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Original Article

Endodontic treatment during COVID-19 pandemic – Economic perception of dental professionals

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Aim: This study evaluated, by the application of questionnaires, the impact of the COVID-19 pandemic on the clinical routine and inspection by the competent authorities, on the flow of patients in the office, as well as on possible changes in Endodontic treatment costs and the amounts charged to patients. **Methods:** This cross-sectional study was conducted from May 2nd, 2020 to May 6th, 2020, using an online questionnaire with a convenience sample. The inclusion criterion was professionals who perform endodontic treatments in daily clinical practice and who professional setting is private practice. The questionnaire brought questions about the impact on costs and the amount charged to the patient. **Results:** A total of 1042 questionnaires were answered from all the different states of Brazil, by professional who usually perform Endodontic treatment, and who is working in private practice. A total of 1010 (96.9%) respondents affirm it was necessary to modify the protective equipment in endodontic treatment due to pandemic and longer intervals between appointments was cited by 922 (88.5%), economically affecting the dental practice. There was no association between routine changes and economic impacts with gender, professional experience, area of residence or education level. **Conclusion:** In conclusion, most dental professionals recognized changes in the routine of endodontic treatment during the COVID-19 pandemic. They have a perception of increase in endodontic costs, and reduction in the volume of patients.

Keywords: Coronavirus. Dentistry. Endodontics. Economics.

Introduction

In March 2020, the World Health Organization (WHO) declared the outbreak of COVID-19 as a pandemic due to the severity of the disease and the global spread. A pandemic is not only a health problem; it is also an economic, social and political issue[1].

The physical distance measures needed to prevent the virus proliferation have unleashed the most severe global recession on record since the Great Depression, since people have been recommended to stay at home whenever possible, which damages the economy as a whole[2]. The demand for social distance resulted in closing of stores, restaurants, gyms, factories, etc[3]. Currently, more than a billion people worldwide are at risk of losing their jobs or at least suffering a cut in wages[2].

With regard to dental services, this economic crisis can significantly affect both demand and supply. On one side, patients may face financial problems resulting from economic crisis, with a decrease in the financial resources available for spending on dental services. On the other side, the pandemic can affect the availability of labor and the supply of materials[4].

In any case, dentists cannot fail to offer their services to the population to avoid overburden on hospitals in cases of urgency and emergency. Initially, elective procedures were suspended in many places, prioritizing essential urgent care. Consequently, these professionals must be prepared to perform their procedures safely during this turbulent period. It has been recommended that dentists should avoid the production of aerosols to reduce the risk of contamination. Professionals were also instructed on the use of specific personal protective equipment (PPE), increasing the costs of dental treatment[5].

Past six months since the WHO had declared the COVID-19 pandemic, most professionals are working as usual and performing the most varied procedures. However, besides the need of precautions to protect themselves and their patients, dentists also face the economic consequences of COVID-19 pandemic. The generated changes in clinical practice and in the daily lives of these professionals caused possible changes in the inspection of dental offices and in the costs involved. Thus, the objective of this study is to evaluate, by the application of questionnaires, the impact of the COVID-19 pandemic on the clinical routine, on the flow of patients in the office, as well as on possible changes in endodontic treatment costs and the amounts charged to patients.

Materials and Methods

This study was approved by the Institutional Review Board (CAAE: 31064820.6.0000.5052). Participants signed an informed consent form (ICF) after acceptance to be part of the survey. As inclusion criteria, the respondent should be a dentist who usually performs endodontic procedures in clinical practice, with no need to be a specialist in Endodontics. The submission was considered only when the 'submit' button was clicked at the end of the questionnaire.

This cross-sectional study obtained data by filling out questionnaires developed on the Google Forms platform, available at: https://docs.google.com/forms/d/10pKh-60CwbptJTuXyOknm8rJSAdOwkiSQ8kLJxkPL3e8/edit. The design, pilot study and

strategies to enroll dentists were previously discussed by the research team. The pilot study had 20 participants and their answers were excluded from the main sample. Since this questionnaire includes many specific questions in the area of endodontics, aiming to assess the impact of the pandemic on this specialty, the inclusion criterion was professionals who perform endodontic treatments in daily clinical practice and whose professional setting is private practice.

In the present study, the questionnaires were applied to a convenience sample, which is a type of non-probability sampling method where the sample is taken from a group of people that is easy to reach. This type of sampling is also known as grab sampling or availability sampling. There are no other criteria to the sampling method except that people be available and willing to participate. In addition, this type of sampling method does not require generation of a simple random sample, since the only criterion is whether the participants agree to participate.

This study was conducted from May 2nd, 2020 to May 6th, 2020. The questionnaire was distributed by email as well as posted on several social media platforms, as Facebook and WhatsApp. This is not a representative sample, and the regional councils were not contacted since they would not be able to provide information about dentists who perform endodontic treatment routinely. It was not possible to calculate the number of professionals reached by the social media platforms, as well as the number of dentists in Brazil who perform endodontic treatment; thus, all individuals who perform root canal treatment as a routine and agreed to participate were included in the research.

