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COVID-19 incidence, severity, medication use, and vaccination among dentists: Staggering body of evidence obtained from a survey during the second wave in Brazil

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ABSTRACT

This cross-sectional survey investigated the pandemic impact on dental practice in May 2021 (second wave in Brazil). COVID-19 incidence and severity among respondents, vaccination status, and level of confidence in vaccines were surveyed, in addition to medications used for preventing or treating COVID-19, including controversial drugs/substances (vitamin D, ivermectin, zinc, and chloroquine). Dentists were recruited by email and responded to a pretested questionnaire until May 31, 2021. In total, 1,907 responses were received (21.2% return rate). Bivariate and multivariate regression analyses were performed (α=0.05). Prevalence Ratios were calculated for the association between professional characteristics and two outcomes: report of SARS-CoV-2 infection and use of controversial drugs. One third of dentists reported intermediate levels of confidence in safety/efficacy of vaccines, but 96% received at least one vaccine dose, mainly CoronaVac. The impact of the pandemic on dental practice was rated as lower/much lower compared with one-year before (first wave) by 46% of respondents; 27% of dentists reported to have had a positive COVID-19 test, ~50% had relatives or friends who had been hospitalized or died from COVID-19. At least one medication was used by 59% of respondents, 43% used two or more drugs and substances. Vitamin D (41%), (35%), and zinc (29%) were the most frequent drugs/substances. More experienced dentists (≥21 years in practice) were 42% more likely to use controversial medications than less experienced respondents. Dentists with residency/advanced training as postgraduate education had 30% higher prevalence of controversial medication use than respondents holding MSc/PhD degrees. Respondents

with low confidence in vaccines were 2.1 times more likely to use controversial medications than participants with very high confidence. The overall findings of this survey highlight the high severity of the pandemic in Brazil, and raised questions about the use of scientific evidence by dentists in their decision to take controversial COVID-19 medications.

Keywords: SARS-CoV-2; COVID-19 vaccines; vitamin D; zinc; ivermectin; chloroquine; evidence-based practice.

INTRODUCTION

The coronavirus disease-19 (COVID-19) pandemic imposed significant challenges to dentistry worldwide[1–5]. Dental practice during the pandemic has been associated with negative feelings among dentists, who had high anxiety levels and fear of exposure to SARS-CoV-2 and infection at work[5–8]. A study during the first wave in Brazil showed that regional COVID-19 incidence and mortality rates were associated with fear of SARS-CoV-2 infection in dental offices[5]. Since the beginning of the pandemic, the Brazilian government has been criticized for being hostile to scientific evidence and unable to stop the spread of SARS-CoV-2[9,10]. As of January 2022, the COVID-19 has caused more than 620,000 deaths in Brazil, one of the highest global mortality rates with approximately 290 deaths per 100,000 inhabitants[11].

Amid an epidemiological crisis, a topic that has received great attention around the world has been the use of ineffective or controversial drugs and substances for preventing or treating COVID-19[12–17]. The issue was a matter of investigational hearings in the Brazilian senate and included the off-label use of hydroxychloroquine and ivermectin, among others. A recent article showed that a small set of poorly designed studies on medications played a significant role in misinformation during the first wave in Brazil[18], when vaccines were still not available. In such a turbulent scenario with uncertainty about the future of the pandemic, combined with the fear and high risk of exposure to SARS-CoV-2 in dental offices, dentists could be inclined to self-medication or use drugs without proven efficacy against COVID-19. At the same time, hesitancy about accepting vaccination has been an issue worldwide[19,20], and the level of confidence in the COVID-19 vaccines could be associated with the use of unproved medications. A recent survey in Italy showed that 18% of participating dentists reported hesitance about COVID-19 vaccination[21], whereas another study showed higher willingness to receive a COVID-19 vaccine in South America than in the USA and Russia[20].

The objective of this study with dentists in Brazil was to address the impact of COVID-19 on dental practice in May 2021, when the second wave was in course, and one of the most severe periods of the pandemic in Brazil, with 148,000 deaths between March and April, 2021[11]. This report addresses

the incidence and severity of the disease among dental professionals participating in a national survey, in addition to the medications used for preventing or treating COVID-19. Information on vaccination status and level of confidence in vaccines during this period were also investigated.

METHODS

Study design and ethical aspects

This cross-sectional survey was implemented in Brazil in May 2021, one year after a similar survey had been conducted with dentists practicing in Brazil during the escalation of the pandemic curve in the first wave[5]. The study protocol had been approved by our institutional review board and all research methods were performed in accordance with the Declaration of Helsinki. The primary objective of the survey was to address the impact of COVID-19 on the dental care routine and associated aspects, including COVID-19 incidence, severity, medication use, and vaccination among the dentists surveyed. A questionnaire that had been developed and pre-tested in previous studies was used[5,22]. The respondents had to agree to participating in the survey, to enable their access the questionnaire. They were instructed to print or save the first page of the questionnaire to retain a copy of the informed consent form. In accordance with open science practices, the research project, the questionnaire in its original language, and the databank of responses are all available in an open platform (doi:10.17605/OSF.IO/DNBGS). An English translation of the questionnaire is presented in the Appendix. This report consulted the Consensus-Based Checklist for Reporting of Survey Studies (CROSS)[23].

