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PANORAMA OF ORTHODONTICS AFTER COVID-19: A CRITICAL LITERATURE REVIEW

Panorama of Orthodontics after COVID-19

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ABSTRACT:

A new Coronavirus (2019-nCov, renamed SARS-CoV-2) was identified in the Chinese city of Wuhan in late 2019, and was declared a pandemic by the World Health Organization, on March 11, 2020. As it is a highly infectious disease, major regional and national changes have been made, social isolation was recommended, which led to the interruption of various services, including elective dental treatments. This review aimed to identify the changes that occurred in the post-COVID-19 orthodontic practice scenario. For such, a search was made for articles published in the bibliographic bases PubMed, Scopus and SciELO, using the keywords "Orthodontics" and "Covid-19". From the eligibility criteria, 11 articles were selected for analysis. It was found that social isolation impacted the scheduling of orthodontic appointments and patient's anxiety about the duration of treatments. The use of teleodontology proved to be an ally in screening and in patient care. Preventive infection control must be adopted for safe orthodontic practice.

Key-words: Coronavirus infections. Orthodontics. Dental practice. Dentistry.

INTRODUCTION

Due to the identification of a high number of cases involving a new Coronavirus in the Chinese city of Wuhan [1] (2019-nCov, renamed SARS-CoV-2) [2,3], the World Health Organization (WHO) declared a pandemic on March 11, 2020 [4]. In an attempt to contain the spread of the highly contagious COVID-19, major regional and national changes have been made, leaving only essential services open [5].

It was recommended to suspend elective dental treatments except for emergencies, to help in social isolation measures, reduce the consumption of individual protective equipment (IPE), reduce aerosol production and the consequent risk of infection [6].

With the postponement of orthodontic consultations, the concern with the prolongation of the treatment arose among patients [7], as well as anxiety about scheduling the next visit to the orthodontist [8], as social isolation became a regulation adopted by several countries [9].

Without the possibility of face-to-face consultations, professionals and patients undergoing orthodontic treatment had the opportunity to use technology to offer and

receive virtual assistance, using photo, video or video-call applications, thus allowing the orthodontist to evaluate the need to be seen at the office [5,6]. These technological communication tools, aside from keeping the patient-professional relationship active, decrease anxiety, since there is no risk of contamination, contrary to what happens during face-to-face care [8].

In order for a full return to orthodontic practice to happen, effective infection control measures must be routinely adopted by all the dental team members, such as the correct washing of hands, disinfection of all surfaces in the dental office, and the complete understanding and acceptance of protocols recommended by WHO [7].

Considering the importance of information about the current situation, this study aimed to identify the changes that occurred in the post-COVID-19 orthodontic practice scenario.

METHODOLOGY

Documentary technique based on pre-existing literature on the subject was used to carry out this bibliographic review. The research included the search for articles published in the bibliographic databases PubMed, Scopus and SciELO. As keywords, the terms “Orthodontics” and “Covid-19” were used in both Portuguese and in English. Both terminologies were extracted from the Health Sciences Descriptors (DeCS) of the Latin American and Caribbean Center on Health Sciences on Health Sciences Information (BIREME).

As eligibility criteria, articles published up to August 2020, written in English and Portuguese, which had the full text available within the theme addressed, were included. Articles involving the theme of COVID-19 in Dentistry but not the Orthodontics specialty, letters to the Editor and those studies carried out on animals (*in vivo*) were excluded.

RESULTS

Forty-seven articles were found, 38 in the PubMed database, 8 in the Scopus database, and 1 in SciELO. Of these, 12 that were duplicated were excluded. The remaining 35 articles were read by two independent reviewers, of which 11 were selected for analysis according to the inclusion criteria, as can be seen in Figure 1.

