Impact of COVID-19 on dental education in Brazil

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ABSTRACT

This study aimed to evaluate the impact and operating strategies that the undergraduate dental programs in Brazil have adopted during the COVID-19 pandemic. A web survey approach was performed in May/June 2020. All coordinators of dental programs in Brazil were contacted by e-mail and invited to answer an online questionnaire consisting of eight questions on four domains: suspension of academic activities, activities maintained, teaching alternatives offered and changes in planning after the pandemic outbreak. The response rate was analyzed by stratifying the program's legal nature, result of the national performance assessment and time of the establishment of the programs. The data from the responses to the questionnaires were analyzed using descriptive statistics. Of a total of 481 programs, 230 responded to the survey (47.8%). The response rate was 100% for public programs and 40.8% for private programs. Most programs (83.3%) suspended all presential activities, and a small portion maintained only emergency care. Few programs completely suspended activities (16.7%), while most maintained theoretical activities using virtual environments (Google Meet or Hangouts, Zoom or Microsoft Teams). Most programs (50%) organized discussions to ensure the graduation of senior students and adopted alternative means for student assessment (30%). Planning the return of activities mainly involves adaptation to the protocols for clinical care (86.3%) and social distancing (82.4%). The pandemic directly impacted the functioning of Brazilian dental programs by causing the total suspension of practical activities and migration of theoretical activities to virtual environments.

Descriptors: Education, Dental. Pandemics. Coronavirus Infections. Education, Distance. Oral Health.

1 INTRODUCTION

The new coronavirus was identified in Wuhan, China, in December 2019, in patients who had had pneumonia of unknown origin. After a rapid escalation, on January 9, 2020, the World Health Organization declared the discovery of a new coronavirus, SARS-CoV-2, with no previous record of infections in humans. On February 11, the respiratory disease due to SARS-CoV-2 infection was named COVID-19[1].

The first official case of COVID-19 in Brazil was confirmed on February 26, 2020, presenting rapid spread, with community transmission acknowledged in March 2020 throughout the national territory. As a result, the federal and state governments adopted measures to flatten the epidemic curve and reduce the peak demand for health services. Such measures included restrictions on the functioning of schools, universities, community venues, public transportation, and places of public gathering, such as social and sports events, theaters, cinemas and commercial establishments, which were not considered essential service providers[2].

The impact of the COVID-19 pandemic on the functioning of educational activities occurred on a global scale. On April 2020, UNESCO estimated that over 80% of the students worldwide have had their routines suspended by the closing of educational institutions in more than 160 countries[3]. Although there have been two coronavirus outbreaks in the recent past, which caused severe acute respiratory syndrome (SARS) in 2002 and Middle East respiratory syndrome (MERS), there are few studies on the impact of these diseases on dental education[4]. Medical schools in China[5] and Toronto[6] reported that they suspended activities that exposed students to contamination until the health problem was resolved.

Particularly in cases of higher education, the current pandemic is more concerning for programs in the health field as it implies challenges for maintaining functioning routines to prevent the spread of the disease among the academic community and their families. In these programs in which students perform intervention procedures on patients, exposure to contamination is high. Therefore, higher educational institutions should suspend all practical activities until the public health problem is under control[4,7].

Many countries have banned routine dental care, as evidence reports that dental professionals are at high risk of COVID-19 infection due to the close contact with patients' faces[8], through air aerosols during intervention procedures[9], or indirectly through the saliva of asymptomatic patients in the incubation phase[10]. Currently, reports by administrative officials and professors of dental schools address the problem of the school functioning given the COVID-19 pandemic[4,11-14], and many institutions have decided to suspend face-to-face activities.

Universities around the world are not sure how long the COVID-19 pandemic will last and how it can affect the mental health of students and professors. While the temporary closure of schools because of health crises and other emergencies is not new, unfortunately the global scale and speed of the current educational disruption is unmatched. The epidemic has changed the programs of congresses, conferences and academic events, and institutions have canceled face-to-face classes and converted them into online sessions[4,15]. In the most affected areas, universities face the possibility of losing one or two entire academic semesters[16].

In this context, the aim of the present study was to understand the strategies that each undergraduate program has used to minimize the impact of the pandemic on dental education in

Brazil, since this information can help assess the different ways of coping with the problem as well as focus on successful choices to guide educational institutions in similar situations in the future.

2 METHODS

Study design

The study was designed as a quantitative, observational, cross-sectional, descriptive web survey and it was approved by the Research Ethics Committee of the School of Dentistry of Piracicaba/UNICAMP, under protocol CAAE 31939920.7.0000.5418. The project was registered at the Open Science Framework (OSF) database (https://doi.org/10.17605/OSF.IO/6SXDH).

