Impact on Dental Work during the Pandemic Covid-19: Systematic Review

Abstract: To simplify the precautionary measures, protocols have been developed for emergency dental care against the CoV-19 pandemic. From April 14 of 2020 show more than 2 million people have been infected with the virus, causing more than 120,000 deaths in over 210 countries worldwide. Published regarding complications, protocols and other information for the dentistry care during SARS-CoV-2 pandemic. The documents included randomized clinical trials and systematic reviews. The research criteria include the following words and combinations: [Randomized study], [Systematic review], [SARS-CoV-2], [coronavirus diseases], [surgery], [epithelial oral mucosa cell], [aerosol], [spray] using the Boolean operators AND, OR and NOT. Was declared a pandemic by the World Health Organization (WHO) on March 11 of 2020, said SARS, MERS, CoV persist on inanimate surfaces (metal, glass, plastic) for up to 9 days, in stomatology, such as the airborne spread, contact spread, and contaminated surface spread, used cetylpyridinium chloride significantly reduced the number of CFU, epithelial cells of tongue, CoV-19 infectious susceptibility. Dentists are directly exposed to inhalation of viral particles in aerosols, where the virus can remain viable for up to 3 hours.

Keywords: COVID-19, RNA, saliva, aerosols, mouth mucosa, pandemic. [MESH].

BACKGROUND

The infectious disease (Covid-19) pandemic and the social, economic, professional impacts it produced occurred more quickly than anticipated. In 1918, the influenza pandemic kill fifty million or more people, and it is estimated that it is currently equivalent to kill one hundred million in the current population. In November 2019, 400 cases of Covid-19 caused by severe acute coronavirus of respiratory syndrome 2 (SARS)-CoV-2 appeared in China and rapidly spread in China and exported to 36 countries, sowing at least 2 secondary cases for each primary case (Morens, D. et al., 2020). The main problem of this type of viral disease that has a global scope is the dynamic processes with possible cycles of repetition, as seen between January 1918 and December 1920 with the Spanish Influenza (caused by the H1N1 virus), which produced three outbreaks during these period. Spanish influenza is estimated to have caused between 25 to 50 million demise, killing more people in 25 weeks than HIV-AIDS killed in 25 years (Zhu, N. et al., 2020). Of the American soldiers who died during the First World War, half perished as a result of Spanish Influenza and not by the enemy’s bullets. Malnutrition, hospitals overwhelmed by capacity, poor hygiene and super infection caused the majority of fatalities (Xu, X. et al., 2020). Patients showed up in different hospitals with diagnoses of well-known pneumonia etiology. Most of these patients were epidemiologically linked to a wholesale market for live and unprocessed fish, shellfish and animals in Huebi province (Rodriguez, V. 2020). In April 2020, Covid-19 officially became a pandemic. Its clinical manifestations are serious, including causing deaths in 124 countries and territories, and the final scope of Covid-19 disease is not yet determined. As seen in Italy and Spain (Kamel Boulos, MN.et.al.,2020), the virus has collapsed developed country health systems and has also overpowered the epidemiological curve in another potency that substantiated the disease in the United States (Emanuel, E. et al., 2020). Most patients infected with SARS-CoV-2 developed some symptoms, like dry cough, soreness or burning sensation in the throat and fever (Khadie, HH. et al., 2020). Many of the cases spontaneously resolve. However, some have developed several complications such as severe pneumonia, acute respiratory distress syndrome, kidney failure and even death (Huang, C. et al., 2020).

METHODS

Databases of Scopus, Ebsco, PubMed, Medline Embase, Cochrane Library, Web Science, Scielo, Latindex and Redalyc were searched for the following key words— [Randomized study], [Systematic review], [SARS-CoV-2], [coronavirus diseases], [surgery], [epithelial oral mucosa cell], [aerosol], [spray]—using the Boolean operators AND, OR and NOT. The Prisma research protocol, flujogram, explains the sequence of information selection. The inclusion criteria were complete articles with publications from November 2018 December 2020. A total of 128 identified records were found, while the records screening included 90 records. 100 records were excluded, and removed after determining that they are duplicated. Also, 23 records number of studies include d in the synthesis n = 5.
Figure 1. Flow diagram Study