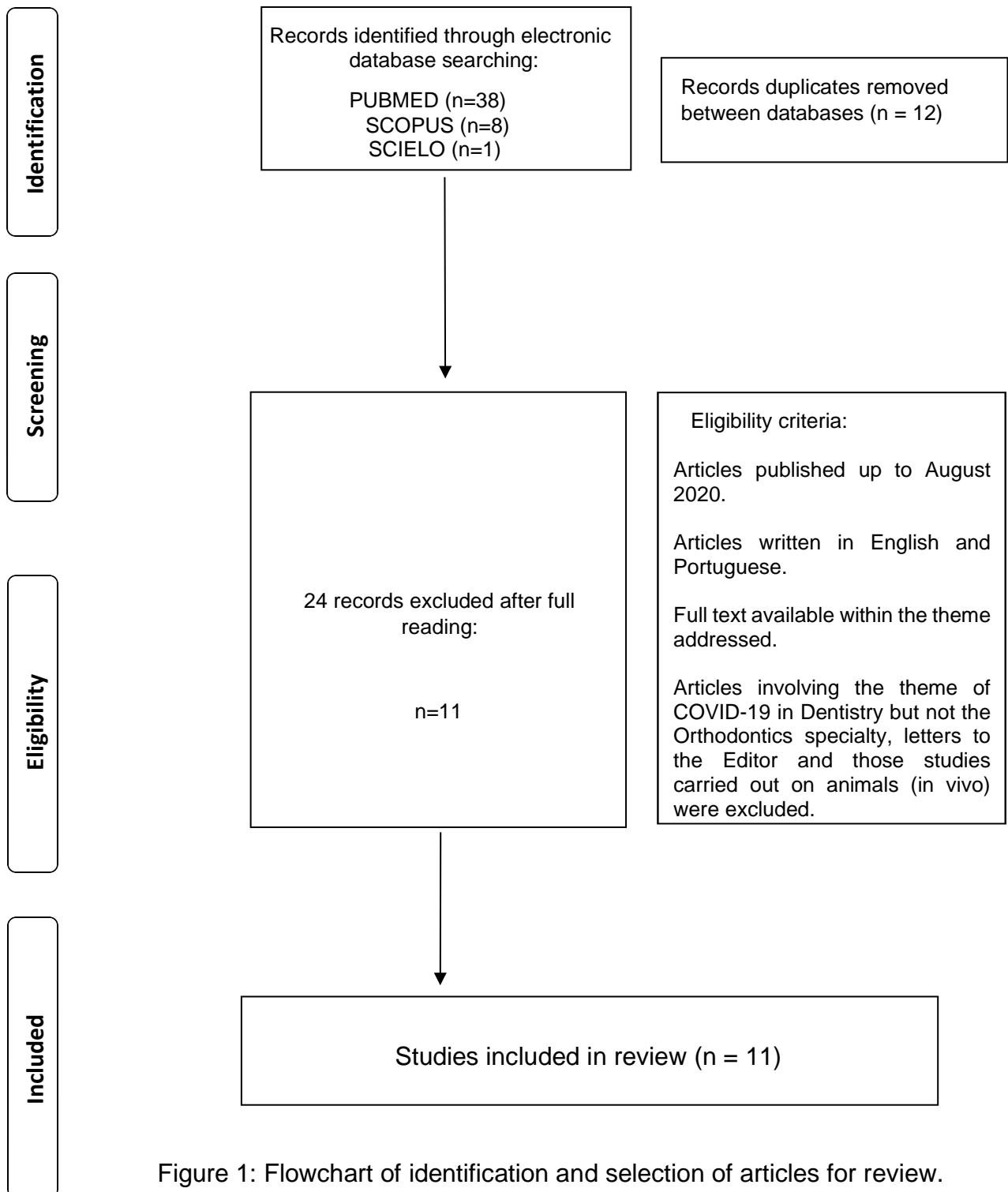


Figure 1: Flowchart of identification and selection of articles for review.

Source: Authors.

Chart 1 shows the author, the year and country of the study, the objectives, the main results, and the conclusions of the 11 selected articles. Data found served as a compass for discussing the results of this article.

Chart 1: Description of works involving the theme of Orthodontics and COVID-19.