Selection, participant inclusion and data collection from higher education institutions

The population studied were undergraduate dental programs approved by the Ministry of Education and Culture (MEC). The survey of the number of programs was carried out by consulting the open-access website of the Ministry of Education using the e-MEC system (http://emec.mec.gov.br/emec/nova#avancada), and using the advanced search tool with following filters: “undergraduate programs”; "dentistry"; "bachelor degree"; "in activity". The search was carried out in May 2020 and totaled 543 dental programs approved by the MEC, of which only 481 were active (57 public institutions and 424 private institutions or foundations).

The following public data were collected from the 481 programs: name of the educational institution, program code, legal nature of the program, name of the coordinator, website, and institutional e-mail and Enade (National Student Performance Exam) results.

Questionnaire application

The coordinators or administrative officers of all 481 programs were contacted by e-mail to participate in the research. The invitation to participate in the survey was sent by e-mail, together with the electronic link to access Google Forms and the free and informed consent term.

As some e-mails collected from the e-MEC website were corrupted, we collected the new e-mail address from the institution’s website.

The survey was sent to schools by e-mail as of May 2020. Everyone who did not reply received the same survey e-mail 7 days later and this attempted correspondence was repeated 4 times until the end of the survey in June 2020. The database was updated periodically as responses were received from participants. The sampling unit was the undergraduate program. When more than one questionnaire from the same school was received, the first reply received was considered. Institutions that did not accept to participate in the research or those that did not answer the questionnaire after the fourth attempt were excluded from the study.

The electronic form was composed of 8 questions on the following domains: suspension of academic activities and type of activities carried out, remote teaching tools and post-pandemic routine changes.

Analysis of results

The response rate was analyzed and stratified according to the legal nature of the program, the results of the last national student performance exam (Enade) and the time of establishment of the programs. The Enade exam is applied by MEC to assess academic performance of undergraduate students in Brazil. The exam is mandatory, and it was first applied in 2004. The maximum periodicity of the assessment is three years for each area of knowledge. The result of Enade score ranges from 1 to 5, where 1 and 2 mean unsatisfactory, 3 regular and 4 and 5 satisfactory.

The responses of the programs regarding the electronic questionnaire were analyzed using

descriptive statistics and expressed in absolute or relative frequency using the Microsoft Excel™ software (Santa Rosa, California, USA). In this analysis, the entire set of responses from the programs were considered without stratification.

3 RESULTS

The flowchart shows the summary of the electronic research (figure 1). The response rate is shown in table 1. Of the 481 programs invited to participate in the research, 230 replies were received, and the response rate was 47.8% for a heterogeneous sample reaching a 95% confidence level and a sample error of 4.67%.

The response rate was total for public programs (100%) and partial for private programs (40.8%). Among the best Enade results, scores 4 and 5 (n = 66), the response rate was high, 79.2% and 84.6%, respectively. The lowest response rate (38%) came from programs established in the last eight years (n = 277) and which still do not have an Enade score. The response rate was 75% (n = 80) among the oldest programs, the most prestigious dental programs in the country, established between 1808 and 1990.

The absolute and relative frequency of program responses regarding questions about how the COVID-19 pandemic impacted their routines is shown in table 2.