Questionnaire development, content, and pretesting

Details on the development and pretesting of the original questionnaire were published elsewhere[5,22]. The instrument was a self-administered electronic questionnaire, which underwent minor revisions for the present investigation, including suppression of 11 and addition of 5 questions mainly about COVID-19 severity, medication use, and vaccination, which were not present in the previous versions of the instrument. The new questions were formulated based on the inputs of three researchers in three discrete rounds of review.

The questionnaire was created and hosted on SurveyMonkey (Momentive Inc., San Mateo, CA, USA). The first section informed the title and objective of the study, and the fact that the invitation was extended only to dentists. This section provided the term of informed consent, in which the participants were notified that their participation was voluntary and unpaid, and they were informed of the potential risks and benefits of the research. In addition, the participants were assured that responses would be treated anonymously and confidentially. Multiple participations from a same

respondent were not allowed by the surveying system, which also protected unauthorized access to the questionnaire. Each question was presented to the participants only after their response to the previous question, which meant that there were no discrete screens. The questionnaire contained 25 mandatory items (1 open, 24 close-ended questions) including demographic and professional characteristics (n = 6), professional practices and challenges during the pandemic (n = 13), and questions about COVID-19 vaccination, prevalence, severity, and medication (n = 6). The items were not randomized, and no adaptive questioning methods were used. The responses could be revised by using back buttons at any time before submitting the completed form. In order to reduce bias related to response errors (units), the options 'I'd rather not say', 'I don't know how to answer', and 'Does not apply' were available in all close-ended questions.

Sample selection, participant recruitment and survey administration

A source population of 24,392 registered dentists were recruited by means of email invitations to participate, sent via SurveyMonkey (convenience sampling). The list was provided by the Brazilian Ministry of Health in 2020 and included professionals from all Brazilian states working in the public and/or private dental care networks. The list also included dentists who had participated in the first survey in May 2020[5]. In previous studies, these sources were shown to lead to sample variability and correspondence with the general population of verified dentists in Brazil[5,22]. The email was a brief invitation containing the study objective, average response time (5 min), and notification of the university conducting the study. We tested whether the questionnaire could be read well on different computers, tablets, and cell phones. The first emails were sent on May 13, 2021. Reminder emails were sent seven and 11 days later to reduce non-response bias. Given a population of ~350,000 dentists in Brazil, we estimated that 1,530 responses would be necessary to ensure a 95% confidence interval and 2.5% margin of error. Responses were collected until May 31, 2021.

Data analysis

To reduce non-response error, partial completion of questionnaires was not allowed (completion proportion = 100%). In some questions, the responses were restricted to a specific population, e.g., only dentists assisting patients when the survey was administered. The responses 'I'd rather not say', 'I don't know how to answer', and 'Does not apply' were treated as missing data. No strategies for item weighting, propensity scores, or sensitivity analysis were used. In analyses using data from the question on medication use, the following were labeled as controversial drugs and substances: vitamin D, ivermectin, zinc, and chloroquine/hydroxychloroquine. Descriptive statistics were used to identify frequencies and distributions of variables with respective 95% confidence

intervals (CI). Bivariate and multivariate Poisson regression analyses were performed, and Prevalence Ratios (PR) were calculated for the association between professional characteristics and two COVID-19-related outcomes: report of SARS-CoV-2 infection and use of controversial drugs or substances by the dentists. Selection of variables in the multivariate models was performed using stepwise backward method. Variables from the bivariate analysis were kept only if $p < 0.25$. All analyses were performed in Stata 14.2 (StataCorp, College Station, TX) considering $\alpha = 0.05$.

RESULTS

Out of the total number of 24,392 invitation emails sent to dentists, 1,347 emails bounced (5.5% loss) and 9,010 emails were opened (unique visitors), as registered by the surveying system (view proportion = 36.9%). A 21.2% return rate was calculated from those opened emails and a total of 1,907 valid responses were received from all 26 Brazilian states and the federal district.

Sample characteristics

The length of work experience and the levels of postgraduate education varied among respondents (Table 1). There was a predominance of responses from females and dentists in the public sector. Almost 90% of the participants worked in the South, Southeast, and Northeast regions. Data indicated that 96% of dentists in this survey received at least one dose of the COVID-19 vaccine by May 2021, and the most common vaccine was CoronaVac (65%). A predominance of high and very high confidence levels in the COVID-19 vaccines was reported (58%), but one third of the sample reported intermediate levels of confidence in the safety and efficacy of the vaccines.

Current impact on dental practice

The impact of the pandemic on dental practice during the second wave was rated as lower/much lower compared with one-year before (first wave) by 46% of respondents. Nevertheless, 39% reported feeling poorly or not prepared to treat COVID-19 patients, and 49% reported moderate or high fear of being infected with the SARS-CoV-2 during work. N95 masks and face shields were always used in dental appointments by at least 60% of respondents, and 27% declared to have treated patients with confirmed COVID-19.

