



ISSN: 2230-9926

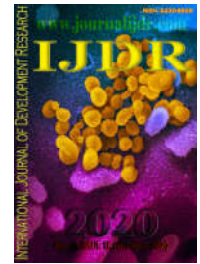
Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research

Vol. 10, Issue, 11, pp. 41996-42000, November, 2020

<https://doi.org/10.37118/ijdr.20393.11.2020>



RESEARCH ARTICLE

OPEN ACCESS

CONTAINMENT OF BIOHAZARDS IN DENTISTRY DURING COVID-19 OUTBREAK

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ARTICLE INFO

Article History:

Received 25th August, 2020

Received in revised form

29th September, 2020

Accepted 17th October, 2020

Published online 24th November, 2020

Key Words:

Dentistry, Coronavirus infections, COVID-19, Containment of Biohazards.

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ABSTRACT

COVID-19 is a virus infectious disease that started spreading from Wuhan by the end of 2019 to the entire globe rising great concern for health professionals, especially Dentists. Thus, this paper aims to review the current literature about the conduct of professionals and biosafety adopted in dental care after the appearance of COVID-19. A guiding question for this study was set by the PICO search strategy and the survey of the papers was performed in three different databases: PubMed, SciELO and LILACS using “Coronavirus infections”, “Dental care”, “COVID-19”, “Biosafety” and “Dentistry” as keywords. 125 Records were identified through database searching, among these records, 10 Full-text articles were assessed for eligibility and only 8 were included in the critical review. Dental and other health professionals in general should adopt the standards of care and infection control as well as keep updated to the new researches about the novel 2019 SARS-COV-2 pandemic settings to provide an adequate protection for the public and for themselves, considering that dentists are the health care professionals at the high risk of cross contamination due to the unique dental office settings.

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Citation: Wanderson Carvalho de Almeida and Maria Ângela Arêa Leão Ferraz. 2020. “Containment of biohazards in dentistry during covid-19 outbreak”, *International Journal of Development Research*, 10, (11), 41996-42000.

INTRODUCTION

COVID-19 is a virus infectious disease caused by a pathogen named 2019 Novel Corona Virus (2019-nCoV) (YU *et al.*, 2020; LU *et al.*, 2020). This pathogen belongs to a virus family already known by the scientists around the world and by the end of 2019 started spreading from Wuhan, the Chinese region where the first cases of infected people were found, to the entire globe (PHELAN *et al.*, 2020; WHO, 2020; DONG *et al.*, 2020). Its remarkable symptoms are fever, difficulty to breathe, nausea, diarrhea, dry cough and most recently it was observed that the infection of SARS-CoV-2 is able to bind to salivary glands' angiotensin-converting enzyme 2 receptors and due to it infected patients presents taste and smell loss (GIACOMELLI *et al.*, 2020; HOFFMANN *et al.*, 2020; SABINO-SILVA *et al.*, 2020).

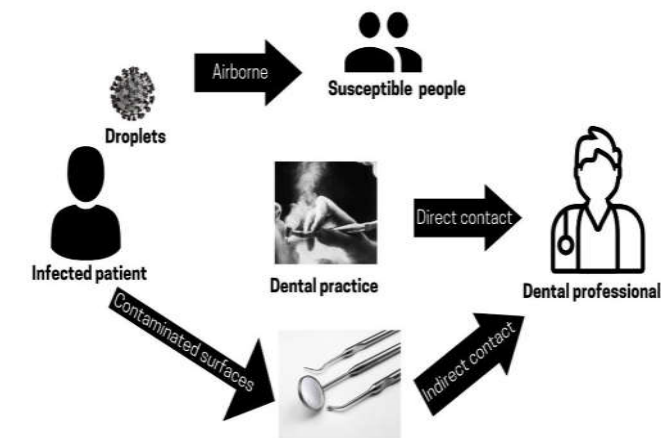
The transmission routes of coronavirus can occur by the intimate contacted with body fluids, mainly saliva droplets of an infected person when sneeze or cough next to health people. 10 But that is not the only way to spread the virus. The infection of SARS-CoV-2 can also happen when someone touches infected objects and then raise his hands to face, in a directly contact to the eyes and nose. SARS-CoV-2 incubation period can range from 7 to 14 days, which is the time official

health services encourage infected people to keep social distancing and monitoring the cases (YU *et al.*, 2020; Rothe *et al.*, 2020; Centers for Disease Control and Prevention, 2020).

