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Hannah Gil de Farias Morais, Maria Helena Rodrigues Galvão, Weslay Rodrigues da Silva, Joyce Magalhães de Barros, André Azevedo do Santos, Nara Régia da Silva Domingos, Cláudia Helena Soares de Morais Freitas

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BIOSAFETY KNOWLEDGE, ACTIONS AND MEASURES OF BRAZILIAN DENTISTS DURING THE COVID-19 PANDEMIC

CONHECIMENTOS, ATITUDES E PRÁTICAS DE BIOSSEGURANÇA POR CIRURGIÕES-DENTISTAS BRASILEIROS DURANTE A PANDEMIA DA COVID-19

Short Title: COVID-19 and biosafety by Brazilian dentists

Hannah Gil de Farias Morais[1]
hannah_gil@hotmail.com
http://orcid.org/0000-0003-3488-3465

Maria Helena Rodrigues Galvão[1]*
mhrgalvao@gmail.com
http://orcid.org/0000-0003-1344-2863

Weslay Rodrigues da Silva[1]
weslayrodriguesilva@gmail.com
http://orcid.org/0000-0002-0430-4656

Joyce Magalhães de Barros[1]
joycemagalhaesb@hotmail.com
http://orcid.org/0000-0001-5654-3766

André Azevedo dos Santos[1]
andreazevedojs@gmail.com
http://orcid.org/0000-0002-8456-8394

Nara Régia da Silva Domingos[1]
nararegiad@hotmail.com
http://orcid.org/0000-0002-3637-4886

Cláudia Helena Soares de Morais Freitas[2]
chsmfreitas@hotmail.com
http://orcid.org/0000-0003-0265-5396

1- Universidade Federal do Rio Grande do Norte – UFRN, Department of Dentistry, Natal, RN, Brazil.
2- Universidade Federal da Paraíba – UFPB, Departament of Clinic and Social Dentistry, João Pessoa, PB, Brazil.

*** Corresponding Author:**

Maria Helena Rodrigues Galvão
Universidade Federal do Rio Grande do Norte - Central Campus - Department of Dentistry
Av. Sen. Salgado Filho, 1787 - Lagoa Nova, Natal - RN, 59056-000
E-mail: mhrgalvao@gmail.com

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ABSTRACT

Objective: To identify the level of knowledge, attitudes and practices related to biosafety measures, prevention and control by DCs during the pandemic. **Methods:** An online questionnaire consisting of 42 questions was disseminated to the CDs operating in Brazil through social networks and also to the 27 Regional Councils of Dentistry in the country via e-mail. The collection period was from June 26 to July 2, 2020. **Results:** 751 CDs answered the questionnaire, of these, 54.9% undertook training in preventing and controlling the spread of the virus and the scientific article was the main means of information (44.5%). Regarding biosafety in dental care, 95.9% reported having knowledge of ANVISA's rules on the subject, however, regarding attitudes and practices, there was a failure to comply with the recommendations. Link between professional performance and training or not, were factors associated with greater knowledge and correct biosafety attitudes and practices. **Conclusion:** Although the Brazilian CDs have good levels of knowledge about biosafety measures for the prevention of COVID-19, they still fail to comply with basic attitudes and recommended practices.

Keywords: COVID-19; Coronavirus; Dentistry; Biosafety.

RESUMO

Objetivo: Identificar o nível de conhecimento, atitudes e práticas relacionadas às medidas de biossegurança, prevenção e controle por parte dos CDs durante a pandemia. **Métodos:** Um questionário *online* composto por 42 perguntas foi divulgado aos CDs atuantes no Brasil pelas redes sociais e também aos 27 Conselhos Regionais de Odontologia do país via *e-mail*. O período de coleta foi do dia 26 de junho a 2 de julho de 2020. **Resultados:** 751 CDs responderam ao questionário, destes, 54,9% realizaram capacitação para prevenção e controle de disseminação do vírus e artigo científico foi o principal meio de informação (44,5%). Com relação à biossegurança nos atendimentos odontológicos, 95,9% relataram ter conhecimento das normas da ANVISA sobre o assunto, porém, com relação às atitudes e práticas, observou-se descumprimento das recomendações. Vínculo de atuação profissional e realização ou não de capacitação foram fatores associados a maior conhecimento e a atitudes e práticas corretas de biossegurança. **Conclusão:** Os CDs brasileiros embora apresentem bons níveis de conhecimento acerca das medidas de biossegurança para prevenção da COVID-19 ainda descumprem atitudes e práticas básicas recomendadas.