COVID-19 incidence, severity, and medication use

In total, 27% of the dentists reported to have had a positive test for COVID-19 by May 2021, and the majority of them were asymptomatic or had mild symptoms (88%). Almost 50% of the respondents had relatives or friends that had been hospitalized or died from COVID-19. From the list

of seven medications or substances, 58.9% of the respondents reported to have used at least one as preventive or treatment measures for COVID-19. Vitamin D was the most common (41%), followed by ivermectin (35%), zinc (29%), and azithromycin (27%). Use of chloroquine or hydroxychloroquine was not prevalent (4%). In total, 42.7% of the dentists surveyed claimed to have used two or more drugs and substances. The most frequent combinations contained vitamin D + zinc either combined or not with ivermectin.

Table 2 presents the prevalence ratios for the association between professional characteristics and SARS-CoV-2 infection by dentists. Sex, work sector, and years in practice were not associated with the prevalence of infection. Dentists working in the Northern region were 58% more likely to report having COVID-19 than those working in the South. Dentists who had residency/advanced training as their highest postgraduate education level were 26% more likely to have had the disease than professionals with MSc or PhD degrees. The level of confidence in COVID-19 vaccines was not associated with a history of infection, whereas respondents who claimed having no fear of being infected at work were 48% more likely to have had COVID-19 than those reporting high fear.

Table 3 presents the prevalence ratios for the association between professional characteristics and use of controversial medications for COVID-19 in the multivariate analysis. The participants' sex and work sector were not associated with the use of controversial medications. However, more experienced dentists (>21 years in practice) were 42% more likely to have used controversial medications for COVID-19 than less experienced respondents. Respondents from the Central-west, North, and Northeast regions were 29–37% more likely to use controversial medications than participants from the South. Dentists who had residency/advanced training as postgraduate education had 30% higher prevalence of controversial medication use than respondents holding MSc or PhD degrees. The level of confidence in COVID-19 vaccines also influenced the use of medications. Increased prevalence of using controversial medications was associated with decreased levels of confidence in vaccines. Respondents with low confidence in the COVID-19 vaccines, for instance, were 2.1 times more likely to have used controversial medications than participants with very high confidence in the vaccines.

DISCUSSION

This study showed a high prevalence of COVID-19 among Brazilian dental professionals and a frequent occurrence of hospitalizations and deaths from the disease within their family members or friends during the second pandemic wave in the country. In addition, 59% of the respondents claimed to have used one or more substances as preventive or therapeutic measures, including vitamin D, zinc and ivermectin, which have limited evidence to support their clinical use against COVID-19.

Studies conducted with dentists in several countries showed varying prevalence of COVID-19 in different pandemic periods: 1.1% in Brazil (May 2020),[5] 9.1% in Belgium (July–September 2020),[24] 2.6% in the USA (June–November 2020),[25] 4.9% in 11 Spanish-speaking Latin American countries (September–December 2020),[26] 10.9% in Italy (December 2020–January 2021),[21] and 1.1% in Canada (July 2020–February 2021)[27]. In a multi-country survey with 36 countries in 2020, ~15% of participating dentists reported symptoms suggestive of COVID-19[28.] The only study we were able to find in the literature, which included dentists that with an occurrence of COVID-19 similar to that reported herein, was conducted in the Czech Republic in June 2021 and showed a 25% prevalence of positive tests among dental profesionals[29]. In general, all of these rates were noticeably lower than the prevalence reported in the present study (27%) and could be partially explained by differences in public health and social measures in response to the pandemic, distinct COVID-19 spreading rates in the countries concerned, and the different assessment periods. In the present study, for example, the prevalence of COVID-19 among dentists working in the Northern region was higher than it was for those working in the South, a finding that could be related to the government's failure to follow science-based guidance[30] and the abrupt increase in the number of COVID-19 cases in Manaus (Amazonas state) during the first months of 2021[31]. It is noteworthy that in our study, the high prevalence of dentists reporting a positive result for SARS-CoV-2 infection could also have been associated with the long-lasting trend of high contamination occurring in Brazil. Differently from other countries where the COVID-19 epidemic curves had peaks and reductions, Brazil continued to be a country with high rates of virus transmission during 2020 (first wave) and had an increase in cases the first half of 2021 (second wave) as a result of the lack of an effective national prevention strategy and the anti-scientific approach adopted by the Brazilian government. The high demand for healthcare services during the pandemic increased the risk of SARS-CoV-2 contamination, especially among dentists who came into close contact with patients.

