








How Brazilian oral health care workers face COVID-19: surveillance, biosafety, and education strategies

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Aim: To investigate surveillance, biosafety, and education strategies of Brazilian oral health care workers (OHCWs) during the first wave of the COVID-19 outbreak. **Methods:** This was a cross-sectional study covering OHCWs from a single multicenter research centre. A self-administered and validated online questionnaire was used for data collection, including the following variables: sociodemographic, medical history, biosafety, professional experience, surveillance, and education.

Results: The sample consisted of 644 OHCWs (82.5% dentists, 13.2% dental assistants and 4.3% technicians), most without comorbidities (84.8%), from the public (51.7%) and private (48.3%) health systems, in 140 cities of a southern state. The most prominent measures of surveillance were waiting room distancing and visual alerts, symptom assessment, and availability of guidelines on COVID-19. Regarding biosafety measures, the lowest adherence was related to intraoral radiographs (2.7±1.4; 95%CI: 2.6–2.9), use of dental dams (2.1±1.4; 95%CI: 2.0–2.2), and availability of high-power suction systems (2.5±1.7; 95%CI: 2.3–2.6). Among OHCWs, 52.6% received guidance on measures to take during dental care in the workplace. Continuing education was mainly through documents from non-governmental health authorities (77.4%).

Conclusion: Surveillance and biosafety measures were adopted, but activities that reduce the spread of aerosols had less adherence. These findings underscore the importance of considering dental practices, and surveillance and education strategies to formulate policies and relevant support to address health system challenges during the COVID-19 pandemic. A coordinated action of permanent education by policymakers is necessary.

Keywords: SARS-CoV-2. COVID-19. Health workforce. Education, dental. Public health dentistry.



Introduction

With the worldwide spread of the COVID-19 pandemic caused by the SARS-CoV-2 virus, the policies adopted by Brazil to contain the disease have had no positive effect. The mismanagement of the public health system, the delay in vaccine acquisition, and the lack of tests, combined with political instability, worsened the country's handling of COVID-19. Brazil was an epicenter of the spread of COVID-19, considered the third most-affected country globally, with excessive cases and deaths¹.

In this challenging scenario for health systems, oral health care workers (OHCWs) in particular have been part of the frontline struggle against COVID-19. Dental care requires proximity to the patient, and it demands procedures that generate aerosols containing saliva, oral fluids, and blood. With the increase of COVID-19 cases combined with the high risk of transmission of SARS-CoV-2 and the intensification of healthcare work, especially in dental emergencies, strict biosecurity and infection control measures were recommended^{2,3}.

Given the need to maintain dental care, Brazil adopted restrictive measures and actions to prevent the spread of the virus. The Ministry of Health (MS) and the Federal Council of Dentistry (CFO) published guidelines with specific recommendations for clinical dental management to be followed by OHCWs. Among them, dental care was restricted to urgencies and emergencies with subsequent release of elective procedures. COVID-19 symptom investigation during anamnesis, education in the waiting room, appropriate use of personal protective equipment (PPE), and reduction of aerosols to prevent the spread of the virus were emphasized^{4,5}.

The bleak context for Brazilian public health and particularly dental care, aggravated by the absence of a national emergency plan, prompted collaboration and research networks to face the challenges of COVID-19. This investigation is part of a broader multicenter study, carried out in three states in the southern region of Brazil between four universities, the CFO, and the Brazilian Dental Education Association (ABENO). Thus, the study aimed to evaluate the surveillance, biosafety, and education strategies of Brazilian OHCWs in the context of the first wave of the COVID-19 pandemic.

Materials and Methods

Study design and population

This study was descriptive and cross-sectional design using data on surveillance and biosafety measures and access to education activities among OHCWs (dentists, dental assistants, and technicians) from the public and private sectors. The study population corresponds to one of the states obtained from the multicenter research encompassing three states of the south of Brazil.

This investigation was conducted between August 2020 and October 2020. Ethical approval for data collection in the state was obtained from the Research Ethics Committee, the Federal University of Rio Grande do Sul, Porto Alegre, Brazil (CAAE

no. 31720920.5.2002.5530). All participants provided written informed consent. The study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines⁶.

Selection of participants and eligibility criteria

Participants were identified through the CFO registration of professionals at June 2020 in the state of Rio Grande do Sul. This record contained a total of 30,588 OHCWs. They were invited to participate by email to the address provided by the CFO. To maximize participation, before recruiting participants through email, Instagram social networking campaigns targeting OHWCs were held to promote this research.

Informed consent for participation in the study was incorporated. After the first invitation, the response to the form was monitored. Two more invitations were made within 15 days.