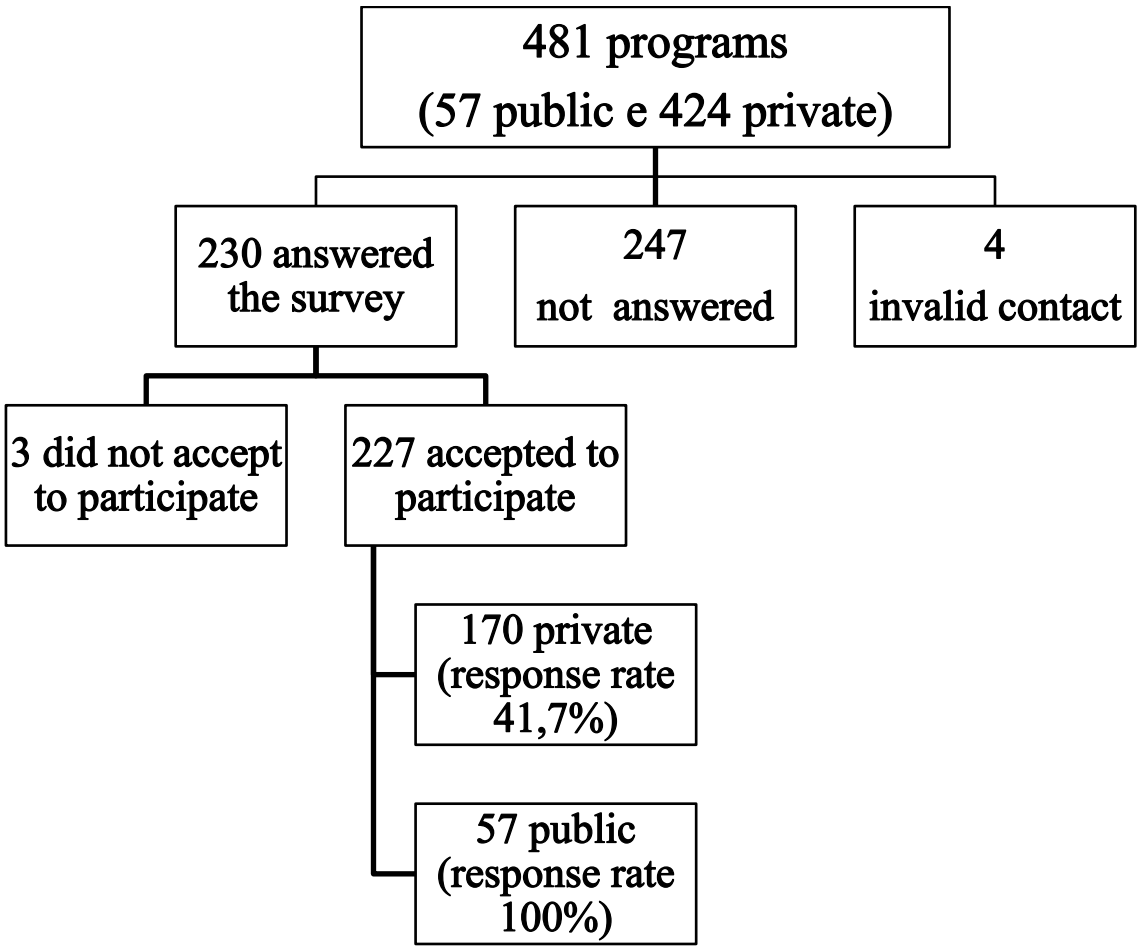

Figure 1. Flowchart of the electronic research

Table 1. Response rate of the programs

Variable	(n)	(n) Response	Response rate (%)
Program legal nature			
Public	57	57	100.0
Private	424	173	40.8
Total	481	230	47.8
Enade Stratification			
W/R*	277	106	38.3
Enade 1 e 2	61	31	50.8
Enade 3	77	40	51.9
Enade 4	53	42	79.2
Enade 5	13	11	84.6
Total	481	230	47.8
Time of establishment			
2011-2019	260	99	38.1
1808-1990	80	60	75.0

* without Enade results

Table 2**.** Descriptive statistics of survey responses

Questions	Responses	
	(n)	%
1) Do you agree to participate in the research? (Informed consent form)		
Yes	227	98.7
No	3	1.3
2) During the COVID-19 pandemic, the dental program you represent		
Suspended all academic activities	38	16.7
Suspended only face-to-face classes and maintained ALL theoretical activities online	174	76.7
Suspended face-to-face classes and maintained SOME theoretical activities online	15	6.6
3) What practical/outpatient activities were maintained during the pandemic? (if applicable)		
Only outpatient / emergency dental clinics	12	5.4
Elective outpatient clinics (normal clinical course activities)	-	-
Pre-clinical activities (laboratory)	-	-
All practical activities have been suspended	210	94.6
4) For the courses that maintained all or some theoretical activities, how was it organized? (if applicable)		
Theoretical classroom activities were normally maintained	0	0.0
Theoretical classroom activities were maintained, but following social distancing rules	0	0.0
Theoretical activities were carried out only online	183	100.0
5) If theoretical activities were maintained online, which were the main technological tools used? (if applicable)		
Zoom	47	24.1
Google Hangouts or Meet	74	37.9
Microsoft Teams	29	14.8
Others	45	23
6) If your institution resumes activities, is the faculty board or equivalent meeting to discuss flexibility of the political pedagogical project (PPP) for the current school year? Check below which measures are being approved		
Flexibility of course hours	69	30.4
Alternative methods for course attendance	72	31.7
Measures adopted for senior students to finish the course in 2020	114	50.2
Alternative assessment methods to replace conventional ones	112	49.3

Suspension of academic activities and types of activities maintained

Of the programs included in the study, most (83.3%) suspended all classroom activities, maintaining only remote activities, while some programs suspended all activities (16.7%).

When asked about the maintenance of some practical laboratory or outpatient activities, most (94.6%) reported that all activities were suspended, and only a few programs (5.4%) maintained emergency care for their patients.