**REVIEW**

**Search results**

Ortiz et al., 2020 SARS-CoV-2 virus, was declared a pandemic by the World Health Organization (WHO) on 11 March 2020; Kampf 2020 said SARS, MERS, Cov persist on inanimate surfaces (metal, glass, plastic) for up to 9 days; Xian Peng 2020 show as 2019-nCov in stomatology, such as the airborne spread, contact spread, and contaminated surface spread. Costa V 2020 cetylpyridinium chloride significantly reduced the number of CFU. Frichembruder, 2020, adults, those from an urban area, people with a lower income; Xu 2020 epithelial cells of tongue, 2019 n-Cov infectious susceptibility. (Table 2).

Fever is the most prevalent symptom in Cov-19 (98.6), fatigue (70) and dry cough (59.4). The myalgias were founded located in pectoral muscles and chewing muscles (34.8) (Table 3).

Xu, H et al., 2020 route of 2019-nCov infection on the mucosa of oral cavity (Table 4).
Table 2. Risk of bias assessment. Review authors’ judgment about each risk of bias item presented as percentages across all included studies and for each included study

<table>
<thead>
<tr>
<th>Number</th>
<th>Authors/Magazine</th>
<th>Aims</th>
<th>Topic Studied</th>
<th>Methods</th>
<th>Results</th>
<th>Conclusions</th>
<th>JAD A Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>Kampf G, Todt D, Pfaender S, Steinmann E 2020</td>
<td>Review was the Insistence.</td>
<td>Systematic Review</td>
<td>“TGEV”, “MHV” or “CCV”: survival surface (88 / 10 / 25 / 0 hits), Cov-19 can be on things without life like glass, plastic or metals for more than 9 days.</td>
<td>Surface disinfection with 0.1% sodium hypochlorite or 62-71% ethanol significantly reduces coronavirus infectivity on surfaces within 1 min exposure time. We expect a similar effect against the SARS-CoV-2.</td>
<td>5 High</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Xian Peng, Xin Xu, Yuqing Li, Lei Cheng, Xuedong Zhou and Biao Ren 2020</td>
<td>Routs transference in stomatology</td>
<td>Systematic Review</td>
<td>Scoping reviews are a synthesis that systematically maps evidence subject matter. Clinics stomatology closed in the epidemic time, a big amount of emergency patients continues going to the hospitals and dental clinics for their treatment.</td>
<td>Infection control measures in the course of a dental practice person-to-person the transmission routes in hospitals and dental clinics.</td>
<td>5 High</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Costa V, Silveira M, Silva E, Alexandre G 2019</td>
<td>Evaluate in reducing the number of microorganisms disseminated by means of the aerosol generated via dental</td>
<td>Systematic Review</td>
<td>Randomized clinical trials, meta-analysis for reduction of the number of colony-forming units (CFU) in the dental aerosol. Essential oils, chlorhexidine and cetylpyridinium chloride meaningfully knock down the amount of CFU. Preprocedural mouthrinses get down significantly the amount of microorganisms in the aerosol.</td>
<td></td>
<td>5 High</td>
<td></td>
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<tr>
<td>Page</td>
<td>Reference</td>
<td>Title</td>
<td>Summary</td>
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<tr>
<td>28</td>
<td>Frichembrude rL, K dos Santos, C Neves, F 2020</td>
<td>Determinant s used for dental care services within the health Systematic Review</td>
<td>Identifying the research question, relevant studies, selecting studies, gathering data, summarizing, and mapping describing the results.</td>
<td>Recorded by people in pain, women, adults, Aggravation of chronic oral diseases with painful symptomatology in users</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Xu, H Zhong L, Deng L, Peng L Hongxia D, Zeng X, Li T and Chen Q. 2020</td>
<td>Research infection on the mucosa of oral cavity bulk RNA-seq. Data base Analysis</td>
<td>The Cancer Genome Atlas (TCGA) and functional Annotation of The Mammalian Genome Cap Analysis of Gene Expression (FANTOM 5 CAGE) (dataset was collected)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Oral cavity is a High potential high risk for 2019 n-CoV infectious susceptibility.</td>
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<tr>
<td>4</td>
<td>Ortiz E 2020</td>
<td>Virus es that could bring about disease in humans and animals. Literature review Comprehensive the virus SARS, Mers CoV-2 (COVID-19)</td>
<td>COVI D-19, caused by the SARS-CoV-2 virus, considerate a pandemic. The genetic, virologic, therapeutic and clinical evidence on the SARS-CoV-2</td>
<td>High</td>
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<td>5</td>
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</tbody>
</table>