Data collection

A structured, self-administered, unidentified, and validated questionnaire was applied via email using a Google Forms® (Appendix 1). Briefly, the instrument was submitted to eight experts with experience from the public health, biosafety, and education for evaluation to verify its performance and reliability. After modifications requested by the experts, the questionnaire was evaluated through a pilot study with 52 OHCWs in the three professional categories. This step aimed to ascertain the degree of understanding concerning the questions that were developed and the reproducibility of the instrument. The agreements obtained in the test retest ranged from 84% to 100%.

The time to complete the instrument was approximately 20 minutes. It was composed of three thematic axes: (1) sociodemographic characteristics; (2) surveillance and biosafety measures; and (3) professional experience, management, education, work, and staff. The questionnaire had 47 closed questions with answer options on a 5-point Likert Scale (1: never, 2: rarely, 3: sometimes, 4: almost always, 5: always).

Data analysis

The data compilation, organization, and codification were performed using Microsoft Excel™ (Microsoft Corp., Seattle, USA). Data were subsequently analyzed for inconsistencies and incomplete data. Missing data were excluded from the study. The statistical analysis was performed using IBM SPSS version 20.0 (IBM Corp, Armonk, USA). Absolute and percentage frequencies were measured for categorical variables and means (\pm standard deviations) for Likert Scale scores. Proportions and confidence intervals for the study population were estimated.

Results

The study included 644 OHCWs in 140 cities of the state of Rio Grande do Sul. The sample was composed of 82.5% dentists, 13.2% dental assistants and 4.3% technicians, being 73.8% women. The length of professional experience was well-distributed

in the sample, with the highest rates in the groups over 20 years (29.5%) and between 6 and 10 years (22.4%). Concerning the professional category of the participating dentists, 47.5% were specialists, 19.1% of whom were in public health. Of the participants, 51.7% worked in the public sector, 46.5% worked in primary health care, and private clinics represented 36.6%. A total of 68.5% reported an absence from work in the first wave of the COVID-19 outbreak. Regarding health aspects, 84.8% of the participants reported no risk factors or conditions. Testing for COVID-19 was not performed by 43.0% (Table 1).

Table 1. Sociodemographic, education, work, and health characteristics of the sample of oral health care workers from the Rio Grande do Sul, Brazil, August-October, 2020.

Variables	n	%	CI 95%
<i>Gender</i>			
Female	475	73.8	70.3 – 77.1
Male	169	26.2	22.9 – 29.7
<i>Age (years)</i>			
18-24	24	3.7	2.4 – 5.4
25-39	307	47.7	43.8 – 51.5
40-59	277	43.0	39.2 – 46.9
>60	36	5.6	4.0 – 7.5
<i>Occupation</i>			
Dentists	531	82.5	79.4 – 85.3
Dental Assistant	85	13.2	10.7 – 16.0
Technicians	28	4.3	3.0 – 6.1
<i>Conclusion of professional training (years)</i>			
Up to 5	131	20.3	17.4 – 23.6
6-10	144	22.4	19.3 – 25.7
11-15	95	14.8	12.2 – 17.6
16-20	84	13.0	10.6 – 15.8
>20	190	29.5	26.1 – 33.1
<i>Higher graduate level*</i>			
Specialization/Residency	306	47.5	43.7 – 51.4
Master	87	13.5	11.0 – 16.3
PhD	57	8.9	6.8 – 11.2
None	194	30.1	26.7 – 33.7
<i>Postgraduate areas#</i>			
Public Health	123	19.1	16.8 – 20.5
Clinical specialties#	327	69.9	67.2 – 72.5
None	194	11.0	9.8 – 14.2

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<i>Workplace</i>			
SUS* – Primary Health Care (PHC)	300	46.5	44.3 – 48.4
SUS* - Dental Specialty Centers (DSC)	32	5.0	3.9 – 7.4
SUS* – Urgency care	1	0.2	0.1 – 0.4
Private clinic	236	36.6	32.8 – 40.5
Dental teaching clinic	43	6.7	3.8 – 8.1
Corporate Entities Health System	11	1.7	0.7 – 2.6
Security forces (army, police, etc.)	4	0.6	0.3 – 0.8
Hospital	6	1.0	0.6 – 1.7
Management	4	0.6	0.3 – 0.8
Other	7	1.1	0.8 – 1.5
<i>Risk factors for severe forms of COVID-19</i>			
Only age over 60 years old	25	3.8	3.0 – 4.5
Health condition only	62	9.7	6.8 – 11.2
Age over 60 and health condition	11	1.7	1.4 – 2.1
None	546	84.8	80.6 – 87.1
<i>Absence from work during the pandemic</i>			
Yes	441	68.5	65.4 – 71.4
No	203	31.5	28.0 – 35.2
<i>Testing for COVID-19</i>			
No	277	43.0	39.2 – 46.9
Yes			
RT PCR	153	23.8	20.6 – 27.1
Rapid test	173	26.9	23.5 – 30.4
Serological test	41	6.4	4.7 – 8.4

* Only dentists included.

