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COVID-19 PANDEMIC: IMPACTS IN DENTISTRY PRACTICE IN THE STATE OF PARANÁ, BRAZIL

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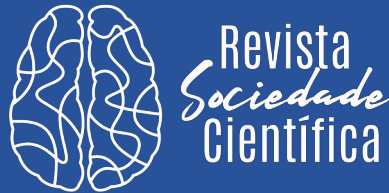
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ABSTRACT

This research evaluated the impacts caused by COVID-19 pandemic on dental care and health of dentists in the state of Paraná, Brazil. Methods: Data were collected by a self-administered online questionnaire. Data analysis were performed by descriptive statistics and the chi-square test. A total of 285 dentists completed the survey. The data showed the compliance and effectiveness of biosafety protocols. The measures adopted to combat the virus associated with vaccination showed effectiveness, since the proportion of professionals contaminated before the vaccine was low (17.2%), as well as after the first and second dose (2.8% and 12, 6%). However, with the reduction in patient care, most dentists suffered a decrease in financial income. In addition, the



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pandemic had a significant impact on mental health of these professionals and women were more psychologically affected. Thus, the COVID-19 pandemic impacted dentists in different ways including changes in clinical routine, decrease in income and induction of mental health problems.

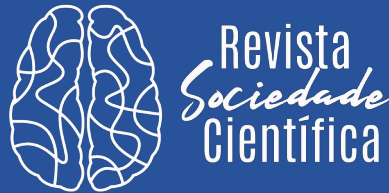
Keywords: Infection control, Prevention, Anxiety, Coronavirus.

1 INTRODUCTION

In 2020, the world was affected by the COVID-19 pandemic. This Public Health Emergency of International Concern brought several health and biosecurity issues that should be adopted with the aim at containing the spread of Sars-CoV-2 virus, mainly in health area. Sars-CoV-2 belongs to a family of viruses responsible for Severe Acute Respiratory Syndrome (SARS) [1]. Sars-CoV-2 main transmissions are through direct contact with fluids from nasal, ocular and oral routes, from sneezing, coughing, saliva, and aerosols [2]. COVID-19 can also be transmitted indirectly, from contact with contaminated surfaces and objects, such as: chairs, counters, and instruments [3].

Among health professionals, dentists are one of the most exposed to contamination by COVID-19, since dentistry procedures require that the patient is exempt from the use of the mask. In addition, during the service, aerosols are produced by high rotation turbine, ultrasound and triple syringe. Thus, these factors may improve the dissemination of contaminated particles through the dental environment [4]. In this way, not only dental professionals, but the entire clinical environment is exposed to contaminated particles during dental procedures. Thus, according to the new biosafety protocols, dental practices were categorized as high-risk for contamination by the new coronavirus [5].

In the 1980s, with the emergence of AIDS and the real danger of occupational transmission, a strong movement began in health services to include actions related to the control of cross-infection, aiming to reduce the risks for both professionals and patients. Since then, dental professionals have been adapted to the use of personal

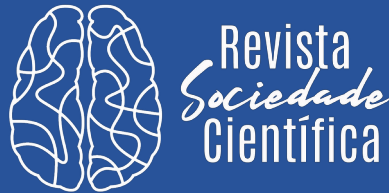


protective equipment (PPE), with a tendency to consider all patients as potentially infected [6].

Likewise, the emergence of COVID-19 forced dentists to modify and expand PPE. In this way, several biosafety protocols related to control the transmission of the new coronavirus have been established. Dentists are recommended to consider every patient as COVID-19 positive. Thus, the use of N95, PFF2 mask or equivalent, face shield and disposable apron with a minimum weight of 50g/m² are highly recommended [7]. Besides, after completing dental treatments, it is necessary to adequately disinfect the dental operating room to avoid the transmission of infectious diseases.