In addition to the high prevalence of COVID-19 in the study population, the dentists also frequently reported that people close to them had COVID-19. Whereas a survey in Italy reported that 55% of dentists had one or more relatives or friends with COVID-19[21], approximately 50% of the participants in our study reported to have a family member or friend who had been hospitalized or died from COVID-19. This result is overwhelming and highlights the severity of the pandemic in Brazil, with COVID-19 being the leading cause of deaths in the Brazilian public health system in 2020[32] and during the first months of 2021[33]. Although the impact on dental practice in May 2021 seemed to be lower for the respondents when compared with May 2020, the participants still frequently reported feeling poorly prepared to treat patients with COVID-19 and had moderate to high fear of acquiring the disease at work. In fact, respondents who claimed having no fear of acquiring the disease were

more likely to have had COVID-19, a result that raises questions about the influence on the occupational hazard arising from more or less strict preventive measures adopted by the dentists interviewed. In addition, a high-risk for SARS-CoV-2 infection in dental offices combined with a frequent occurrence of COVID-19 within their family circles could be associated with underlying high levels of psychosis and anxiety[3,7], which may help to explain the high prevalence of off-label drugs used for preventing or treating COVID-19 in the present sample.

Misinformation has been a major problem in the ongoing pandemic and a potential source of public confusion and controversy. A study conducted in Vietnam when the pandemic had just started, showed that more than 91% of healthcare workers learned about COVID-19 via social media[34], which are digital places from which the misinformation has free access to pathways that are not subject to content policing, and could lead to driving the population into a state of panic[35]. Healthcare professionals are expected to keep themselves up to date with reliable information so that they can educate and treat their patients properly. Scientific literature plays an important role in this context of professional practices. This is highlighted in the present study by the observation that dentists holding MSc or PhD degrees were less likely to take controversial medications than those with a lower level of postgraduate education. On the other hand, healthcare workers have been described as major practitioners of self-medication[36]. In the pandemic, a report on a sample of participants including healthcare workers in Togo, showed a 34% prevalence of self-medication to prevent COVID-19, with vitamin C being the product most frequently used (28%)[37]. Other professional characteristics can also influence the use of drugs. We found that more experienced dentists were more likely to have taken controversial medications than younger practitioners, a result that could be associated with the higher risk of older adults having severe cases of COVID-19. In addition, respondents with low confidence in COVID-19 vaccines were 2.1 times more likely to use controversial medications than participants with a high confidence in the vaccines. To the best of our knowledge, this is the first study to show this association.

Among the many factors that may negatively interfere with evidence-based healthcare practice in the pandemic context is the large number of low-quality studies reporting conflicting results for COVID-19 treatment. This is coupled with difficulties of implementing the best available evidence due to lack of time, knowledge, or basic skills to find and critically appraise the literature. This means that the controversial substances addressed herein could be considered either effective or ineffective depending on the article selected and how it was interpreted. Regarding vitamin D, for instance, a systematic review including varied study designs suggested that its supplementation was associated with reduced intensive care unit (ICU) admission, need for mechanical ventilation, and mortality[38]. In contrast, a systematic review with randomized trials and quasi-experimental studies

reported that vitamin D did not reduce the risk of these clinical outcomes[39]. A meta-analysis on micronutrient supplements demonstrated that zinc reduced death rates of COVID-19 patients, whereas vitamins C and D did not affect mortality[40]. Another meta-analysis concluded that there is no evidence to support routine zinc supplementation in COVID-19 patients[41]. Karale et al.[42] indicated that treatment with ivermectin for COVID-19 may reduce the need for hospitalization, but the mortality benefit was uncertain, and no effect was observed on the need for ICU admission and mechanical ventilation, or on the length of hospital stay. In addition, a living network meta-analysis concluded that it was highly uncertain whether ivermectin used as preventive measure would be capable of reducing the risk of SARS-CoV-2 infection[43]. Another problem regarding the evidence-based use of medications is that methodological issues are generally present across the primary studies. In all systematic reviews quoted here, the authors highlighted that more randomized controlled trials with larger sample sizes and less risk of bias, imprecision, and/or heterogeneity were necessary. It seems that the topic about controversial drugs and substances for COVID-19 will still attract attention in the following years as definitive conclusions will hardly be accepted universally. In the meantime, dentists are encouraged to rely on evidence arising from randomized trials or meta-analyses that have been judged as having low risk of bias and good methodological quality, or through evidence-based guidelines when available.

A positive finding in the present study was the high rate of vaccination for COVID-19 among the dentists surveyed. In Brazil, healthcare professionals were prioritized for vaccination following the elderly, thus dentists were vaccinated in the first stages of the immunization program by using the first vaccines available in the country. This explains the high frequency of dentists using CoronaVac, which was the first vaccine authorized for emergency use by the Brazilian Health Regulatory Agency in January 2021. This vaccine was developed by the Brazilian Institute Butantan in association with the Chinese laboratory Sinovac. A study showed that the rapid scaling up of vaccination using CoronaVac among Brazilian elderly was associated with a significant decline in mortality when compared with younger individuals[44]. Sadly, the vaccine was criticized by President Bolsonaro and his allies during its testing phases in 2020. In that period, a study showed that Brazilians were less likely to accept vaccination when the country of origin of the vaccine was mentioned[45]. Particularly, rejection of a vaccine from China was strong among President Bolsonaro's supporters. As of January 2022, four vaccines have been available for use in Brazil and dentists around the country are eligible for taking booster shots. Further studies could investigate the acceptance of dental practitioners to new COVID-19 vaccination phases and the maintenance of other preventive measures to address whether a so-called 'pandemic fatigue' may decrease their adherence to individual and collective risk reduction strategies[46].