Most cited areas of dentistry: orthodontics, implantology, dental prosthesis, endodontics, periodontics, pediatric dentistry and dentistry.

* Brazilian National Health System.

The COVID-19 preventive practices with the highest average responses were the availability of guidelines (3.9 ± 1.2) and visual alerts in the office (3.9 ± 1.4), investigation of possible respiratory symptoms (4.1 ± 1.3), and adoption of distancing in the waiting room (4.2 ± 1.1). However, lower averages were registered for questions relating to innovative practices in dental care: working directly in COVID-19 fast-tracking procedures (2.2 ± 1.4) or the use of tools for telemonitoring of patients (2.4 ± 1.6 ; Table 2).

Table 2. Sample distribution regarding the adoption of surveillance, planning and risk management measures to control the dissemination of COVID-19 in health services. Oral health care workers from the Rio Grande do Sul, Brazil, August-October, 2020.

Organization of health services (surveillance, planning and management)	Always (score 5)	Often (score 4)	Sometimes (score 3)	Ever (score 2)	Never (score 1)	Do not know	Mean (DP)	CI 95%
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)		
Suspended elective procedures and care restricted to urgency/emergency	213 (33.1)	198 (30.7)	124 (19.3)	64 (9.9)	42 (6.5)	3 (0.5)	3.7 (1.2)	3.6 – 3.8
Participation in decision-making about changes in work during the pandemic	238 (37.0)	69 (10.7)	96 (14.9)	59 (9.2)	178 (27.6)	4 (0.6)	3.1 (1.6)	3.0 – 3.3
Reduced workload or professional turnover to minimize the risk of contamination	165 (25.6)	74 (11.5)	100 (15.5)	63 (9.8)	236 (36.6)	6 (0.9)	2.7 (1.6)	2.6 – 2.9
Worked directly in COVID-19 reception/ sorting/fast track procedures	89 (13.8)	53 (8.2)	89 (13.8)	84 (13.0)	325 (50.5)	4 (0.6)	2.2 (1.4)	2.0 – 2.3
Investigation of respiratory infection symptoms in appointment scheduling	394 (61.2)	98 (15.2)	60 (9.3)	39 (6.1)	32 (5.0)	21 (3.3)	4.1 (1.3)	4.0 – 4.2
Patients with symptoms of respiratory tract infection immediately isolated	384 (59.6)	84 (13.0)	40 (6.2)	29 (4.5)	65 (10.1)	42 (6.5)	3.8 (1.6)	3.7 – 4.0
Waiting room respecting the minimum distance of 01 meter between people	386 (59.9)	125 (19.4)	72 (11.2)	34 (5.3)	16 (2.5)	11 (1.7)	4.2 (1.1)	4.1 – 4.3
Availability of visual alerts in the health service	346 (53.7)	110 (17.1)	61 (9.5)	47 (7.3)	63 (9.8)	17 (2.6)	3.9 (1.4)	3.7 – 4.0
Urgency based on pre-established clinical protocols	318 (49.4)	141 (21.9)	73 (11.3)	29 (4.5)	58 (9.0)	25 (3.9)	3.8 (1.4)	3.7 – 3.9
Orientation of patients about COVID-19	303 (47.0)	135 (21.0)	125 (19.4)	42 (6.5)	30 (4.7)	9 (1.4)	3.9 (1.2)	3.8 – 4.0
Use of digital tools for teleorientation or telemonitoring	121 (18.8)	62 (9.6)	102 (15.8)	81 (12.6)	255 (39.6)	23 (3.6)	2.4 (1.6)	2.3 – 2.5
Interaction with other health professionals	221 (34.3)	153 (23.8)	157 (24.4)	67 (10.4)	44 (6.8)	2 (0.3)	3.6 (1.2)	3.5 – 3.7

Regarding the adoption of biosafety measures by OHCWs, the highest averages were related to routine care with PPE and decontamination of environments: disinfection of the face shield (4.7 ± 0.9), proper removal of personal barrier protection (3.9 ± 1.3), reuse of N95/PFF2 masks following appropriate criteria (3.8 ± 1.5), and disinfection of environments (3.8 ± 1.4). Lower averages were identified in practices to minimize the generation of aerosols and oral secretions: avoiding intraoral radio-

graphs (2.7 ± 1.4), use of dental dams in high-speed care (2.1 ± 1.4) and availability of high-power suction systems (2.5 ± 1.7 ; Table 3).

Table 3. Sample distribution regarding the adoption of biosafety measures in health services. Oral health care workers from the Rio Grande do Sul, Brazil, August-October, 2020.