The questionnaire consisted of 21 questions designed to collect information about socioeconomic data, professional experience, biosecurity measures (to protect both professionals and patients) and the impact on the economic costs for professionals.

The survey was divided into two parts: the first part contained questions related to personal data such as sex, age, area of residence, years of experience in dental practice; the second part included questions about the impact on costs and the amount charged to the patient. After responding to the questionnaire, the subjects were requested to provide their registration number in the Regional Dental Council (CRO) to prevent duplication of data.

Data were collected and analyzed by SPSS 25.0 for Windows (IBM corp., SPSS, Inc., Chicago, IL, USA). Descriptive statistics were performed. Chi-square and Fisher's exact tests were used to test the significance of possible associations. The significance level was 5% ($P < 0.05$).

Results

A total of 1042 questionnaires were answered from all different Brazilian states, by professionals who usually perform endodontic treatment and are working in private practice. Female respondents accounted for 65.5% (n=683) and males 34.5% (n=359) of the total. The mean age of respondents was 37.5±10.3 years. Regarding the time elapsed since graduation, 44.9% (n=468) of respondents graduated in the last 10 years; while 29.9% (n=312) graduated between 11 and 20 years ago; and 25.1% (n=262) graduated more than 20 years ago (Table 1).

Table 1. Percent distribution of respondents by background characteristics

	n	%
Gender		
Female	683	65.5
Male	359	34.5
Professional experience		
Up to 10 years	468	44.9
11 to 20 years	312	29.9
More than 20 years	262	25.1
Area of residence		
South-east	308	29.6
South	247	23.7
North-east	393	37.7
Mid-west	50	4.8
North	44	4.2
Marital status		
Single	341	32.7
Divorced, separated or Widowed	78	7.5
Married	625	60.0
Professional setting		
Private only	801	76.9
Public and private practice	241	23.1
Highest education level		
PhD/MS	259	24.9
Specialist degree	646	62.0
DDS	137	13.1

The percentage of respondents by Brazilian regions was 23.7% from the South, 29.6% from the Southeast, 37.7% from the Northeast, 4.8% from the Midwest and 4.2% from the North (Table 1).

A total of 1010 (96.9%) respondents stated that it was necessary to modify the protective equipment in endodontic treatment due to the pandemic. Major attention with biosecurity measures was cited by 1021 respondents (98.0%), and longer intervals between appointments was cited by 922 (88.5%), economically affecting the dental practice. Most participants believe that the new habits necessary to dental practice during the pandemic will last even after pandemic.

Table 2 describes the routine changes in Endodontic treatment, volume of patients and economic impact of the pandemic. Most professionals reported changes in routine and economic impacts. There was no association between routine changes and economic impacts with gender, professional experience, area of residence or educational level ($p>0.05$).

The perception of dental professionals from different Brazilian regions regarding the impact of the COVID-19 pandemic is reported in Table 3.

Table 2. Routine changes in Endodontic treatment, volume of patients and economic impact of pandemic

	n	%
Should the total cost of Endodontic treatment change due to pandemic?		
Yes	901	86.5
No	141	13.5
Have work routine changes led to increased financial costs of Endodontic treatment?		
No	77	7.4
Yes, but prices were not adjusted	663	63.6
Yes, and prices were adjusted for patients	302	29.0
Number of patients compared with prepandemic period		
There was not a reduction in the volume of patients	54	5.2
There was a reduction in the volume of patients	988	94.8
Expected time, pospandemic, until the number of patients return to previous state		
Up to 1 year	535	51.3
1 year or more	507	48.7

Table 3. Perception of dental professionals regarding the impact of pandemic considering the different Brazilian regions.

	Total	South-east	South	North-east	Mid-west	North	P value
	n (%)						
Which changes in your practice routine were necessary during pandemic? due to pandemic?							
Changes in the protective equipment in endodontic treatment	1010 (96.9)	305 (99.0)	243 (98.4)	384 (97.7)	48 (96.0)	43 (97.7)	0.328
Major attention to biosafety measures	1021 (98.0)	302 (98.1)	243 (98.4)	384 (97.7)	48 (96.0)	44 (100)	0.689
Longer intervals between dental appointments	922 (88.5)	272 (88.5)	211 (85.4)	359 (91.3)	43 (86.0)	37 (84.1)	0.160
Should the total cost of Endodontic treatment change due to pandemic?							
Yes	901 (86.5)	266 (86.4)	209 (84.6)	345 (87.8)	44 (88.0)	37 (84.1)	0.804
No	141 (13.5)	42 (13.6)	38 (15.4)	48 (12.2)	6 (12.0)	7 (15.9)	
Have work routine changes led to increased financial costs of Endodontic treatment?							
No	77 (7.4)	23 (7.5)	15 (6.1)	28 (7.1)	4 (8.0)	7 (15.9)	0.546
Yes, but prices were not adjusted	663 (63.6)	165 (63.3)	153 (61.9)	255 (64.9)	33 (66.0)	27 (61.4)	
Yes, and prices were adjusted for patients	302 (29.0)	90 (29.2)	79 (32.0)	110 (28.0)	13 (26.0)	10 (22.7)	
Patients flow in comparison with prepandemic period							
There was not a reduction in the volume of patients	54 (5.2)	16 (5.2)	13 (5.3)	17 (4.3)	3 (6.0)	5 (11.4)	0.546
There was a reduction in the volume of patients	988 (94.8)	292 (94.8)	234 (94.7)	376 (95.7)	47 (94.0)	39 (88.6)	
Expected time, pospandemic, until the number of patients return to previous state							
Up to 1 year	535 (51.3)	162 (52.6)	127 (51.4)	195 (49.6)	26 (52.0)	25 (56.8)	0.878
1 year or more	507(48.7)	146 (47.4)	120 (48.6)	198 (50.4)	24 (48.0)	19 (43.2)	