Autor	País	Objetivos	Resultados Principais	Conclusões
Sunjay Suri et al. [5]	Canada	To provide a comprehensive summary of the implications of SARS-CoV-2 infection and COVID-19 on orthodontic treatment, contingency management, and provision of emergency orthodontic treatment.	Human-to-human transmission of SARS-CoV-2 occurs predominantly through the respiratory tract via droplets, secretions, and or direct contact, where the virus enters the mucous membrane of the mouth, nose, and eyes. The virus can remain stable for days on plastic and stainless steel. Most infected persons experience a mild form of disease, but those with advanced age or underlying comorbidities may suffer severe respiratory and multiorgan complications.	During the spread of the COVID-19 pandemic, elective orthodontic treatment should be suspended and resumed only when permitted by federal, provincial, and local health regulatory authorities. Emergency orthodontic treatment can be provided by following a contingency plan founded on effective communication and triage. Treatment advice should be delivered remotely first when possible, and where necessary, in-person treatment can be performed in a well-prepared operatory following the necessary precautions and infection prevention and control protocol.
Martina et al. [6]	Italy	To investigate if dentists are anxious about returning to their daily activities, and what the perception of the risk is for dentists and orthodontists regarding orthodontic procedures.	A total of 349 dentists, including 183 orthodontists, completed the survey. Returning to their daily work activity was a source of anxiety for 192 participants and this was associated with the level of distress. 67.6% of the orthodontists thought that they would increase the number of working hours during the week.	Italian dentists were mostly scared to return to their daily activities because they considered their jobs a high risk to them and their families. Dentists with an exclusive/prevaling orthodontic activity were forced to increase their working day during the week.
Peloso et al. [7]	Brazil	To evaluate the impact of quarantine resulting from the COVID-19 pandemic on dental appointments and patients'	Five hundred ninety five patients answered the questionnaire. Most patients reported they were receiving orthodontic treatment and would attend	The quarantine recommended due to the COVID-19 pandemic was shown to have an impact on dental appointments and the anxiety levels of patients, since there was a significant association

		positions and concerns regarding their ongoing dental treatment.	to a dental appointment; meanwhile, those patients not receiving treatment would not attend or would visit only in the case of an emergency. Males reported to be calmer than females, who were more anxious and afraid; as such, males reported more willing to go a dental appointment while, in general, females were not worried about how quarantine could affect dental treatment. Orthodontic patients were concerned about delay in treatment.	between patients' feelings and their willingness to attend a dental appointment. Overall, patients undergoing dental treatment and orthodontics were more willing to attend an appointment and were more concerned about an increase in treatment duration.
Cotrin et al. [8]	Brazil	To evaluate the impact of the coronavirus pandemic and the quarantine in orthodontic appointments, and patient's anxiety and concerns about their ongoing orthodontic treatment.	The questionnaire was answered by 354 patients with mean age of 35.49 years. Most patients are respecting the quarantine, more than 40% related to be calm and afraid or anxious. The level of anxiety was greater for females than males. There was significant association of the level of anxiety and the willingness to attend an appointment. The greatest concern of patients was delay in the end of treatment.	The quarantine and coronavirus pandemic showed to have impact on orthodontic appointments and patients' anxiety. Patients willing to attend an orthodontic appointment presented significantly lower level of anxiety than patients that would not go or would go only in urgency/emergency. Females were more anxious than males about coronavirus pandemic, quarantine and impact on their orthodontic treatments. Delay in treatment was the greatest concern of patients undergoing orthodontic treatment.
Xiong et al. [9]	China	To evaluate the mental distress of orthodontic patients and to investigate the level of their anxiety on treatment duration and outcome during the early stage of the pandemic.	Questionnaires were collected from 458 patients. The prevalence of mental distress was 38%. Higher odds ratios were associated with female participants, missed appointments and Hubei residence. Types of orthodontic appliance were associated with anxiety	Over one third of orthodontic patients experienced mental distress during the pandemic. Multiple factors affected the level of anxiety of orthodontic patients, such as the typo of orthodontic appliance, interval from the last dental visit, manner of communication with the orthodontist, and the localities of the pandemic progression.