Remote teaching tools

The theoretical activities have all been carried out remotely using Google Meet or Hangouts (37.8%), Zoom (24.1%) and Microsoft Teams (14.8%) platforms.

Post-pandemic routine changes

When asked about the main curricular adaptations during the epidemic, most programs (50%) have been discussing ways to ensure the graduation of senior students and (30%) adapting alternative means of assessment to replace the presential activities, in addition to flexible hours and frequency in subjects.

The gradual return of practical outpatient activities, safeguarding selective distancing and new biosafety rules, have been discussed by most of the programs (79.3%) in the survey. The main changes planned for the return of activities are the review of biosafety protocols during consultations (86.3%), pre-screening before entering institutions (82.4%) and establishment of social distancing protocols (78.4%).

Programs have been using institutional e-mail lists of students as well as other social media to stay in touch with their students to update them on the pandemic.

4 DISCUSSION

To the best of our knowledge, this is the first quantitative research to investigate the impact of the COVID-19 pandemic on the functioning of undergraduate dental programs in Brazil. These programs have an average workload of 4406 hours and most laboratory activities are related to basic courses and pre-clinical training, in addition to activities focused on outpatient care in integrated clinical courses[17]. Thus, the authors hoped that the COVID-19 pandemic would negatively impact program functioning, which was confirmed by the responses obtained from the program coordinators.

In our survey, practically all institutions (94.6%) suspended face-to-face activities, with the exception of a few that maintained only emergency dental care (5.4%), according to the resolutions of Brazilian regulatory agencies[18]. The almost total suspension of face-to-face activities is due to the high probability of contamination by coronavirus among dental professionals and students[8,9], since most of the course activities are carried out in collective clinical clinics, with several dental teams in the same environment producing aerosol, jeopardizing the entire academic community[11].

In this survey, all institutions suspended face-to-face classes, and 83.4% maintained all or part of the theoretical activities through remote education while only 16.6% suspended all course activities. The suspension of face-to-face activities for an indefinite period is an unprecedented obstacle in Brazilian dental education and the remote education model is supported by MEC, but only as a temporary strategy[19]. While the pandemic persists, programs must have initiative and creativity to find solutions that make it possible to return to school safely.

Remote education in dental programs in Brazil have been using the platforms that they had access to before the pandemic, and the most widely used have been Google, Microsoft and Zoom. These virtual environments were created with a collaborative learning proposal and have been useful for maintaining student activities during the

pandemic[20]. However, institutions are still facing difficulties as there are two main barriers to remote education in the country: the lack of ability of professors and students to handle these tools and the disparity between economic and social conditions for students to access the internet[21].

In the systematic review by Dedeilia, Sotiropoulos[20] on teaching innovations in medical programs during COVID-19, the negative impact on course activities is evident. Despite massively migrating to remote education, it is challenging to reproduce medical teaching remotely and obtain the same face-to-face experiences. However, several tools have been used to overcome this problem, such as teleconferences and webinars, online learning, virtual consultations, telemedicine, simulation, and virtual reality. The merging of various educational technology tools can decrease student resistance and achieve good teaching and learning results during the pandemic.

Most programs (79%) plan to resume activities gradually and for that purpose some guidelines have been discussed among their leaders, which mostly converge to social distancing protocols, adaptations to the infrastructure of the programs, pre-screening protocols for access on the premises, updating the biosafety protocols and new rules for living together to resume face-to-face activities. All these actions are necessary due to the need to adapt the teaching methods and infrastructure of programs so students and the population can safely return to school[14,21-23].

Perhaps the main challenge will be to apply the new biosafety routine in the daily actions of the academic community during and after the pandemic. Thus, actions that reinforce the learning of the basic principles of the epidemiology of infections, susceptibility, modes of transmission, risk factors, signs and symptoms, laboratory diagnosis and preventive measures against contamination are more than imperative at this point in time and can be addressed by online courses[24].

The concern with emphasizing biosafety protocols can be understood by the results of studies that show less interest from students and professionals to follow these protocols strictly. In a survey conducted in the United States, it was found that most schools used only lectures and clinical demonstrations to teach infection control[25]. In another study among dental students in India, the level of knowledge and practice of infection control measures was also deficient[26]. In a systematic review that included studies from Brazil, the United Kingdom and France to analyze the adherence of educators and students in academic dental institutions regarding hand hygiene procedures found that adherence among university students did not even reach 50% of total number of participants[22].