Nowadays, considering the COVID-19 pandemic, dentists had to change their clinical routine attitudes. Thus, dental professionals had to adopt new preventive measures as pre-screening of patients before dental appointment; temperature measurement; restrictions of companions and patients; constant cleaning of the workplace and waiting room and increase in interval between appointments [8]. In the face of the COVID-19 pandemic, anxiety is a normal response, but severe anxiety can lead to a state of panic, especially in high-risk professions like dentists. That anxiety can be heightened by the constant fear of imminent contamination and other factors like the need of social distancing. Thus, excessive anxiety, associated with other factors, may result in stress and depression [9].

Hence, the verification of compliance with sanitary and biosafety parameters is important, since their function is to guarantee social well-being in dental office and prevent contamination by both professionals and patients. In addition, it is necessary to investigate the physical and mental condition of these professionals, who are daily exposed to inherent contamination, and to correlate these psychic impacts with their professional performance.



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In this way, this research aimed to verify the impacts of COVID-19 pandemic on dental care, on physical and mental health of dentists and to evaluate the effectiveness PPE in the protection against the new Coronavirus.

2 METHODS

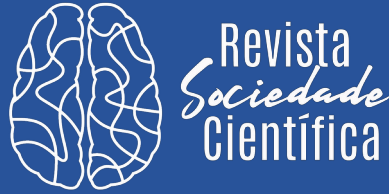
In this cross-sectional study, having its methodological structure outlined based on the STROBE guidelines for observational studies [10], data were collected through a self-administered online questionnaire sent to dentists of Paraná State - Brazil. This research was approved by the research ethics committees of Integrado University Center from Campo Mourão, Paraná-Brazil (number: 49697321.6.0000.0092).

The questionnaire, developed by the authors, was divided into four domains: a) personal data (age, sex, dental degree, graduation time, specialty, and working status); b) health conditions (COVID-19 status, vaccine, comorbidities); c) changes in working conditions; and d) personal protective equipment adopted following the start of pandemic.

The questionnaire was pre-tested by five dentists not otherwise involved in the study. The Google Forms platform was used to collect data. The online survey questionnaire was shared with active dentists registered in Regional Council of Dentistry of the State of Paraná via email and other social networks such as WhatsApp, Instagram, and Facebook. Before answering the questionnaire, all participants were required to check the box related to consent form, on the first screen of the survey.

2.1 STATISTICAL ANALYSIS

Descriptive analyses were used to describe the sociodemographic and pandemic features. Absolute and relative frequencies mean, and standard deviation values were used for categorical independent variables. Descriptive statistics were performed as percentages. Association between dependent variables was performed with the chi-



square test in SigmaPlot software (version 12.1). Results were considered significant for $p < 0.05$.

3 DEVELOPEMENT AND DISCUSSIONS

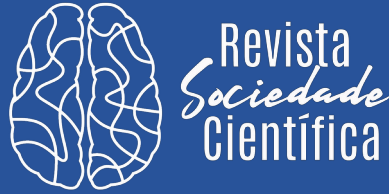
3.1 DESCRIPTIVE DATA

The sample size ($n=268$) was calculated for a confidence level of 90% and a sampling error of 5% from a total of 20,545 active dentists, registered in the Regional Council of Dentistry of the state of Paraná, Brazil. Personal and professional profiles of are summarized in table 1. Among all the participants, 70 (24.6%) are male, 215 (75.4%) are female. Nearly half of the participants ($n=138$, 48.42%) are between 20 to 30 years. Most participants has a job experience time lesser than ten years ($n=175$, 61.40%) and works at a private clinic ($n=224$, 78.6%). Among the participants, there are general dentists ($n=40$), specialists ($n=204$) and postgraduate students ($n=41$) from more than ten expertise areas in Dentistry. Orthodontics (26.2%), Implantology (22.1%) and Endodontics (17.6%) are the most frequent.

3.2 PROTECTING MEASURES FOR DENTISTS AND PATIENTS

Table 2 shows the work practice modification of dental professionals on prevention COVID-19 dissemination. Majority of the dentists ($n=277$, 97.2%) are sanitizing patients' hands with alcohol gel, followed by requesting the use of facial masks ($n=261$, 91.6%). The entrance of companions, removal of magazines and toys from the waiting room and the assessment of the patient's temperature are also practiced by dentists.