			<p>of prolonged treatment duration. The manner of communication with patients regarding the postponement of appointments was associated with patients' concern of prolonged treatment duration. Frequency of contact from dentists was associated with patients' independence.</p>	
Caprioglio et al. [10]	United States of America	<p>To summarize guidelines on the management of orthodontic patients during COVID-19 emergency focusing on virtual assistance devices and classification of emergencies.</p>	<p>The first step should always be virtual assistance, and WhatsApp may be considered a good tool to do that. The virtual assistance might be performed by using photos, videos or video call.</p> <p>Orthodontic emergencies is classified on the basis of the type of the appliance used by the patient: removable or fixed appliance.</p>	<p>A good method to manage emergencies, reassure, and follow patients remotely, while they are in their home, is via WhatsApp web.</p> <p>At the moment, it is necessary to manage in the office only the real cases of urgencies that cannot be resolved remotely by the patient, following the guidelines dictated by the WHO and local authorities.</p>
Eliades e Koletsi [11]	Switzerland	<p>To list the sources of aerosol production during orthodontic standard procedure, analyze the constituent components of aerosol and their dependency on modes of grinding, the presence of water and type of bur, and suggest a method to minimize the quantity and detrimental characteristics of the particles comprising the solid matter of aerosol.</p>	<p>Minimization of water-spray syringe utilization for rising is anticipated on bonding related procedures. Before any procedure, must be done mouth rinse with CHX 0.2% in attempt to reduce the load of aerosolized pathogens. Water cooling rotary instruments might not be the treatment of choice, whereas hand-instruments for remnant removal might represent better and effective strategy.</p>	<p>Wide and consistent adoption of occupational measures to control generation of aerosol in orthodontic practice should be universal, with microbiologic considerations, particulate matter production as well as toxicity related perspectives being on the spot, even more within the course of a pandemic. Realistic management in practice should focus on bonding and debonding strategies. In-office measures of self-protection should never be neglected.</p>

Guo et al. [12]	China and United States of America	To summarize the preventive strategies for control of SARS-CoV-2 transmission to protect both staff and patients during the orthodontic practice.	In orthodontic practice, there may be transmission when bonding and removing brackets, moldings, oral scanning, photographs, wire changes, and placement of mini implants. Orthodontic instruments and materials that are not individually packaged can be a risk of contamination. High speed use should be avoided in order not to generate aerosols. During the pandemic period, emergency procedures are recommended.	All procedures related to the orthodontic practice should be strictly performed with preventive measures to control the potential transmission of SARS-CoV-2. The control strategies include, but are not limited to, pre-examination and triage of patients, hand hygiene, personal protective measures, mouth rinse, reducing the use of high-speed handpieces while increasing the use of high-volume saliva ejectors during bracket or attachment bonding and removal, disinfection during archwire changing or bending and removable appliance adjustment, disinfection of dental settings between patients, instructions to patients, management of reusable items and medical wastes, air and environment disinfection, and digital patient follow-up.
Maspero et al. [13]	Italy	To reduce in-office appointments by providing an overview of the technologies available and their reliability in the long-distance monitoring of patients (teledentistry).	Available Technologies that can be used in Teleorthodontics are: high-speed Internet connection, digital videos and photographs, smartphones, and websites. Teleorthodontics reduces costs and provides treatment access to a wider range of persons without compromising the quality of care. It also allows the orthodontist to maintain treatment control in situations where the patient cannot go to the clinic.	Teleorthodontics can manage most emergencies, reassuring and following patients remotely, reducing patient's office visits without compromising the results.

Saccoman no et al. [14]	Italy	To explain how tele-orthodontics represents the only way to perform orthodontics during a period of restriction as the one subsequent to COVID-19 emergencies.	Tele-orthodontics allowed to perform some orthodontic follow-ups with less chairside time, reduced time spent by the patients in the dental office from up to 45 min, less risk of infection, fewer to no missed appointments, specific troubleshooting solutions, and more follow-ups with odontophobic patients.	The need to respect safety distance and the fears patients have about the risk of infection make tele-orthodontics a fundamental tool during a pandemic lockdown and in its immediate post-emergency phase. Tele-orthodontics demonstrated to be a viable tool to continue at least some orthodontic care in times of emergency, but it may be considered an appropriate solution and addition even in normal times to ease therapy demands for both the orthodontist and the patients, while reducing time and money spent, without an excessive decrease in orthodontic quality.
Turkistani [15]	Saudi Arabia	To report to orthodontists in the emergence, epidemiology, risks, and precautions during the disease crisis.	Minimize aerosol production and reinforce strict infection control measures are important. Compliance with the highest level of personal protection and restriction of treatment to emergency cases is recommended during the outbreak. Surface disinfection, adequate ventilation, and decontamination of instruments and supplies following the guidelines are required.	Reinforce strict infection control measures and minimizing personal contact and aerosol production are keys to prevent contamination within orthodontic settings. Although no cases of COVID-19 cross-transmissions within a dental facility have been reported, the risk exists, and the disease is still emerging. Further studies are required.