8
Table 3 Clinical Manifestations of COVID 19 infection.

<table>
<thead>
<tr>
<th>Clinical manifestations</th>
<th>ICU</th>
<th>Non-ICU</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>5 (3.6)</td>
<td>3 (8.3)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>5 (3.6)</td>
<td>3 (8.3)</td>
</tr>
<tr>
<td>Headache</td>
<td>9 (6.5)</td>
<td>3 (8.3)</td>
</tr>
<tr>
<td>Dizziness</td>
<td>13 (9.4)</td>
<td>8 (22.2)</td>
</tr>
<tr>
<td>Nausea</td>
<td>14 (10.1)</td>
<td>4 (11.1)</td>
</tr>
<tr>
<td>Pharyngalgia</td>
<td>14 (10.1)</td>
<td>6 (16.7)</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>24 (17.4)</td>
<td>12 (33.3)</td>
</tr>
<tr>
<td>Sputumproduction</td>
<td>37 (27)</td>
<td>8 (22.2)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>43 (31.2)</td>
<td>23 (63.9)</td>
</tr>
<tr>
<td>Myalgia</td>
<td>48 (34.8)</td>
<td>12 (33.3)</td>
</tr>
<tr>
<td>Anorexia</td>
<td>55 (40)</td>
<td>24 (66.7)</td>
</tr>
<tr>
<td>Dry Cough</td>
<td>82 (59.4)</td>
<td>21 (58.3)</td>
</tr>
<tr>
<td>Fatigue</td>
<td>96 (70)</td>
<td>29 (80.6)</td>
</tr>
<tr>
<td>Fever</td>
<td>136 (98.6)</td>
<td>36 (100)</td>
</tr>
</tbody>
</table>

Table 4. Oral Lesion in Patient Covid-19 positive test.

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Ubication</th>
<th>Symptomatology</th>
<th>Times Evolution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Days</td>
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<tr>
<td>Irregular ulcer</td>
<td>Dorsal side of</td>
<td>Painful inflammation</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>the tongue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythematous macula</td>
<td>Tongue papilla</td>
<td>Irregular and asymptomatic ulcer</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asthenia</td>
<td>48</td>
</tr>
<tr>
<td>Plane lesion</td>
<td>Big toe</td>
<td>Nasopharyngeal</td>
<td>3</td>
</tr>
<tr>
<td>Covid-19</td>
<td>nose</td>
<td>Erythematous</td>
<td>8</td>
</tr>
<tr>
<td>Cutaneous lesion ,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vasculitis</td>
<td>Dermatologists</td>
<td></td>
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<tr>
<td></td>
<td>Vascular Inflammation</td>
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</tbody>
</table>

DISCUSSION

Angiotensin-converting enzyme II (ACE2) is the cell receptor through which the virus enters cells (Harmer, D. et al., 2002). ACE2 in the oral cavity has been observed especially in the tongue, being considered as a potentially high risk for the infectious susceptibility of the virus (Kämmerer, P. et al., 2010). ACE2 receptors have also been observed in lymphocytes within the oral mucosa, and similar results found in various organs of the digestive system and in the lungs. Although SARS-CoV-2 infection shows no oral signs or symptoms, ace2 expression in the oral mucosa suggests that the route of oral fandlime infection cannot be excluded (Hofmann, H. et al 2005).