In face of these particular features of COVID-19 routes of transmission, dental professionals are at the high risk of infection, due to the unique dental practice and office settings (ATHER *et al.*, 2020). In Dentistry, the risk of infection transmissions between professional to patient or patient to professional is high, because there is a close contact with body and oral fluids, such as saliva and blood, during dental procedures, as well as the management of instruments that may be contaminated (ATHER *et al.*, 2020; KOHN *et al.*, 2003; PENG *et al.*, 2020).

Besides, the use of high speed, ultrasound and others equipments that aid dentists to realize clinical procedures produce aerosols and saliva droplets, making the dental office a high level contaminated place and possible route of transmission for coronavirus and others infections, as demonstrated in Figure 1 right below this paragraph. In light of what was discussed above, the containment of Biohazards during dental practice is a matter of concern and it needs to be continuously revised and updated regarding to Biosafety

standard protocols already adopted and aid to stop, avoid or, at least, minimize the level of COVID-19 routes of transmission in dental environment. Thus, the objective of the paper is to review the current literature about the conduct of professionals and biosafety adopted in dental care after the appearance of COVID-19.



Source: Own elaboration

Figure 1. Transmission routes of 2019-nCoV in dental offices

MATERIALS AND METHODS

The study conducted was a review which gathers results from different methodologies aiming to analyze critically scientific evidences of the current literature in order to go deeper in the investigated question. For the inclusion criteria established, scientific articles were considered available in full, involving original research and literature reviews, systematic or not, published from December 2019 until July 2020 and that had direct relationship with the objective of the study. Studies such as experience reports, letter to editor and opinion articles were excluded, as well as studies that did not answer the guiding question. A guiding question for this study was based in the acronym PICO, which is a search strategy that each of the letters gets a meaning: P (population), I (Interest), CO (context). The guiding question was: "Which containment of Biohazards protocols Dental professionals are taking in order to prevent infections in their clinical practices after COVID-19 outbreak?" This review is based on an electronic search in three different databases: PubMed, SciELO and LILACS. The MeSH terms used was "Coronavirus infections", "Dental care", "COVID-19", "Biosafety" and "Dentistry", combined according to each database Table 1 right below this paragraph. Preferred Reporting Items for Systematic reviews and Meta-Analyses – PRISMA method was used for the selection of the papers included in this review, Figure 2 right below this paragraph.

RESULTS

The results of the critical analyses provided by after the scanning and selection of articles are described below throughout a discussion on containment of biohazards in Dentistry during COVID-19 outbreak. Some specific procedures for dental patient management must be discussed, concerning nosocomial infection prevention. A long-distance screening by telephone voice calls can be performed to identify patients with COVID-19 infection, using three initial questions: 1) considering any contact with a symptomatic

person for coronavirus disease; 2) a travel history to a place registering a high number of confirmed cases of COVID-19 and 3) presence of symptoms like fever, cough or any other febrile respiratory illness (ATHER *et al.*, 2020).