The present study has limitations that should be acknowledged, and caution should be taken when extrapolating the results observed herein. Respondents were free either to accept or not to accept the invitation to participate in the survey, which may lead to self-selection bias increasing the chances of dentists who were more concerned with the pandemic to participate and perhaps more willing to take medications. In addition, we did not collect data on doses or frequency of usage of the controversial drugs and substances, which may have varied largely among participants. Self-reported information about use of medications may also be influenced by social desirability bias, but the questionnaire was anonymous and thus the influence could be low. A strength of the study was that a large sample of dentists was recruited in a period when the country was struggling to deal with the pandemic. In addition, this seems to be the first study assessing COVID-19 incidence, severity, medication use, and vaccination among dentists. Further studies could explore reasons underlying the use of controversial drugs and substances and socioeconomical aspects involved.

CONCLUSION

This survey with dentists showed a staggering body of evidence during the second wave of COVID-19 in Brazil, including high incidence of the disease among professionals, frequent occurrence of hospitalization and death from COVID-19 among their family members or friends, and very frequent claim of using medications as COVID-19 preventive or treatment measures. The overall findings highlighted the high severity of the pandemic in Brazil and raised questions about the use of scientific evidence by dentists in their decision to take controversial COVID-19 drugs and substances such as vitamin D, zinc, and ivermectin.

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COMPETING INTERESTS

The authors declare no conflicts of interest associated with this manuscript.

DATA AVAILABILITY

The questionnaire in its original language and databank of responses are available in an open platform (doi:10.17605/OSF.IO/DNBGS).

AUTHORS' CONTRIBUTIONS

RRM: Investigation, Methodology, Validation, Data curation, Project administration, Writing – Original draft preparation, Writing – Review & editing. MBC: Conceptualization, Formal analysis, Validation, Writing – Review & editing. PRMF and GSL: Writing – Review & editing. FFD: Conceptualization, Resources, Writing – Review & editing.

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Table 1. Characteristics of this sample of dentists surveyed in Brazil, 2021 (N = 1,907)

Variable/category	n*	%	95% CI
Sex	**1,907**		
Female	1,414	74.1	72.1; 76.1
Male	493	25.9	23.9; 27.9
Years in dental practice	**1,905**		
≤5	451	23.7	21.8; 25.6
6 to 10	474	24.9	23.0; 26.9
11 to 20	534	28.0	26.1; 30.1
>20	446	23.4	21.6; 25.4
Postgraduate education (complete)	**1,899**		
None	505	26.6	24.7; 28.7
Residency or advanced special training	997	52.5	50.2; 54.7
MSc or PhD	397	20.9	19.1; 22.8
Main work sector	**1,892**		
Public	1,106	58.5	56.1; 60.6
Private	613	32.4	30.3; 34.5
Other	173	9.1	8.0; 10.7
Brazilian region	**1,906**		
South	586	30.7	28.7; 32.9
Southeast	552	29.0	26.8; 30.9
Northeast	552	29.0	27.1; 31.2
Central-west	139	4.0	3.2; 5.0
North	77	7.3	6.2; 8.6
COVID-19 vaccination status	**1,894**		
Not vaccinated	76	4.0	3.2; 5.0
Partially vaccinated	188	9.9	8.5; 11.2
Fully vaccinated	1,630	86.1	84.6; 87.7
Vaccines received	**1,818**		
CoronaVac (Sinovac/Butantan)	1,179	64.9	62.7; 67.1
Oxford (AstraZeneca/Fiocruz)	622	34.2	32.0; 36.4
Pfizer (BioNTech)	17	0.9	0.5; 1.4
Level of confidence in safety and efficacy of COVID-19 vaccines	**1,856**		
Very low	59	3.2	2.3; 4.0
Low	104	5.6	4.1; 6.3
Intermediate	611	32.9	30.5; 35.2
High	712	38.4	36.3; 41.1
Very high	370	19.9	18.4; 22.4
Impact of COVID-19 pandemic on dental practice compared with one year previously (May 2020, first wave in Brazil)	**1,749**		
Much lower	154	8.8	7.5; 10.4
Lower	648	37.1	36.0; 40.8
Similar	528	30.2	26.5; 31.0
Higher	240	13.7	12.5; 15.9
Much higher	179	10.2	8.6; 11.6
How prepared do you feel to treat patients with COVID-19?	**1,743**		
Not at all prepared	412	23.6	21.7; 25.9