Work biosafety	Always (score 5)	Often (score 4)	Sometimes (score 3)	Ever (score 2)	Never (score 1)	Do not know	Mean (DP)	CI 95%
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)		
Disinfection of the environment by a trained professional with appropriate PPE	322 (50.0)	118 (18.3)	69 (10.7)	45 (7.0)	82 (12.7)	8 (1.2)	3.8 (1.4)	3.7 – 3.9
Disinfection of suction hoses	272 (42.2)	86 (13.4)	89 (13.8)	56 (8.7)	105 (16.3)	36 (5.6)	3.4 (1.7)	3.2 – 3.5
Use of sterile micromotors at every dental appointment	269 (41.8)	62 (9.6)	67 (10.4)	80 (12.4)	152 (23.6)	14 (2.2)	3.2 (1.7)	3.1 – 3.4
Intraoral radiographic examinations were avoided	75 (11.6)	159 (24.7)	160 (24.8)	75 (11.6)	156 (24.2)	19 (3.0)	2.7 (1.4)	2.6 – 2.9
Performing four-handed dental procedures	165 (25.6)	114 (17.7)	110 (17.1)	103 (16.0)	137 (21.3)	15 (2.3)	3.0 (1.5)	2.9 – 3.1
Use of the dental dam in high rotation services	68 (10.6)	77 (12.0)	98 (15.2)	84 (13.0)	278 (43.2)	39 (6.1)	2.1 (1.4)	2.0 – 2.2
Procedures that generate aerosols were avoided	135 (21.0)	176 (27.3)	135 (21.0)	86 (13.4)	98 (15.2)	14 (2.2)	3.1 (1.4)	3.0 – 3.3
Use of suction system (vacuum pump)	176 (27.3)	51 (7.9)	53 (8.2)	31 (4.8)	309 (48.0)	24 (3.7)	2.5 (1.7)	2.3 – 2.6
Proper removal of personal barrier protection	317 (49.2)	167 (25.9)	61 (9.5)	34 (5.3)	50 (7.8)	15 (2.3)	3.9 (1.3)	3.8 – 4.0
N95/PPF2 mask reuse with proper criteria	357 (55.4)	101 (15.7)	66 (10.2)	24 (3.7)	70 (10.9)	26 (4.0)	3.8 (1.5)	3.7 – 4.0
Disinfection of face shield	569 (88.4)	31 (4.8)	12 (1.9)	13 (2.0)	8 (1.2)	11 (1.7)	4.7 (0.9)	4.6 – 4.7

Table 4 shows how the participants accessed technical standards and recommendations on dental care during the COVID-19 pandemic. Of the OHCWs, 77.4% searched for documents without identifying the agency responsible for the information accessed. The responses related to accessing official recommendations showed similar scores: 58.8% accessed CRO recommendations, and 58.0% accessed the Technical Note No. 04/2020 ANVISA.

Table 4. Aspects related to access to technical standards and recommendations on dental care during COVID-19 pandemic. Oral health care workers from the Rio Grande do Sul, Brazil, August-October, 2020.

Variables	Total	Dentists	Dental Assistants	Technicians
	n (%)	n (%)	n (%)	n (%)
<i>Access to technical standards and recommendations</i>				
Technical note GVIMS/GGTES/ANVISA N° 04/2020	374 (58.0)	324 (50.3)	40 (6.2)	10 (1.5)
Recommendations booklet of the Federal Council of Dentistry (CFO)	377 (58.5)	334 (51.8)	33 (5.1)	10 (1.5)
Recommendations booklet of the Regional Council of Dentistry (CRO) from own state	361 (56.0)	303 (47.0)	44 (6.8)	14 (2.1)
Recommendations booklet of the Regional Council of Dentistry (CRO) from other state	92 (14.2)	84 (13.0)	6 (0.9)	2 (0.3)
Recommendations from the Municipal/ State Secretariat	341 (52.9)	270 (41.9)	51 (7.9)	20 (3.1)
None	33 (5.1)	29 (4.5)	4 (0.6)	0 (0.0)
Other documents *	499 (77.4)	405 (62.8)	70 (10.8)	24 (3.7)

* Any source of information without identification of the agency responsible for the information accessed.

The results related to continuing education show that 52.6% of the participants received guidance on measures to be taken during dental care in the workplace. However, 22.2% reported not having applied the acquired information, with no changes in dental practices. Clarity and security to work correctly in the pandemic were positive, with 41.3% of participants partially agreeing and 39.3% fully agreeing. However, 33.4% felt anxious or worried about working properly during the pandemic (Table 5).

Table 5. Sample distribution regarding training/education during COVID-19 pandemic. Oral health professionals from the Rio Grande do Sul, Brazil, August-October, 2020.