Table 1. Databases' search strategies

Data Base	Search Strategy	Results
PubMed	(("Dentistry"[Mesh] AND "Coronavirus Infections"[Mesh]))	113
SciELO	covid-19, dentistry, biosafety	5
LILACS	covid-19, dental care, biosafety	7

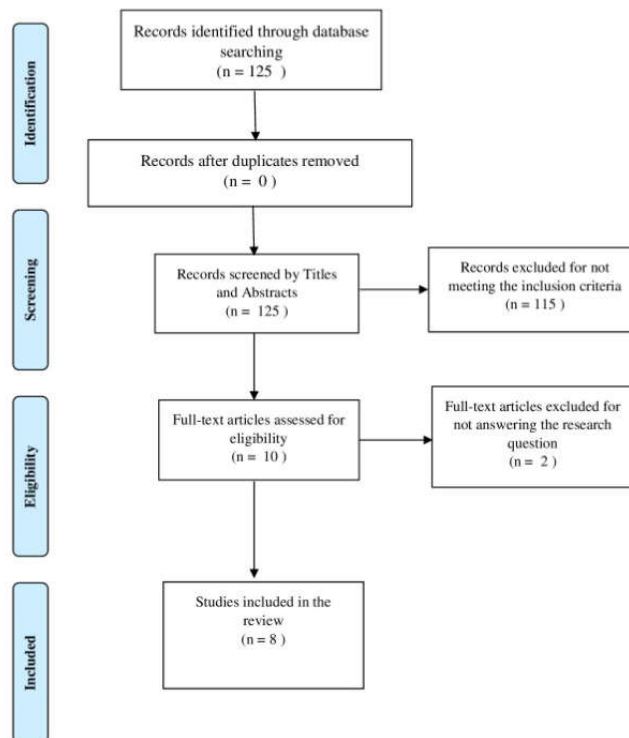
If patient reports positively to any of these initial questions, an elective actions of dental care must be taken as long as the incubation period of the virus persists (it can range from 7-14 days). Also, social distancing of these kinds of patients must be encouraged (WANG *et al.*, 2020). As patients seek for Dental care, it is suggested to apply two different questionnaires: I) both true emergency and II) COVID-19. Also, patient's body temperature should be measured by the Dental professional team using infrared thermal cameras or with a non-contact forehead thermometer (PENG *et al.*, 2020). The presence of body temperature higher than 38° C and respiratory disease symptoms for patients should alert clinical oral professionals and according with the Centers for Disease Control and Prevention guidelines, these people must be seated in well-ventilled waiting rooms distant at least 6 ft from health people looking for oral care. For these patients, the use of surgical masks must be indicated and provide them with the proper respiratory hygiene habits recommendations, such as covering nose and mouth before sneezing and coughing (Centers for Disease Control and Prevention, 2020). Another concerned matter is the disinfection procedures during daily activities in clinical dental offices. Handwashing with aid of soap and water and disinfection of objects with the use of 70% alcohol are high recommended actions for infection control, knowing that people rise their hands to face on an average number of 23 times per hour and 44% of these occurrences involve the touch of mucous membranes of the mouth and/or nose (KWOK *et al.*, 2020). Thus it is imperative to professionals wash their hands with soap and water for at least 30 minutes or more before and after clinical procedures. The hygiene measures must be intensified with the end of the work shift. Gloves, goggles, hat and mask are already common Personal Protective Equipments (PPE) adopted in Dentistry. But after SARS-CoV-2 outbreak it is great in need to add Facial shields, polypropylene lab coat / apron with long sleeves, elastic cuffs and collar, foot protection and specific masks, to these PPE in order to control infection and prevent the spread of SARS-CoV-2 within the dental office. About 62,5% (n= 5) of the selected papers for this review reports N-95, PFF2 and PFF3 as the standard recommendation masks for dental use (COELHO *et al.*, 2020; MENG *et al.*, 2020).

Coronavirus persists in environments for hours or even days, depending on the surface where it is "hidden". Thus, a series of standard recommendations for clinical procedures are indicated, which must be adopted in order to inactivate, destroy or remove pathogens from any surface, instrument and during dental care, which the virus can install itself, as summarized in table 2 (ATHER *et al.*, 2020; PENG *et al.*, 2020; MENG *et al.*, 2020; AHMED *et al.*, 2020; IZZETTI *et al.*, 2020; LO GIUDICE *et al.*, 2020; PEREIRA *et al.*, 2020).