SARS-CoV-2 in the saliva

Rapid and accurate detection of the virus is critical to the control and isolation of positive cases. Samples for molecular diagnostic tests derived from the upper respiratory tract are taken via a swab of the nasopharynges and oropharynges (Hamming, I. et al., 2004). The presence of viral RNA was found in saliva in 11 of 12 patients with positive diagnosis, showing variable titling’s but with a very poor crop possibility (Cao, B. et al., 2020). It is important to note that a reverse transcriptase polymerase chain reaction test (RT-PCR) that is negative in suspicious patients does not exclude infection. Clinically, patients with an epidemiological approach, their history, related symptoms and correlation with imaging studies should be evaluated (Huang, L. et al., 2020). There are immense advantages associated with the use of saliva as a diagnostic method, such as the ease of sampling and the reduced exposure of staff in the collection procedure, since it can be performed by
the same patient by spitting in an appropriate collector (To KoK, W. et al., 2020). There are three ways to explain the presence of the virus in saliva: (a) exchange of drops from the respiratory tract to the oral cavity; (b) SARS-CoV-2 present in the blood can access the oral cavity through the crevicular fluid and; (c) by infection of the salivary glands, releasing the virus into saliva through the epithelium of the ducts (Sabino-Silva, R. et al., 2020).

Risk of nosocomial infection in dental spaces
Due to the unique characteristics of dental procedures that generate a large number of droplets and aerosols, standard protective measures in daily clinical practice are not sufficiently effective to prevent transmission of SARS-CoV-2 (Meng, L. et al., 2020). However, all biosecurity measures must be maintained and closely monitored. Dentists are directly exposed to inhalation of viral particles in aerosols (where the virus can remain viable for up to 3 hours) (Georgakopoulou, E., 2020), especially when patients are in the incubation period, unaware that they are infected, or choose to hide their infection, putting staff at risk (Rimmer, A., 2020). Therefore, it is peremptory for dentists to refine preventive strategies as well as reduce their activity to strict emergencies to cut the chain of the contagion. It is important that dental professionals write down the particular (not universal) protective measures to be taken at this time and inform their staff. Implications of breaking dental care protocols should be clearly and concisely explained (Xu, XW. et al., 2020).

Hand washing
Washing your hands is the most effective measure to take, and both soap and running water are needed for this. The use of gloves is not a substitute for hand hygiene (Yan, Y. et al., 2020). The dentist should choose antimicrobial soap (e.g., chlorhexidine soaps, iodine, chloroxylenol, triclosan). Hand washing should be done before and after touching a patient, before any dental procedure, after possible exposure to the patient’s bodily fluid and after touching the patient’s surroundings or items that may be contaminated (Kharma, M. et al., 2015). Hygiene should also be performed before putting on face protective masks (cover, visor, eye protector) and after removing them as well as before and after feeding or drinking, before and after the use of toilets and when arriving at your residence (Seah, I. et al., 2020). The virus shows low resistance to disinfectants. Ultraviolet disinfection, hot water bath at 56 °C for 30 min, disinfectants containing chlorine or 75% ethanol can effectively inactivate the virus. Therefore, hand sanitizers that use ethanol as the main component are indicated for hand cleaning (Kampf, G. et al., 2020). The application of hand creams every time the hand cream is performed, if the condition permits, is highly recommended. If you wear gloves for an extended period of time, emollients containing hyaluronic acid, cemidine, vitamin E or other restorative ingredients are advised post-wash (Peng, X. et al., 2020).

Protective measures
The use of barrier protection equipment, including protective lenses or visors, mouth cap, as well as disposable material such as latex gloves or nitrile gloves, hats, boots and surgical gowns, is inescapable (Kohn, WG. et al., 2003). Your face should be completely covered, and you should wear a surgical mask and eye protection with solid side protectors oral full face protector to protect mucous membranes from the eyes, nose and mouth. The use of the disposable surgical mask, gown, cap and boots should be for individual use with each patient and should be discarded after the dental procedure with the patient is completed.

If during treatment the surgical mask is moistened, it should be replaced immediately (Marui, VC. et al., 2019). Also, wash with soap and disinfect facial protective equipment before and after use by a patient. Do not wear jewelry, rings, tendril (earrings/earrings), watches, bracelets, in which the virus may remain viable. Nail hygiene should be maintained, including maintaining proper length and removing artificial systems (Frichembruder, K. et al., 2020).