Poorly prepared	268	15.4	14.1; 17.7
Intermediately	486	27.9	25.5; 29.9
Well prepared	434	24.9	22.6; 26.9
Very well prepared	143	8.2	6.9; 9.7
Fear of being infected at work	**1,766**		
None	354	20.0	18.0; 22.0
Little	553	31.3	29.5; 34.2
Moderate	450	25.5	23.6; 28.0
High	409	23.2	20.5; 24.7
Frequency of N95 mask use in dental appointments	**1,710**		
Never	100	5.9	4.8; 7.1
Perceived higher risk for COVID-19	64	3.7	2.9; 4.8
Aerosol-generating procedures	127	7.4	6.3; 9.0
Whenever it is available	237	13.9	11.7; 15.1
Always	1,182	69.1	67.2; 71.8
Frequency of face shield use in dental appointments	**1,699**		
Never	159	9.4	7.6; 10.5
Perceived higher risk for COVID-19	90	5.3	4.5; 6.8
Aerosol-generating procedures	438	25.8	23.8; 28.2
Always	1,012	59.6	57.1; 62.0
Have you ever treated patients with confirmed COVID-19 diagnosis?	**1,752**		
No or do not know	1,279	73.0	70.9; 75.1
Yes	473	27.0	24.9; 29.1
COVID-19 positive test	**1,754**		
No	1,288	73.4	71.2; 75.4
Yes	466	26.6	24.6; 28.8
Severity of COVID-19	**463**		
Asymptomatic	55	11.9	9.1; 15.2
Mild	352	76.0	71.9; 79.8
Severe	48	10.4	7.7; 13.5
Need of hospitalization	8	1.8	0.7; 3.4
Severe COVID-19 among relatives or friends	**1,717**		
None	878	51.1	48.7; 53.5
Yes, with hospitalization	367	21.4	19.5; 23.4
Yes, with death	472	27.5	25.7;29.7
Drugs or substances used as preventive or treatment measures for COVID-19**	**1,554**		
None of the listed below	639	41.1	38.7; 43.6
Vitamin D	630	40.5	38.0; 43.0
Ivermectin	549	35.3	32.9; 37.8
Zinc	450	29.0	26.8; 31.4
Azithromycin	416	26.8	24.6; 29.0
Corticosteroid	190	12.2	10.6; 14.0
Chloroquine or hydroxychloroquine	69	4.4	3.4; 5.5
Remdesivir	2	0.1	0.0; 0.4
Number of drugs or substances used for COVID-19	**1,554**		
1	251	16.2	14.4; 18.1

2	252	16.2	14.4; 18.1
3	217	14.0	12.3; 15.9
4 or more	195	12.5	10.9; 14.2
Most frequent combinations of drugs or substances used for COVID-19	**1,554**		
Vitamin D + zinc + ivermectin	106	6.8	5.6; 8.2
Vitamin D + zinc	101	6.5	5.3; 7.8
Chloroquine/hydroxychloroquine + ivermectin + zinc + vitamin D	61	3.9	3.0; 5.0
Ivermectin + zinc	53	3.4	2.6; 4.4

CI: confidence interval. *Varies from total N because of missing data in different questions. **More than one entry was possible.

Table 2. Crude (c) and Adjusted (a) Prevalence Ratios (PR) for the association between professional characteristics and COVID-19 infection by Brazilian dentists. Multivariate Poisson regression analysis (N = 1,907).

Variable	PR[c]	95% CI	PR[a]	95% CI
Sex				
Male	1		*	*
Female	0.97	0.81; 1.15		
Main work sector				
Public	1		*	*
Private	0.87	0.73; 1.74		
Others	0.84	0.62; 1.13		
Years in practice				
≤ 10	1		*	*
11 - 20	1.29	1.05; 1.59		
≥ 21	1.17	0.93; 1.48		
Brazilian region				
South	1		1	
Southeast	0.77	0.62; 0.95	0.78	0.63; 0.98
Northeast	1.12	0.92; 1.35	1.16	0.95; 1.41
North	1.52	1.10; 2.11	1.58	1.14; 2.20
Central-west	0.94	0.68; 1.31	0.94	0.67; 1.32
Postgraduate education				
MSc or PhD	1		1	
Residency or advanced special training	1.27	1.03; 1.57	1.26	1.02; 1.57
None	1.13	0.88; 1.44	1.13	0.88; 1.45
Confidence in COVID-19 vaccines				
Very high	1		*	*
High	1.18	0.94; 1.49		
Moderate	1.24	0.98; 1.57		
Low	1.33	0.92; 1.93		
Very low	1.60	1.07; 2.38		
Fear of being infected at work				
High	1		1	
Moderate	1.03	0.81; 1.31	1.04	0.82; 1.32
Little	0.97	0.77; 1.22	0.99	0.79; 1.25
None	1.43	1.14; 1.80	1.48	1.18; 1.85

CI: Confidence Interval. *Not included in the multivariate analysis.

Table 3. Crude (c) and Adjusted (a) Prevalence Ratios (PR) for the association between professional characteristics and use of controversial drugs and substances for COVID-19 by Brazilian dentists. Multivariate Poisson regression analysis (N = 1,907).