Source: Author.

DISCUSSION

There are concerns regarding the appearance, epidemiology, risks and precautions during the disease crisis [15] and implications of coronavirus infection for orthodontic treatment [5]. Preventive strategies for infection control [12] and aerosol reduction [13] have been reported. Additionally, there was the recommendation to use virtual assistance [11, 13, 14] and assessments regarding the impact of the pandemic on orthodontic consultations and on the anxiety generated in patients and professionals [6-9].

Due to the pandemic caused by the coronavirus, dental professionals must be aware of the occupational risks caused by COVID-19, and stay up to date on infection control guidelines. It is the orthodontist's responsibility to ensure the safety of his/her team and prevent cross-contamination within the dental office [5,15].

The risk of acquiring COVID-19 can occur by several ways, including droplets of saliva from coughing or sneezing, indirect contact with droplets of saliva that have stuck to surfaces, aerosols generated during orthodontic procedures [11], during removal and replacement aligners, fixed or removable appliances and elastic and being in contact with several people and companions, bonding and removal of brackets, moldings, oral scanning, photographs, wire changes, and placement of mini implants [5]. Orthodontics instruments and materials that are not individually packaged can be a source of contamination [12]. As the coronavirus was also identified in the saliva of infected individuals [16], this biological fluid represents an additional risk for professionals and their relatives. [17].

Among the situations that can be considered urgent in Orthodontics, are the insertion of a wire from a fixed orthodontic appliance in the gum, oral mucosa leading to severe pain and/or infection, circumstances related to dental trauma in patients who use fixed or removable appliances, or other conditions in which the lack of care would be harmful to the patient, such as gingival inflammation resulting from the loosening of an orthodontic band or the detachment of brackets [18].

As tools for teleodontology, photos, videos or video calls, communication applications such as WhatsApp and Telegram, and websites [10,13] were used. Virtual assistance proved to be a good way to provide assistance to patients, with reduced costs, greater access to treatment, less risk of infection, less consultations, problem solving and more follow-up with odontophobic patients [10,13,14]. Remote monitoring

is a viable way for some orthodontic care in times of pandemic, and can be considered a solution in normal times to facilitate the demands of orthodontic therapy [14].

Assessments regarding the impact of the pandemic on the orthodontic consultations and on the anxiety generated in patients and professionals were carried out through questionnaires. It was observed that the level of anxiety was more related to women than to men and that the greatest concern was associated with delayed treatment [6-9]. Fixed lingual appliances and invisible aligners were less associated with high levels of anxiety about the duration of treatment compared to conventional fixed appliances [9]. Professionals, on the other hand, reported fear of returning to their daily activities because they considered it a high risk for them and their families [6].

As can be seen, procedures related to orthodontic practice must strictly follow preventive measures to control the transmission of SARS-CoV-2, reducing the use of aerosol to minimize infections and avoid contamination of environments. Treatment guidelines can be provided in a remote format at first, and when necessary, treatment can be performed if the infection prevention and control protocol is followed. Finally, Teleorthodontics is a way of reassuring patients and professionals, and accompanying patients without compromising treatment results.

CONCLUSIONS

The need for social isolation imposed by the coronavirus has been shown to have an impact on scheduling orthodontic appointments, as well as on patient's anxiety about prolonging their treatments. The use of communication technologies has been of great value in patient care, as well as in the initial screening before a face-to-face consultation. Strict infection control protocols must be adopted so that orthodontic practice is fully performed without offering risks to patients and professionals.

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