Considering the biosafety, most participants answered that the dental clinic where they work follows the protocols established by the Brazilian Federal Council of Dentistry ($n=279$, 97.9%). Besides, reflector and its support ($n= 268$, 94.4%), dental chair surface ($n=278$, 97.9%), instruments ($n=279$ 98.2%), instrumental table ($n=269$,



94.7%) and dental spittoon (n=225, 79.2%) are the surfaces and equipments most frequent cleaned, disinfected or sterilized between each patient attendance.

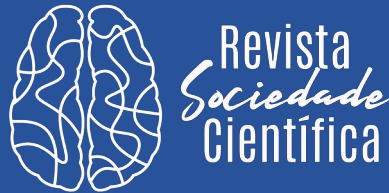
Table 1. Demographic information of dentists (n=285).

DEMOGRAPHIC INFORMATIONS	ANSWER	N (%)
Gender	Male	70 (24.6)
	Female	215 (75.4)
Age (years)	20–30	138 (48.42)
	31–40	95 (33.33)
	41–50	44(15.44)
	51–60	7 (2.46)
	> 60	1 (0.35)
Graduation time	< 5 years	102 (35.8)
	5 - 10 years	73 (25.6)
	11 - 15 years	43 (15.1)
	16 - 20 years	33 (11.6)
	21 - 25 years	21 (7.4)
Which practice do you work in?	26 - 35 years	13 (4.6)
	Government	20 (7.0)
	Private Clinic	224 (78.6)
Qualification/designation	Both	41 (14.4)
	General practitioner	40 (14)
	Postgraduate trainee	41 (14.4)
	Specialist	204 (71.6)

Table 2. Most frequent adjustments made by dentists in their clinical practice following the beginning of the COVID-19 pandemic.

Changes in clinical routine	N (%)
Hands hygiene with alcohol gel	277 (97.2)
Request the use of facial mask	261 (91.6)
Regulate the entry of companions	246 (86.3)
Check indications of patient's contamination	226 (79.3)
Removal of magazines and toys from the waiting room	181 (63.5)
Patient's temperature assessment	133 (46.7)

Regarding the use of personal protection, the most commonly personal protective equipment used by dentists after the start of pandemic are disposable procedure gloves (97.2%) and face shields (74.7%), followed by surgical (68.1%) and PFF2/N95 masks (63.9%). In contrast, the least commonly used equipment are



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waterproof jackets (43.5%). Statistical analysis showed not significantly difference in contamination by COVID-19 when comparing the use of PFF2/N95 masks or surgical ones.

3.3 CHANGES IN CLINICAL ROUTINE

Dentists related that there was a decrease in the number of patients during the pandemic. Only 48 (16.8%) participants did not refer to a reduction in the number of dental appointments. Most dentists have observed a decrease in the number of elective procedures (n=236, 83.6%) and a postponement or suspension of appointments due to the pandemic (n=271, 95.1%). Moreover, since the beginning of the pandemic, a reduction in income was noted by 203 (71.5%) respondents.

3.4 LEVEL OF FEAR AND ANXIETY OF DENTISTS

Figure 1 shows the level of fear and anxiety of dental professionals during COVID-19. Most of the dentists (n=220, 77.2%) were psychologically impacted by COVID-19 pandemic. Anxiety (65.61%), Stress (49.82%), fear of getting contaminated (47.37%) and fear of contaminating patients (37.19%) were the most common feelings reported by dentists. Concerning mental health, results also show that women were more impacted by COVID-19 pandemic than men ($p < 0.05$, Chi-square test).

3.5 FREQUENCY OF CONTAMINATION AND SEVERITY OF ILLNESS AMONG DENTISTS

At the beginning of the pandemic, there was great concern with dentists, because they work very close to patients and are frequently exposed to aerosols generated during procedures. Nonetheless, data analysis showed that 183 (64.2%) was not infected by COVID-19, 49 (17.2%) were infected before being vaccinated while 8 (2.8%) and 36 (12.6%) were infected even after the 1st and the 2nd dose of vaccine, respectively. From the 102 dentists affected by SARS-CoV-2, 60.8% have developed disease's mild form,

with few or no symptoms, 36.3% developed the moderate disease form, without the need for hospitalization and only 2.9% were hospitalized. None was seriously ill.

