandemic. In addition, the types of masks, since before the pandemic there was no emphasis it, it was possible to use any mask, remembering to change it at specific times such as: after attending to each patient if it suffers any damage or gets wet with any aerosol, if it is infected with any body liquid or blood splashes by the patient.

Among the lang of dental professionals Ushiña (et al.)⁽⁶⁾ states that phasis should be placed on biosafety and on the cleanliness of the instruments used during clinical practice.⁽⁶⁾ The obligation to use a surgical cap, gown and mask for both patients and dental personnel, but specifies that latex gloves must be latexonitrile, as well as the N95 mask to avoid Covid19 infection, the gown is discarded with the care of each patient, and the use of double gloves is a norm.⁽¹²⁾

There were evident changes in the transition of learning to live with Covid-19, among them: the conditions of cleanliness and biosafety within the dental practice, more informed patients, effective cleaning staff, mandatory rules for handwashing, temperature taking, gel disinfection, instruments for each patient, standard rules for sterilization and clean lines in general.

Conflict of interest

The authors declare that there is no conflict interest.

Authors' contribution

All authors participated in the conceptualization, formal analysis, project management, writing - original draft, writing - revision, editing and approval of the final manuscript.

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