Disinfection of all surfaces of the dental clinic
SARS-CoV-19 can remain viable for 3 hours in aerosols, 1 day on cardboard surfaces, 2 days on stainless steel surfaces and up to 72 hours in plastics (Ramphul, K. et al., 2020). Studies have shown that the use of 70% ethanol, 0.5% hydrogen peroxide or 0.1% sodium hypochlorite are effective in eliminating human Coronavirus. Other agents such as benzalkonium chloride or chlorhexidine are less effective. Offices as well as common areas, including door handles, chairs and bathrooms, should be disinfected (Zhou, J. et al., 2020).

Pre-assessment of the patient
Although some patients may hide crucial information to be cared for, the dentist should be insistent on a first contact over the phone. The professional should evaluate whether or not the appointment is a true dental emergency, and if so, the patient should be instructed to go to the dental clinic at the aforementioned time, without companions (Lipsitch, M. et al., 2020). Upon admission to the clinic, it is recommended to measure the patient's temperature, ask for the symptomatology of COVID-19 (Chen, N. et al., 2020). Patients over 38 °C temperature are recommended to not be treated until the febrile state passes. Patients should be instructed to wash their hands when entering and leaving the clinic as well as to cover their mouth and nose if they cough or sneeze (Fauci, AS. et al., 2020).
Using pre-treatment mouthwashes

Decrease the patient's oral viral load with 1% hydrogen peroxide rinses or povidone to 0.2% prior to the start of the emergency procedure. Chlorhexidine rinses do not seem to be as effective (Cao, B. et al., 2020). There is moderate evidence that pre-treatment mouth washes significantly reduce the number of microorganisms in the spray produced by the dental activity (Smales, F.C. et al., 2003).

Measures to be taken during the management of the dental emergency

The dentist must be prepared, and cannot refuse, to care for the patient with a dental emergency. Urgency is any immediate treatment that alleviates the discomfort of the patient who is not at risk, while emergencies are when the patient requires prompt care, as there is a life risk involved (Ding, Q. et al., 2020). A dental emergency is associated with immediate measures aimed at relieving painful, infectious and/or aesthetic symptoms of the oral cavity (Rostom, R. et al., 2017). Try the procedure in a well-ventilated office. The waiting room should also be well ventilated, although the patient should not stay in the waiting room for a long period of time. Do not use your cell phone while you are caring for the patient. Aerosol- producing operations should be avoided at all costs (De Wit, E. et al., 2016). If these cannot be avoided, it should be accompanied with high suction as well as the use of rubber dams. In the same sense, the use of the water/air syringes should be restricted. At the end of the treatment, water and air should be discharged for a minimum of 20-30 seconds from any device connected to the water/air system entering the patient's mouth (e.g., triple syringes, turbines, hand pieces) (Xu H, et al., 2020). Biopsy is indicated in case of suspected malignancy, and it is considered an emergency procedure. Use reabsorbable sutures for this procedure or any other surgical. Clean and disinfect the outside of the container after sampling. Avoid intraoral X-rays when possible, but wear gloves and all appropriate protection if they are necessary (Ren, X. et al., 2006).

 Coronaviruses are an extensive family of viruses that can cause disease in both animals and humans (Ortiz, E. et al., 2020). The current classification of coronaviruses recognizes 39 species in 27 subgenera that belong to the family Coronaviridae (Kell, A. M. et al., 2015; & Yoneyama, M. et al., 2009). From these, at least seven coronaviruses are known to cause respiratory infections in humans (Diebold, S. 2009). Four of these viruses can cause common cold-like symptoms, while others that infect animals can evolve and become infectious to humans (Ma D. et al., 2015; & Nelemans, T. et al., 2019). Three recent examples of this viral jumps include SARS CoV, MERS-CoV and SARS CoV-2 viruses (Dandekar, A. et al., 2005; & Channappanavar, R. et al., 2017). They are responsible for causing severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS) and the most recently discovered coronavirus disease during 2019 (COVID-19) (Zumla, A. et al., 2019; & Kidler, E. et al., 2016).

CONCLUSION

Dentists are directly exposed to inhalation of viral particles in aerosols (where the virus can remain viable for up to 3 hours).

Covid-19 creates a high risk for dental personnel, the necessary precautionary measures must be taken to avoid aerosols as a result of dental actions such as ensuring the disinfection of instruments, work surfaces.

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Conflict the interest

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