Most of diagnosis tests for SARS-CoV-2 infection (71.9%) were performed in private health systems. Molecular tests (RT-PCR, POCT-PCR, Sanger, CRISPR) (56.7%) and Immunochromatography tests (quick test, swab of nasopharynx) (52.9%) were the most frequent.

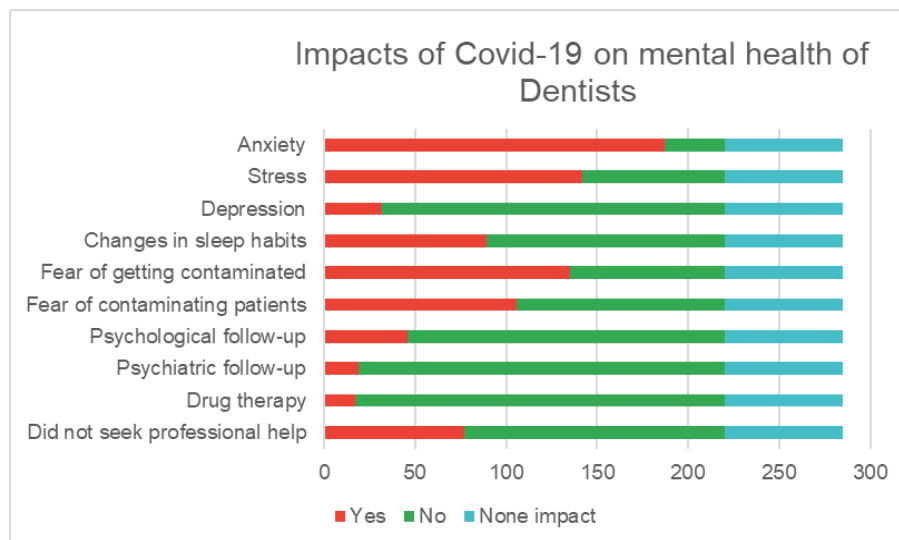
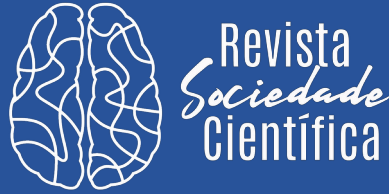


Figure 1. Fear and anxiety assessment of dental professionals.

3.6 DISCUSSION

During COVID-19 pandemic, in the face of widespread transmission, several countries experienced challenges and uncertainties regarding the surveillance and control of new coronavirus [11]. In Brazil, the first case was confirmed in February 2020, therefore numerous actions were implemented aiming to control the virus transmission and mitigate its complications [12]. These measures were necessary for the continuity of the work of health professionals, including dentists, but they caused extreme changes in their labor routine [13].

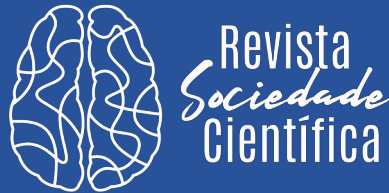


Currently, Paraná has just over than 20,000 registered dentists [7], and it has been included among the three Federation Units with the most cases of COVID-19 in Brazil [14]. In this research, that investigated the impact of the COVID-19 pandemic among dentists, there was a greater participation of women professionals. This is justifiable as, according to the Federal Council of Dentistry [7], most dentists are female, corresponding to almost 60% of all professionals registered in Brazil.

As professionals that work very closely to patients, dentists are often exposed to contamination by the virus due to aerosols generated during their work routine [15]. Faced with this risk, the pandemic caused impacts and brought changes in dentistry practices [16]. Data showed that most of the interviewees adopted the biosecurity measures established by the Federal Council of Dentistry [17]. Other studies conducted in the country, showed that most dentists also follow biosecurity measures [18], [19].