Discussion

The present cross-sectional study reported the perception of Brazilian dentists regarding endodontic treatment during the COVID-19 pandemic, and its possible economic impact for these professionals, by a qualitative analysis. The study was conducted in the early period of the pandemic in Brazil, from May 2nd, 2020 to May 6th, 2020 and at this time a quantitative analysis of losses or percentages was still not possible. The questionnaire was distributed by e-mail and also by several social media platforms (Facebook, WhatsApp, Instagram). Unfortunately, it was not possible to calculate the number of professionals reached, as well as the number of dentists in Brazil who perform endodontic treatment. Even though not knowing the exact number of professionals contacted could represent a methodological failure, it is well recognized that using social media platforms may optimize the number of reached answers in this kind of study.

Most professionals reported changes in the routine of endodontic treatment, mainly related to the volume of patients assisted and increased costs of dental treatment. Despite the reduced number of patients in dental clinics, according to an infodemiological study between March and May in Brazil, the volume of tweets related to dental treatment needs increased during the COVID-19 pandemic. Pain/urgencies and orthodontic treatment were the most common needs[6].

The routine of dental procedures generates aerosols that characterize a risk to dental care personnel. In this sense, a higher interval between dental appointments is mandatory[7]. Given the high transmissibility of SARS-Cov-2, dental teams must be attentive to maintain a healthy care environment for patients and themselves[8]. Hygiene and cleaning care need to be increased and controlled routinely; thus, dentists need to adapt their practice and take special precautions during this period[9]. Moreover, in this study, 1021 (98.0%) of respondents reported the need of greater attention to biosecurity measures during dental practice and consequently the higher cost of dental procedures (Table 2).

As expected, the present results demonstrated that 965 respondents (92.6%) stated that changes in work routine have already increased the financial costs of endodontic treatment; however, surprisingly, the prices have not changed according to 663 participants (63.6%). Dentists are spending more and charging the same amount from each patient. It is important to highlight that this whole situation can bring difficulty in managing the dental office in the medium and short term.

According to the literature, reducing the number of patients assisted each day in the dental office can be extremely useful to avoid the risk of cross infection[10]. In this sense, there will be reduced number of people in the waiting room at the same time, enabling a distance of 2 meters between individuals, given that the distance of approximately 1 meter has been established as a risk area[11]. In addition, the reduction in the number of patients offers a longer time interval between consultations and can provide the team with the necessary time to properly disinfect the clinical area[9]. This information is recognized by most participants of this study, since more than 88% of respondents reported that the interval between consultations should be longer during the pandemic period.

Conversely, the reduction in the volume of patients assisted has negative impacts for professionals, considering the reduction in the number of procedures performed per day. In this study, 94% of respondents reported a reduction in the number of patients compared to the pre-COVID-19 pandemic period. Besides the need of increasing the measures to avoid cross infection, the search and use of dental services has also decreased, due to the fear and anxiety demonstrated by the patients, as well as the financial crisis, with a tendency to migrate to the public service[12], evidencing the importance to strengthen it as soon as possible[13].

There was no association between routine changes and economic impacts with gender, professional experience, area of residence or educational level. This result possibly occurred because the questionnaires were applied in the initial months of pandemic in Brazil, thus the impact was similar across groups, since most Brazilian areas were in quarantine, and the number of confirmed cases and deaths was also still low[14]. At that moment, probably a percentage of clinicians had not yet felt the effects of the pandemic in the dental practice. Additionally, all Brazilian regions were affected similarly along the pandemic period.

Governments around the world are not only aiming to reduce the virus spread, but also to ease the economic burden of COVID-19. It is known that the CODIV-19 pandemic has caused an unprecedented challenge for all economic sectors[15]. In Brazil, more than 50% of the population is in the informal economy, according to government data[16]. This had not occurred since 2007, and consequently it is probable that several dental professionals will be experiencing a strong crisis in the financial sector.

One limitation of the present study is the fact that the individual income or family income was not assessed, which would require a longitudinal study. Besides, information was obtained only by questionnaires. However, questionnaires are good for gathering data about abstract ideas or concepts that are otherwise difficult to quantify, such as opinions, attitudes and beliefs[17].

In conclusion, most dental professionals recognized changes in the routine of endodontic treatment during the COVID-19 pandemic. They have a perception of increase in endodontic costs, and reduction in the volume of patients.

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