Training on COVID-19	Strongly Agree (score 5)	Agree (score 4)	Undecided (score 3)	Disagree (score 2)	Strongly Disagree (score 1)	Do not know	Mean (DP)	CI 95%
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)		
I consider that I received guidance at my workplace regarding measures to be taken during the COVID-19 pandemic	339 (52.6)	177 (27.5)	43 (6.7)	39 (6.1)	42 (6.5)	4 (0.6)	4.1 (1.2)	4.0 – 4.2
I was able to apply the knowledge acquired in training/education about COVID-19 to modify my practice	255 (39.6)	180 (28.0)	35 (5.4)	17 (2.6)	14 (2.2)	143 (22.2)	4.6 (1.1)	4.5 – 4.6

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I feel sufficiently enlightened and secure to work properly in dental practice during the COVID-19 pandemic	253 (39.3)	266 (41.3)	42 (6.5)	51 (7.9)	27 (4.2)	5 (0.8)	4.0 (1.1)	3.9 – 4.1
I feel anxious and concerned to work properly in dental practice during the COVID-19 pandemic	215 (33.4)	208 (32.3)	57 (8.9)	72 (11.2)	88 (13.7)	3 (0.5)	2.3 (1.4)	2.2 – 2.4

Discussion

This study emphasizes the surveillance, biosafety and education strategies by OHCWs during the first wave of the COVID-19 outbreak in the south of Brazil. Although the pandemic's effects on dentistry in Brazil have been discussed⁷⁻⁹, scarce information exists regarding actions to respond to the challenges facing OHCWs. The pandemic has amplified the need for instituting biosafety processes and actions and professional updating in the area. The context of the high risk of contagion faced by health professionals is one of the vulnerabilities of health systems. In addition to human risks, the decrease in front-line workers can compromise the potential response of health services.

Our findings demonstrate the adherence of OHCWs to COVID-19 procedures, guidelines, and surveillance, especially for activities close to the dental office such as screening and fast-tracking - a rapid-flow tool for triage and care of COVID-19 cases. The results are consistent with studies indicating that dentists know about methods to investigate patients¹⁰ with suspected COVID-19 and inform the population about widespread disease issues^{11,12}.

Adherence to fast-tracking of OHCWs working in the SUS was low. This performance may have influenced oral health policies at the time of the pandemic, which induced a financing model based on the productivity of specific indicators for dentistry, that do not include activities such as fast-tracking¹³.

The restrictions imposed by the pandemic impacted the offer of dental treatments, and dentistry mediated by remote technologies emerged as a possibility, but with controversies, especially in the regulation of this professional practice. Therefore, during the pandemic, a resolution has regulated the types of use of teledentistry: teleorientation (guidance by digital means or telephone) and telemonitoring (verification of health issues and clinical developments), prohibiting its use for consultation, diagnosis, prescription, or preparation of a treatment plan¹⁴.

In the present study, OHCWs demonstrated moderation in the use of digital tools in daily dental work. Obstacles to the use of teledentistry are related to the conservatism of managers, clinical acceptance (willingness by professionals to use telehealth tools)¹⁵, the perception of its benefits by professionals, and demanding technological and personnel resources¹⁶. With teledentistry, the workflow and the

participation of the patient can be streamlined in more personalized and accessible care^{7,17}. In the resumption of activities during the pandemic, teledentistry was used to face the reduction of preventive procedures, allowing the monitoring of groups in health surveillance¹⁸.

The highest scores in the biosafety themes were those related to the care of professionals' PPE. Specifically, cleaning and disinfection of the face shield were reported as always performed by 88.4% of the participants, and the appropriate reuse of N95/PFF2 masks was always performed by 55.4%. Additionally, 50.0% reported always cleaning the environments (Table 3). SARS-CoV-2 can be found in the saliva of COVID-19 patients in the pre-symptomatic period, which demands the correct use of PPE to avoid exposure to contaminated aerosols^{19,20}. The survival of this virus on surfaces for many days can be considered one of the reasons for the care reported by OHCWs in the frequent cleaning of dental environments. These locations can be vehicles for indirect contact between patients and professionals².

Proper removal of personal barrier protection for OHCWs is essential. The operator's body and arms, visors, glasses, and masks can become highly contaminated¹⁹. In this study, adequate removal was indicated as always performed by 49.2% of the participants. Considering that one of the main ways of contamination of health professionals is during the removal of PPE, all steps must be strictly followed. Health services must carry out training with teams to achieve mastery in these skills²¹.

This study showed lower adherence to the recommendations associated with controlling the generation and spread of aerosols and oral secretions. Of the participants, 10.6% stated that they always used dental dams. Additionally, 27.3% reported adherence with high-power suction systems, and 11.6% always avoided intraoral radiographic examinations (Table 3).