The protective measures implemented in the pandemic context were essential to reduce the virus transmission. Whereas, data analysis showed that most respondents in this survey 183 (64.2%) did not contract COVID-19. However, an increase in the number of cases was detected after the 2nd dose of the vaccine compared to 1st dose. Such results may be associated with a reduction in care to prevent contamination by COVID-19 after immunization starts. To control the virus spread, a sequence of factors and actions must be combined. Essential cares, such as social distancing and the use of mask, must be maintained even after vaccination, until a considerable reduction in Sars-CoV-2 circulation is observed [20].

Infected dentists developed the mild or moderate form of the disease. Nevertheless, not only the physical health of dentists of Paraná was affected by the pandemic, but a significant impact on mental health was also observed. The results showed that most dentists (n=220, 77.2%) were psychologically impacted by the COVID-19 pandemic. Among the psychological consequences the following stood out: anxiety, stress, and fear of getting contaminated or contaminating the patients. These



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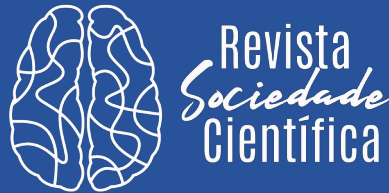
negative emotions were also reported by dentists in other studies carried out in Brazil, Italy, Israel and Pakistan [16], [21], [22], [23], [24].

Comparing genders, results show that female professionals were more susceptible to psychological impacts. This data is in line with other studies that reported the prevalence of mental health problems in women in different parts of the world, such as United States and China [25], [26]. This fact may be related to women responsibility in society, with a multitasking profile that reconciles domestic work and professional life. In addition, it should be noted that health workers are predominantly composed by women. Therefore, women are the majority on the front line against COVID-19 [27]. Thus, the pandemic weighed more heavily on these professionals [28].

This study also provides evidence of financial impact caused by the pandemic on dentists in Paraná. The data obtained showed that most respondents (71.5%) reported a drop in income. The limitation of dental care is the cause of this decrease, since at the beginning of the pandemic, only urgent and emergency cases were attended. In addition, there was an increase in the time between appointments and the postponement of elective procedures [29]. Statistics from this study show that 236 (83.6%) professionals had a decrease in the number of elective procedures. In addition, 271 (95.1%) reported postponement or suspension of appointments due to the pandemic. These results agree with other studies that have shown an economic impact caused by pandemic in the dental sector [30], [21].

4 CONCLUSION

The COVID-19 pandemic caused major changes in the work routine of dentists in the state of Paraná. In this study, the professionals reported that they are following established biosecurity measures. However, some of these measures – such as restricting attendance – impacted them financially. On the other hand, compliance with the prevention measures, associated with the action of vaccines, proved to be effective, since most dentists were not contaminated. The additional biosecurity measures,

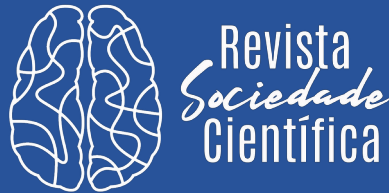


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implemented during the COVID-19 pandemic, could stimulate substantial changes in dental care that provides safety for patients and professionals. Furthermore, pandemic had a significant impact on mental health of dentists, mainly for female professionals. Thus, considering the challenges and changes imposed by the pandemic, it is important to note that these professionals would have received a support of special financial programs and psychological education during COVID-19.

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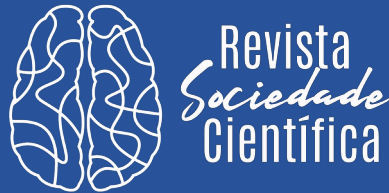
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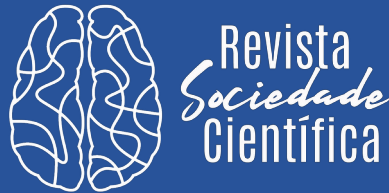
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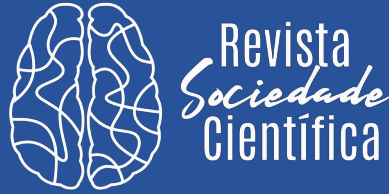
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