In the current reality, educational institutions should consider adopting a high standard infection control policy, review protocols, offer training for the academic community, infection monitoring and control committees, and means of communication to inform the community about pandemic actions and news. In our survey, most institutions have been using some form of communication with their students and staff, whether through institutional e-mail lists or messaging applications. This attitude is welcome, as it keeps the academic community informed with science-based news, thus avoiding misinformation by fake news[24].

In a study with dentists in Jordan that assessed the level of awareness, perception and attitude towards COVID-19 infection control, they observed that although professionals in the country were aware of the most common characteristics of the disease, many had a limited understanding of extra precautionary measures that protect dental staff and other patients from the disease[27]. Therefore, dental schools can provide information to the academic community and professionals on how to prevent and fight the virus and this would

be another way to curb the advance of the pandemic.

The rapid spread of the COVID-19 disease and the subsequent suspension of dental education has created the need to promptly assess and discuss strategies that dental schools have been using worldwide to bridge this educational gap. Other similar surveys have been carried out in Europe. The partial results of the research by Quinn, Field (2020)[28] involving 153 dental schools associated with ADEE (Association of Dental Education in Europe) obtained a response rate of 45%. These results show the negative impact of the pandemic on dental programs, which, in summary, limited the performance of students in clinical environments and only delivered urgent treatments, and performed non-clinical activities remotely. Student assessments were also impaired and were being adapted to the new reality.

As with all questionnaire-based surveys, there is a risk in the reliability of responses and a potential for non-response bias. To demonstrate the reliability of our results, the response rate was stratified and analyzed according to the criteria of legal nature of the institution, Enade results and time of establishment of the programs. The overall response rate was 47.8%, a result similar to other surveys that carried out an equivalent methodology in the country[29]. It is worth mentioning that in Brazil there is a high number of undergraduate dental programs, which has been the result of a policy to expand private higher education in the last 15 years, making a high response rate in surveys almost impossible[30]. In the analysis stratified by the legal nature of the program, 100% of responses from programs from public and free institutions were observed, which traditionally are mostly the oldest dental schools in the country. In the stratification of the response rate according to the Enade results, high rates were obtained for programs with scores 4 and 5 (79.2% and 84.6%), thus representing the programs with the best results in the country.

5 CONCLUSION

The pandemic caused by COVID-19 had a direct impact on the functioning of Brazilian dental programs, causing the total suspension of practical activities, and migration of theoretical activities to virtual environments. The planning the return includes changes in the clinical and administrative protocols of the institution and changes in the infrastructure of outpatient clinics. In uncertain times for the future of dental education in the world, adaptation and learning through distance education will be necessary, as the role of higher education is to generate knowledge, promote innovation and means of adaptation in challenging environments such as the one imposed by COVID-19.

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RESUMO

Impacto da COVID-19 na educação odontológica no Brasil

O objetivo deste estudo foi avaliar o impacto e as estratégias de funcionamento que os cursos de graduação em Odontologia no Brasil adotaram durante a pandemia da COVID-19. Uma pesquisa eletrônica foi realizada entre os meses de maio e junho de 2020. Todos os coordenadores dos cursos de Odontologia do Brasil foram contatados via e-mail e convidados a responder um questionário *online* formado por oito perguntas, baseadas em quatro domínios: suspensão de atividades acadêmicas, atividades mantidas, alternativas de ensino oferecidas e planejamento de mudanças pós-pandemia. A

taxa de resposta foi analisada pela estratificação por natureza jurídica, resultado da avaliação nacional de desempenho e tempo de criação dos cursos. Os dados das respostas dos questionários foram analisados por meio de estatística descritiva e expressos como frequência absoluta ou relativa. De um total de 481 cursos, 230 responderam ao questionário (47,8%). A taxa de resposta foi de 100% dos cursos públicos e de 40,8% dos privados. A maioria dos cursos (83,3%) suspendeu todas as atividades presenciais e uma pequena parcela manteve apenas os atendimentos de urgência. Poucos cursos cursos suspenderam totalmente as atividades (16,7%), enquanto a maioria manteve as atividades teóricas via salas virtuais (Google Meet ou Hangouts, Zoom ou Microsoft Teams). Grande parte dos cursos (50%) estão viabilizando discussões para garantir a formatura dos concluintes e 30% estão adotando meios alternativos de avaliação dos estudantes. O planejamento para o retorno das atividades envolve principalmente adaptações nos protocolos de atendimentos clínicos (86,3%) e de distanciamento social (82,4%). A pandemia teve impacto direto no funcionamento dos cursos de Odontologia brasileiros, ocasionando a paralisação total das atividades práticas e migração das atividades teóricas para salas virtuais.

Descritores: Educação Odontológica. Pandemia. Infecções por Coronavírus. Educação a Distância. Saúde Bucal.

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