Variable	PR[c]	95% CI	PR[a]	95% CI
Sex				
Male	1		1	
Female	1.11	0.98; 1.25	1.09	0.97; 1.23
Main work sector				
Public	1		1	
Private	1.09	0.99; 1.22	1.10	0.99; 1.23
Other	0.56	0.43; 0.74	0.76	0.58; 1.00
Years in practice				
≤ 10	1		1	
11 - 20	1.17	1.04; 1.33	1.18	1.03; 1.35
≥ 21	1.38	1.22; 1.55	1.42	1.26; 1.61
Brazilian region				
South	1		1	
Southeast	0.99	0.86; 1.15	0.98	0.85; 1.13
Northeast	1.29	1.14; 1.48	1.37	1.20; 1.57
North	1.37	1.08; 1.73	1.37	1.07; 1.76
Central-west	1.29	1.07; 1.57	1.29	1.07; 1.57
Postgraduate education				
MSc or PhD			1	
Residency or advanced special training	1.52	1.30; 1.77	1.30	1.11; 1.53
None	1.31	1.10; 1.57	1.19	0.98; 1.43
Confidence in COVID-19 vaccines				
Very high	1		1	
High	1.38	1.14; 1.66	1.31	1.09; 1.58
Moderate	1.90	1.59; 2.27	1.65	1.37; 1.99
Low	2.21	1.77; 2.76	1.94	1.55; 2.42
Very Low	2.50	1.97; 3.16	2.14	1.67; 2.75

CI: Confidence Interval.

Appendix. Questionnaire (original language: Brazilian Portuguese)

Impact of COVID-19 on routine of dental care assistance

Dear dentist

You are invited to participate in this research that aims to evaluate the impact of the pandemic on dental practice. If you don't want to participate, just leave the page or don't finish filling out the questionnaire. If you are not a dentist or have not yet graduated, we ask that you do not participate. If you have answered this questionnaire before, we appreciate your participation but please do not respond the survey again.

Your participation is voluntary and identification is not required. If you wish, at the end of the form, you can provide your e-mail to receive the results of the study. In this case, we guarantee that your data will be treated anonymously and confidentially, and your responses will be kept confidential. There is no remuneration for participation in the study.

Potential benefits of the research: identification of the impact of the pandemic on dental practice and prospecting for solutions to help improve clinical routines.

Potential risks: possible discomfort when answering a question. In this case, the response option "I'd rather not declare" is available. The option "Does not apply" also can be used for questions that you think do not apply to your case.

If you agree to participate in the survey, this page will be your Free and Informed Consent Form. To keep a copy, print this page or save to PDF. If you need any clarification on this research or want access to new information at any time, please contact the researcher responsible for the study (data provided below). If you prefer, please contact us before answering the questionnaire. The contact can also be used if you wish to withdraw your consent to participate.

Please answer the questionnaire until the end, the average response time is 5 (five) minutes.

YOUR PARTICIPATION IS VERY IMPORTANT!

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Graduate Program in Dentistry
Universidade Federal de Pelotas

Research Ethics Committee:
Medical School, Universidade Federal de Pelotas
Phone: (53) 3301.1801

Do you agree to participate in the study voluntarily?
0 – No
1 – Yes

1. What is your gender?	0 – Male 1 – Female 2 – I'd rather not declare
2. How old are you?	I'd rather not declare List 18 – 80 or +
3. In which year did you graduate in Dentistry? *Attention: if you are not a dentist or did not graduate yet, please do not answer this survey.*	I'd rather not declare List of years from 2020 to 1960 or before

4. In which type of service do you work mostly? *Mark only one oval*	0 – Public health network 1 – Team dental office, private network 2 – Solo private office 3 – Professor 4 – Management 5 – Research 6 – I am studying exclusively at the moment 7 – I don't know 8 – I'd rather not declare 88 – Does not apply
5. In which Brazilian state does your work mostly take place?	I'd rather not declare List of acronyms for all states + federal district
6. Have you completed postgraduate education in Dentistry? *Please select the highest degree*	0 – No 1 – No but I'm currently enrolled 2 – Yes, short-term courses 3 – Yes, residency or special advanced training 4 – Yes, Masters or PhD 5 – I'd rather not declare
7. Have you received any vaccine dose for COVID-19?	0 – No 1 – Yes, one dose of CoronaVac (Sinovac/Butantan) 2 – Yes, two doses of CoronaVac (Sinovac/Butantan) 3 – Yes, one dose of Oxford (AstraZeneca/Fiocruz) 4 – Yes, two doses of Oxford (AstraZeneca/Fiocruz) 5 – Yes, one dose of Pfizer (BioNTech) 6 – Yes, two doses of Pfizer (BioNTech) 7 – Yes, one or more doses but I don't know which vaccine/laboratory 8 – Yes, one or more doses of another vaccine not listed here 9 – I'd rather not declare 88 – Does not apply
8. In general terms, what is your level of confidence regarding the safety and efficacy of COVID-19 vaccines currently available in Brazil?	0 – Very low 1 – Low 2 – Intermediate 3 – High 4 – Very high 5 – I don't know 6 – I'd rather not declare
9. How do you rate the impact of COVID-19 in your clinical routine in the place you work most when compared to the period before the pandemic?	0 – There was no impact 1 – Low impact 2 – Intermediate impact 3 – High impact 4 – Very high impact 5 – I don't know 6 – I'd rather not declare 88 – I do not have a clinical routine or does not apply
10. How do you rate the impact of COVID-19 in your clinical routine in the place you work most when compared with one year previously (May 2020)?	0 – Much lower 1 – Lower 2 – Similar 3 – Higher 4 – Much higher 5 – I don't know 6 – I'd rather not declare