In the context of the COVID-19 pandemic, biosafety needs have made dental practice more costly. In the SUS, the place of employment of half of the study participants (51.7%) and many Brazilian dentists (around 58,000), adapting to guidelines and norms has implied a high investment economy^{22,23}.

The pandemic represented an unprecedented situation, a disease with high morbidity and mortality caused by an etiological agent that can be airborne, which caused fear and high demand for technical information²⁴. An important finding of the study regarding access to technical standards and recommendations for dental care during the pandemic was that 77.4% of participants reported accessing publications that did not identify the agency responsible, regardless of whether they also accessed materials from reputable agencies (Table 04). Much access to publications via the media, the internet, or direct communication has been observed in other studies^{12,25,26}. This reality, which presents difficulties in clinical practice is based on the best evidence during such times^{20,27}. Searching without scientific criteria can lead to false information and corroborate inappropriate conduct in dealing with the pandemic²⁶.

As for continuing education, 52.6% of the participants stated that they had received guidance on the measures to be adopted in their workplaces, but 22.2% did not know how to answer this question (Table 5). Given the panorama of social iso-

lation imposed by the pandemic, the privileged education strategies were elaborated online, lacking a foundation in the problematization of realities²⁸. Digital tools (applications, online courses) allow for fast and constant updating. It is noteworthy that this type of pedagogical tool is an essential resource in the face of social isolation. However, it disfavors human interaction that facilitates learning and sociability^{28,29}. Thus, coordinated actions based on a national education program for health professionals should be proposed with a broad scope, contributing to safety in work processes²⁶.

In this study, 33.4% strongly agreed and 32.3% agreed that they felt anxious or worried about working during the pandemic (Table 5). Fear and anxiety are natural in pandemics, especially with an increase in infected individuals and mortality rates¹¹. The highest scores for anxiety, depression, and stress were related to increased risk factors for contracting the disease³⁰. The highest indices of fear and anxiety were associated with low searching for knowledge^{7,31}, not following biosafety rules^{11,25} and receiving updates by social media²⁶.

Some strengths and weaknesses should be highlighted. The study was carried out in the context of the first wave of COVID-19. Therefore, the generalizability of the results must be extrapolated with caution. Considering the country's regional inequalities, epidemiological differences, and subnational government response to the COVID-19 pandemic, the results may not fully reflect the Brazilian reality since the responses varied widely in terms of the type, timing, and rigor of policy implementation in each state³². Nevertheless, our study was intended to be discussed at the moment of the first wave, as the pandemic impacts unfold around us daily. The results reveal for researchers and policymakers the evidence needed for planning and evaluating surveillance and biosafety measures in the context of the Brazilian political severe crisis.

Our findings revealed that OHCWs adopted surveillance measures in dental environments, such as providing COVID-19 guidelines and visual alerts in the office, investigating possible respiratory symptoms, and adopting distancing in the waiting room. Biosafety measures to reduce the generation or propagation of aerosols, including avoiding intraoral radiographs, using dental dams in high-speed care, and availability of high-power suction systems, had less adherence because they conflict with team management. However, disinfection of face shields, proper removal of personal barrier protection, and reuse of N95/PFF2 masks following appropriate criteria had greater compliance.

The substantial access to information on dental care during the COVID-19 pandemic reflected awareness of the high risk of work exposure. Most access to technical standards and recommendations was through non-governmental health authorities. Coordinated and purposeful action by policymakers for permanent education of the entire workforce is necessary.

Conflict of interest

None declared.

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None declared.

Ethical approval

Ethical approval for data collection was obtained from the Research Ethics Committee, the Federal University of Rio Grande do Sul, Porto Alegre, Brazil (CAAE no. 31720920.5.2002.5530) in accordance with the Helsinki Declaration of 1975 on experiments involving human subjects.

Data availability

Datasets related to this article will be available upon request to the corresponding author.

Author Contribution

All authors substantially contributed to the analysis and interpretation of the data; significantly contributed to the critical review of the content; and participated in the approval of the final version of this manuscript. LZP, GRV, FSP, MHB, CFC and CMW contributed to the project elaboration and conception of the present study.