Table 2. Included studies in the critical review

AUTHOR	USE OF ORAL RINSE	RUBBER DAM INDICATION AND HIGH POWER SUCTION	AUXILIARY IMAGE EXAMINATION
Ahmed, et al. (2020)	Mouthwashes containing agents with antiviral activity such as povidone-iodine exhibited efficacy against several respiratory viruses.	The use of a rubber dam is recommended during the procedures, as well as a high-powered suction device.	Intraoral radiographs can be replaced by extraoral radiographs, such as computed tomography, whenever possible.
Ather, et al. (2020)	-	Recommends use as a duct for reducing aerosols in the dental office	extra-oral radiographs, panoramic radiography and CT scans are appropriate alternatives during the COVID-19 outbreak.
Coelho MG. (2020)	Mention mouthwashes with 1% hydrogen peroxide, 0.2% provider or cetylpyridinium chloride (CPC) 0.05% - 0.1%, for having an oxidizing action.	the use of the rubber dam reduces 70% of the production of aerosols or splashes of saliva or blood, and 90% of microorganisms in the air by 1 meter in diameter.	-
Izzetti, et al. (2020)	1% hydrogen peroxide or povidone at 0.2% to reduce the microbial load in saliva, with potential effect on SARS-CoV-2.	He mentions that the use of the rubber dam and high power suction can limit the diffusion of aerosol.	Recommends extra-oral radiographs to reduce the risk of stimulate cough.
Lo Giudice, (2020)	It suggests that the patient rinse his mouth for 30 s with a 1% hydrogen peroxide solution (1 part to 10 volume / 3% hydrogen peroxide and 2 parts water) or 1% povidone-iodine.	Mention only the indication of the rubber dam to reduce the possible production of aerosols	Recommends extra-oral radiological examinations instead of intraoral to prevent stimulation of cough or vomiting
Meng, et al. (2020)	Antimicrobial mouthwash as a pre-procedure procedure. It does not mention the antimicrobials that can be used.	Isolation of the operative field with rubber sheets and high saliva suction devices can help to minimize aerosol or spatter in dental procedures.	It points to extra-oral dental radiographs, panoramic radiography and computed tomography as appropriate alternatives during the outbreak of COVID-19.
Peng, et al. (2020)	It brings 1% hydrogen peroxide or 0.2% povidone as recommended antimicrobial agents after the appearance of COVID-19.	It has been reported that the use of a rubber dam significantly reduces airborne particles by around 1 meter in diameter, containing 70% of the particles within the operational field	-
Pereira, et al. (2020)	Suggests using rinses before each procedure 1% or 1.5% hydrogen peroxide or 0.2% povidone.	To minimize the production of aerosols, dentists should choose to use saliva suction (high power) and isolation of the operative field during treatment, in addition to avoid using a triple syringe (air / water).	Warns that intraoral radiographs should be avoided as it can induce coughing.

Source: own elaboration



Source: Own elaboration

Figure 2. Flowchart of identification, selection and inclusion of articles, adapted from PRISMA

DISCUSSION

The rapid transmission of the novel SARS-COV-2 raised a worldwide concern for governments, health professionals and for people in general. All possible information about how the coronavirus spreads and acts is valuable as long as this pandemic moment remains. The present review brings several information for dental care professionals about the containment of biohazards during dental care support, helping the scientific community and dentists to be updated to new clinical behavior and future challenges. Surgical masks present low capacity of filtration of particles when they are compared to N-95, which can filter 94 to 99% of the particles, in addition to promoting a good facial adaptation, according to Lo Giudice *et al.*, 2020. In Dentistry, the use of N-95 masks as a PPE is crucial due to the high producing of aerosols during clinical procedures (LO GIUDICE *et al.*, 2020; SWENNEN *et al.*, 2020). A meticulous selection of patients who require urgency care, such as uncontrolled bleeding, cellulite or diffuse bacterial infections and trauma involving facial bones with potential airway impairment must be performed by voice calls. This kind of trial is reported by the studies of Ather *et al.*, 2020 and Pereira *et al.*, 2020. Carroulet *et al.*, 2020 affirm the ineffectiveness of chlorhexidine digluconate against SARS-CoV-2. This mouth rinse presents a vast spectrum of action and it is commonly used in intraoral antiseptics in Dentistry. This fact leads the use of hydrogen peroxide, povidone iodine and cetylpyridine chloride as standard chemical agents for intraoral antiseptics against coronavirus in order to reduce the viral load present in the oral cavity.