	88 – I do not have a clinical routine or does not apply
11. In average, how many patients are you currently assisting in a regular week?	I do not work with clinics or does not apply I don't know how to answer I'd rather not declare None, because of the pandemic None, due to other reasons List of numbers 1 – 100 or +
12. Since May 2020, have work routine changes led to increased financial costs?	0 – No 1 – Yes, but prices were not adjusted 2 – Yes, and prices were adjusted for patients 3 – I don't know 4 – I'd rather not declare 88 – I do not have a clinical routine or does not apply
13. Do you (or any other person) perform any type of patient screening concerning to COVID-19 before appointments in your main workplace? *Mark all that apply*	0 – No, I am using normal anamnesis 1 – Face-to-face application of specific questionnaire for COVID-19 2 – Previous application of specific COVID-19 questionnaire via telephone, text message or similar 3 – Temperature check of patients in the office 4 – Request a temperature check before the patient arrives at the office 5 – Recommend mouthwashes with antimicrobials in the office 6 – Recommend mouthwashes with antimicrobials for the patient before arriving at the office 7 – I don't know 8 – I'd rather not declare 88 – Does not apply
14. How prepared do you feel today to assist patients with confirmed diagnosis of COVID-19?	0 – I do not feel any prepared 1 – Poorly prepared 2 – Intermediately prepared 3 – Well prepared 4 – Very well prepared 5 – I don't know 6 – I'd rather not declare 88 – Does not apply
15. Have you ever assisted any patients via online appointment during the pandemic?	0 – No, and I'm not willing to at the moment 1 – No, but I'm willing to 2 – Yes, and I rate the experience as positive in general 3 – Yes, but I rate the experience as negative in general 4 – I'd rather not declare 88 – Does not apply
16. How often do you use a N95 mask in dental appointments?	0 – Never 1 – When there is a perceived higher risk for COVID-19 infection 2 – During aerosol-generating procedures 3 – Depending on the availability of N95 masks 4 – Always 5 – I don't know 6 – I'd rather not declare 88 – Does not apply Other:
17. How often do you use a face shield mask during patient care?	0 – Never 1 – When there is a perceived higher risk for COVID-19 infection 2 – During aerosol-generating procedures

	3 – Always 4 – I don't know 5 – I'd rather not declare 88 – Does not apply Other:
18. Have you assisted patients with confirmed COVID-19 diagnosis?	0 – No 1 – Yes 2 – I don't know 3 – I'd rather not declare 88 – Does not apply
19. Do you currently fear to contract COVID-19 at work?	0 – No 1 – Yes, a little 2 – Yes, moderately 3 – Yes, a lot 4 – I don't know 5 – I'd rather not declare 88 – Does not apply
20. Have you suspected or tested yourself for COVID-19?	0 – No 1 – Suspect without test 2 – I tested negative for COVID-19 3 – My test was inconclusive for COVID-19 4 – I tested positive for COVID-19 5 – I'd rather not declare 88 – Does not apply
21. Which of the following medications or substances have you used for preventing or treating COVID-19? *Mark all that apply*	0 – Vitamin D 1 – Zinc 2 – Ivermectin 3 – Chloroquine or hydroxychloroquine 4 – Azithromycin 5 – Corticosteroid 6 – Remdesivir 7 – None of the listed above 8 – I'd rather not declare 88 – Does not apply
22. If you had a confirmed COVID-19 diagnostic, what was the severity of the disease?	0 – Asymptomatic 1 – Mild (cough, headache, low fever, loss of smell or taste, diarrhea) 2 – Severe without hospitalization (shortness of breath, change in consciousness levels, chest pain, fever above 39°C) 3 – Severe with need of hospitalization 4 – No COVID-19 diagnosis or suspicious 5 – I'd rather not declare 88 – Does not apply
23. Have you had family members or friends severely affected by COVID-19?	0 – No 1 – Yes, with hospitalization 2 – Yes, with death 3 – I don't know 4 – I'd rather not declare 88 – Does not apply
24. What has been your main professional challenge during the pandemic?	0 – Fear of contracting COVID-19 1 – Difficulty in acquiring personal protective equipment 2 – Difficulty in the clinical use of new personal protective equipment 3 – Increased material and equipment costs

	4 – Reduction in the number of patients 5 – Reduction of financial gains or salary 6 – Keep my health well cared for, including mental health 7 – Reconciling work and household chores, caring for children or other people 8 – I don't know 9 – I'd rather not declare 88 – Does not apply Other:
25. With just ONE WORD, describe the feeling you have felt most during the pandemic:	Open question
THANK YOU VERY MUCH FOR YOUR PARTICIPATION!	

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