References

1. Boschiero MN, Capasso Palamim CV, Ortega MM, Mauch RM, Lima Marson FA. One year of coronavirus disease 2019 (Covid-19) in Brazil: a political and social overview. *Ann Glob Heal*. 2021 May;87(1):44. doi: 10.5334/aogh.3182.
2. Cirillo N. COVID-19 outbreak: succinct advice for dentists and oral healthcare professionals. *Clinical Oral Investigations*. 2020 Jul;24(7):2529-35. doi: 10.1007/s00784-020-03323-3.
3. Dave M, Seoudi N, Coulthard P. Urgent dental care for patients during the COVID-19 pandemic. *Lancet*. 2020 Apr;395(10232):1257. doi: 10.1016/S0140-6736(20)30806-0.
4. National Health Surveillance Agency of Brazil. Technical note GVIMS/GGTES/ANVISA nº 04/2020. [Guidelines for health services: measures of prevention and control that must be adopted during case assistance suspected or confirmed infection by new Coronavirus (SARS-CoV-2) – updated on 02/25/2021]. Rio de Janeiro: ANVISA, Feb 2021 [cited 2021 Jun 6]. Available from: https://www.gov.br/anvisa/pt-br/centraisdeconteudo/publicacoes/servicosdesaude/notas-tecnicas/2020/nota-tecnica-gvims_ggtes_anvisa-04_2020-25-02-para-o-site.pdf. Portuguese.
5. Brazilian Association of Intensive Care Medicine/Federal Council of Dentistry. [AMIB/CFO recommendations for coping with COVID-19 in Dentistry.2nd Update]. Brasília-DF: AMIB/CFO; 2020. [cited 2021 Sep 26]. Available from: https://www.amib.org.br/fileadmin/user_upload/amib/2020/junho/22/220620Recomendacoes_AMIB_-_CFO_para_atendimento_odontologico_COVID-19.pdf. Portuguese.
6. Vandembroucke JP, Von Elm E, Altman DG, Gøtzsche PC, Mulrow CD, Pocock SJ, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): explanation and elaboration. *PLOS Medicine*. 2007 Oct;4(10):e297. doi: 10.1371/journal.pmed.0040297.
7. Moraes RR, Correa BM, Queiroz AB, Daneris Â, Lopes PJ, Pereira-Cenci T, et al. COVID-19 challenges to dentistry in the new pandemic epicenter: Brazil. 2020 Nov;15(11):e0242251. doi: 10.1371/journal.pone.0242251.

8. Novaes TF, Jordão MC, Bonacina CF, Veronezi AO, de Araujo CAR, Olegário IC, et al. COVID-19 pandemic impact on dentists in Latin America's epicenter: São-Paulo, Brazil. *PLoS One*. 2021 Aug;16(8):e0256092. doi: 10.1371/journal.pone.0256092.
9. Candeiro GTM, Gavini G, Vivan RR, Carvalho FDMB, Duarte HAM, Feijão PC, et al. Knowledge about Coronavirus disease 19 (COVID-19) and its professional repercussions among Brazilian endodontists. *Braz Oral Res*. 2020 Sep 4;34:e117. doi: 10.1590/1807-3107bor-2020.vol34.0117.
10. Hesaraki M, Akbarizadeh M, Ahmadidarrehshima S, Moghadam MP, Izadpanah F. Knowledge, attitude, practice and clinical recommendations of health care workers towards COVID-19: a systematic review. *Rev Environ Health*. 2020 Nov 23;36(3):345-57. doi: 10.1515/revh-2020-0099.
11. Ahmed MA, Jouhar R, Ahmed N, Adnan S, Aftab M, Zafar MS, et al. Fear and practice modifications among dentists to combat novel coronavirus disease (COVID-19). *Int J Environ Res Public Health*. 2020 Apr;17(8):2821. doi: 10.3390/ijerph17082821.
12. Kamate SK, Sharma S, Thakar S, Srivastava D, Sengupta K, Hadi AJ, et al. Assessing knowledge, attitudes and practices of dental practitioners regarding the COVID-19 pandemic: a multinational study. *Dent Med Probl*. 2020 Jan-Mar;57(1):11-7. doi: 10.17219/dmp/119743.
13. Azevedo e Silva G, Giovanella L, Camargo Jr RK. Brazil's National Health Care System at Risk for Losing Its Universal Character. *Am J Public Health*. 2020 Jun;110(6):811-2. doi: 10.2105/AJPH.2020.305649.
14. Brazilian Federal Council of Dentistry. [Resolution CFO-226, of June 4, 2020. Provides for the practice of Distance Dentistry, mediated by technologies, and other measures]. Brasília: CFO; 2020. [cited 2021 Oct 15]. Available from: <https://sistemas.cfo.org.br/visualizar/atos/RESOLU%C3%87%C3%830/SEC/2020/226>. Portuguese.
15. Smith AC, Thomas E, Snoswell CL, Haydon H, Mehrotra A, Clemensen J, et al. Telehealth for global emergencies: implications for coronavirus disease 2019 (COVID-19). *J Telemed Telecare*. 2020 Jun;26(5):309-13. doi: 10.1177/1357633X20916567.
16. Wosik J, Fudim M, Cameron B, Gellad FZ, Cho A, Phinney D, et al. Telehealth transformation: COVID-19 and the rise of virtual care. *J Am Med Inform Assoc*. 2020 Jun;27(6):957-62. doi: 10.1093/jamia/ocaa067.
17. Gasparoni A, Michael K. COVID-19 and dental emergencies: reflections on teledentistry. *Brazilian Dental Science*. 2020; 23(2 Supp 2):1-4. doi: 10.14295/bds.2020.v23i2.2270.
18. Chisini AL, Costa F dos S, Sartori LRM, Corrêa MB, Otávio Pereira D'Ávila PO, et al. COVID-19 Pandemic impact on Brazil's Public Dental System. *Braz Oral Res*. 2021 Jul;35:e082. doi: 10.1590/1807-3107bor-2021.vol35.0082.
19. Innes N, Johnson IG, Al-Yaseen W, Harris R, Jones R, Kc S, et al. A systematic review of droplet and aerosol generation in dentistry. *J Dent*. 2021 Feb;105:103556. doi: 10.1016/j.jdent.2020.103556.
20. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. *Int J Oral Sci*. 2020 Mar;12(1):9. doi: 10.1038/s41368-020-0075-9.
21. Sinjari B, Rexhepi I, Santilli M, D'Addazio G, Chiacchiaretta P, Di Carlo P, et al. The impact of COVID-19 related lockdown on dental practice in central Italy-Outcomes of a survey. *Int J Environ Res Public Health*. 2020 Aug;17(16):5780. doi: 10.3390/ijerph17165780.
22. Cavalcanti YW, da Silva RO, Ferreira LF, Lucena EHG, de Souza AMLB, Cavalcante DF, et al. Economic impact of new biosafety recommendations for dental clinical practice during covid-19 pandemic. *Pesq Bras Odontoped Clin Integr*. 2020.20(sup 1):1-9. doi:10.1590/pboci.2020.143.
23. Müller A, Melzow SF, Göstemeyer G, Paris S, Schwendicke F. Implementation of COVID-19 Infection Control Measures by German Dentists: A Qualitative Study to Identify Enablers and Barriers *Int J Environ Res Public Health*. 2021 May;18(11):5710. doi: 10.3390/ijerph18115710.