Conclusion

Dental and other health professionals in general should adopt the standards of care and infection control as well as keep updated to the new researches about the novel 2019 SARS-COV-2 pandemic settings to provide an adequate protection for the public and for themselves, considering that dentists are the health care professionals at the high risk of cross contamination due to the unique dental office settings. Thus, this new scenario never once seen before by healthcare professionals and mainly for dentists requires more researches in the area, establishing better definitions and behaviors to contain biohazards in the environments of work.

REFERENCES

- Ahmed MA, Jouhar R, Ahmed N, Adnan S, Aftab M, Zafar MS et al. 2020. Fear and Practice Modifications among Dentists to Combat Novel Coronavirus Disease COVID-19. Outbreak. Int. J. Environ. Res. Public Health. 17. pp. 2821. doi:10.3390/ijerph17082821.
- Ather A, Patel B, Ruparel NB, Diogenes A, Hargreaves KM. 2020. Coronavirus Disease 19 COVID-19. : Implications for Clinical Dental Care. J Endod.46, pp.584-595.doi: 10.1016/j.joen.2020.03.008.
- Carroulet F, Pia Conte M, Fisher J, Gonçalves LS, Dussart C, Llodra JC et al. 2020. COVID-19: A recommendation to examine the effect of mouthrinses with cyclodextrin combined with citrox in preventing infection and progression. J. Clin. Med. 9, pp.1126. doi: 10.3390/jcm9041126.
- Centers for Disease Control and Prevention. Infection control: severe acute respiratory syndrome coronavirus 2 SARS-CoV-2. Available online at: <https://www.cdc.gov/coronavirus/2019ncov/infectioncontrol/controlrecommendations.html>.
- Centers for Disease Control and Prevention. Transmission of coronavirus disease 2019 COVID-19. . Available online at: <https://www.cdc.gov/coronavirus/2019-ncov/about/transmission.html>.
- Coelho MG. 2020. 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.14, pp.271-278.
- Dong E, Du H, Gardner L. 2020. An interactive web-based dashboard to track COVID-19 in real time. Lancet Infect Dis.20, pp.533-534.doi: 10.1016/S1473-309920.30120-1.
- Giacomelli A, Pezzati L, Conti F, Bernacchia D, Siano M, Oreni L. 2020. Self-reported olfactory and taste disorders in SARS-CoV-2 patients: a cross-sectional study. Clin Infect Dis. 2020. 28, pp.889-890. doi: 10.1093/cid/ciaa330.
- Hoffmann M, Kleine-Weber H, Schroeder S, Krüger N, Herrler T, Erichsen S, et al. 2020. SARS-CoV-2 Cell Entry Depends on ACE2 and TMPRSS2 and Is Blocked by a Clinically Proven Protease Inhibitor. Cell.181, pp.271-280. doi: 10.1016/j.cell.2020.02.052.
- Izzetti R, Nisi M, Gabriele M, Graziani F. 2020. COVID-19 Transmission in Dental Practice: Brief Review of Preventive Measures in Italy. Journal of Dental Research.99, pp.1030-1038. doi: 10.1177/0022034520920580.
- Kohn WG, Collins AS, Cleveland JL, Harte JA, Eklund KJ, Malvitz DM. 2003. Guidelines for infection control in dental health-care settings. MMWR Recomm Rep. 52, pp.1-61.
- Kwok YL, Gralton J, McLaws ML. 2015. Face touching: a frequent habit that has implications for hand hygiene. Am J Infect Control.43, pp.112-114. doi: 10.1016/j.ajic.2014.10.015.
- Lo Giudice R. The Severe Acute Respiratory Syndrome Coronavirus-2 SARS CoV-2. in Dentistry. 2020. Management of Biological Risk in Dental Practice. Int. J. Environ. Res. Public Health. 17, pp. 3067. doi: 10.3390/ijerph17093067.
- Lu R, Zhao X, Li J, Niu P, Yang B, Wu H. 2020. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. Lancet. 395, pp.565-574. doi: 10.1016/S0140-673620.30251-8.
- Meng L, Hua F, Bian Z. 2020. Coronavirus Disease 2019 COVID-19. : Emerging and Future Challenges for Dental and Oral Medicine. Journal of Dental Research. 99, pp.481-487. doi: 10.1177/0022034520914246.
- Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. 2020. Transmission routes of 2019-nCoV and controls in dental practice. Int J Oral Sci. 12, pp. 9. doi: 10.1038/s41368-020-0075-9.
- Phelan AL, Katz R, Gostin LO. 2020. The Novel Coronavirus Originating in Wuhan, China: Challenges for Global Health Governance. Jama.323, pp.709-710. doi:10.1001/jama.2020.1097
- Pereira LJ, Pereira CV, Murata RM, Pardi V, Pereira-dourado SM.2020. Biological and social aspects of Coronavirus Disease 2019 COVID-19. related to oral health. Braz. Oral Res.34, pp. 3.<http://dx.doi.org/10.1590/1807-3107bor-2020.vol34.0041>.
- Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C. 2020. Transmission of 2019-nCoV Infection