24. Consolo U, Bellini P, Bencivenni D, Iani C, Checchi V. Epidemiological aspects and psychological reactions to COVID-19 of dental practitioners in the Northern Italy Districts of Modena and Reggio Emilia. *Int J Environ Res Public Health*. 2020 May;17(10):3459. doi: 10.3390/ijerph17103459.
25. Al-amad SH, Hussein A. Anxiety among dental professionals and its association with their dependency on social media for health information: insights from the COVID-19 pandemic. *BMC Psychol*. 2021 Jan;9(1):9. doi: 10.1186/s40359-020-00509-y.
26. Costa SM, Lacerda GT, Villafort RN, Silveira RL, Amaral MBF. What do we know about COVID-19?: maxillofacial surgeons survey. *J Craniofac Surg*. 2020 Sep;31(6):e661-3. doi: 10.1097/SCS.00000000000006658.
27. Sezgin GP, Şirinoğlu Çapan B. Assessment of dentists' awareness and knowledge levels on the Novel Coronavirus (COVID-19). *Braz Oral Res*. 2020;34:e112. doi: 10.1590/1807-3107bor-2020.vol34.0112.
28. Warmling CM, Moysés SJ. Essay on visibilities and blindness in the formative world of dentistry: part 2 - internships and online (remote) education. *Rev ABENO*. 2021;21(1):1599. doi: 10.30979/revabeno.v21i1.1599.
29. Ghai, S. Are dental schools adequately preparing dental students to face outbreaks of infectious diseases such as COVID-19? *J Dent Educ*. 2020 Jun;84(6):631-3. doi: 10.1002/jdd.12174. Epub 2020 May 11.
30. Alencar CM, Silva AM, Jural LA, Magno MB, Campos EA, Silva CM, et al. Factors associated with depression, anxiety and stress among dentists during the COVID-19 pandemic. *Braz Oral Res*. 2021 Aug;35:e084. doi: 10.1590/1807-3107bor-2021.vol35.0084.
31. Duruk G, Gumuşboğa ZŞ, Colak C. Investigation of Turkish dentists' clinical attitudes and behaviors towards the COVID-19 pandemic: a survey study. *Braz Oral Res*. 2020;34:e054. doi: 10.1590/1807-3107bor-2020.vol34.0054.
32. Touchton M, Knaul FM, Arreola-Ornelas H, Porteny T, Sánchez M, Médez O, et al. A partisan pandemic: state government public health policies to combat COVID-19 in Brazil. *BMJ Global Health*. 2021 Jun;6(6):e005223. doi: 10.1136/bmjgh-2021-005223.