- from an Asymptomatic Contact in Germany. *N Engl J Med.* 382, pp.970-971. doi: 10.1056/NEJMc2001468.
- Sabino-Silva R, Jardim ACG, Siqueira WL. 2020. Coronavirus COVID-19 impacts to dentistry and potential salivary diagnosis. *Clin Oral Investig.* 24, pp. 1619-1621. doi: 10.1007/s00784-020-03248-x.
- Swennen GRJ, Pottel L, Haers PE. 2020. Custom-made 3D-printed face masks in case of pandemic crisis situations with a lack of commercially available FFP2/3 masks. *Int J Oral Maxillofac Surg.* 49, pp. 673-677. doi: 10.1016/j.ijom.2020.03.015.
- Situation Report-67 SITUATION IN NUMBERS total and new cases in last 24 hours. Available online at: https://who.int/docs/defaultsource/coronaviruse/situationreports/20200327sitrep67covid19.pdf?sfvrsn=5b65f68eb_4.
- Wang Y, Chen Y, Qin Q. 2020. Unique epidemiological and clinical features of the emerging 2019 novel coronavirus pneumonia COVID-19. implicate special control measures. *J Med Virol.* 92, pp.568-576. doi: 10.1002/jmv.25748.
- World Health Organization. 2020. Coronavirus disease 2019 COVID-19. : situation report-36. Available online at: https://www.who.int/docs/defaultsource/coronaviruse/situationreports/20200225-sitrep-36-covid-19.pdf?sfvrsn=2791b4e0_2.
- Yu P, Zhu J, Zhang Z, Han Y, Huang L. 2020. A familial cluster of infection associated with the 2019 novel coronavirus indicating potential person-to-person transmission during the incubation period. *J Infect Dis.* 221, pp.1757-1761. doi: 10.1093/infdis/jiaa077.
- Zhonghua Liu Xing Bing Xue Za Zhi. 2020. An update on the epidemiological characteristics of novel coronavirus pneumonia (COVID-19. . 41, pp.139-144. doi: 10.3760/cma.j.issn.0254-6450.2020.02.002.