Palavras-chave: COVID-19; Coronavírus; Odontologia; Biossegurança.

INTRODUCTION

In December 2019, a new coronavirus outbreak emerged in Wuhan, in the Hubei Province, China, and rapidly reached another 24 countries. On January 30, 2020, the virus was named by the World Health Organization (WHO) as SARS-coV-2 (Severe Acute Respiratory Syndrome virus-Coronavirus-2) and identified as the etiological agent of COVID-19 ("CO"Rona"VI"rus"D"isease)[1,2]. With the exponential increase in cases, the WHO classified the epidemic as a Public Health Emergency of International Concern and, on 11 March 2020, the SARS-coV-2 was officially declared a pandemic[1,3]. The first case of the disease in Brazil was reported on February 26, 2020, and its community transmission was declared on March 20, 2020[4].

The new coronavirus can cause serious respiratory disease, especially in high-risk individuals, such as the elderly and people with chronic diseases including diabetes and cardiovascular and respiratory diseases[1,3,5]. Despite the similarities to previous strains of the virus, SARS-coV-2 spreads more rapidly due to its high infection ability. However, its death rate is considered low, ranging between 3.7% in the world and 3.3% in Brazil. The global mortality rate of the disease is around 9.6 cases per 100,000 inhabitants and in Brazil it reaches 48.6 per 100,000 inhabitants, being currently the 2nd country in number of confirmed cases (3,057,470) and deaths (101,752)[6.7].

The main mode of COVID-19 transmission is the direct contact with infected droplets from coughing or sneezing, in addition to the direct contact with the oral, nasal, and eye mucosa of infected people[1,5]. Due to the closeness to patients' face and high exposure to saliva, blood, and other body fluids during clinical procedures, dentists are at high risk of infection, and dentistry is the top work category for occupational risk in the pandemic.

As healthcare workers are vital in the control of the pandemic while being the people most at risk of infection, measures to reduce infection rate and spread among them are essential, first with the identification of risk factors and then by taking appropriate action[8].

At the beginning of the pandemic, the Federal Council of Dentistry (CFO) advised the Ministry of Health (MS) to interrupt the delivery of elective care in the public health system in the country. The guidelines for private dental offices was for dental health staff to apply the highest rigor in biosafety protocols and in the cleaning and disinfection of instruments, equipment and surfaces, as well as other recommendations to reduce infection risk.

On March 31, the CFO, the National Health Surveillance Agency (ANVISA), the Brazilian Association of Dentistry (ABO), and the Brazilian Association of Intensive Care Medicine (AMIB) released a joint guideline (GVIMS/GGTES/ANVISA Nº 04/2020 Technical Note) of prevention and control measures for clinical procedures of suspected or confirmed infected COVID-19 patients in clinics and hospitals. The document also classifies emergency and urgent dental procedures and provides oral hygiene protocols for Intensive Care Unit (ICUs) patients[10].

Although dentists have a high risk of infection by the new coronavirus and can become silent spreaders, the spread of the disease can be controlled by following rigorous biosafety guidelines[11,12]. Having appropriate knowledge of a disease can influence the behavior of healthcare workers, while incorrect actions directly increase the risk of infection[10]. Therefore, the aim of this study was to assess the level of biosafety knowledge of dentists, and actions and measures adopted for prevention and control of the new coronavirus pandemic and their impact on daily practice.

METHODS

This was a cross-sectional survey and thus an ethics approval was not needed, as, according to the resolution 510/2016 of the National Health Council, the survey collects the opinion of participants on a subject in a specific point in time using specific methodology and participants are anonymous[13].

An online questionnaire created on Google Forms (https://forms.gle/jg4VHtUFzGysgJ1UA) was used for data collection. The questionnaire was verified by two dentists and a sanitarian, to ensure the correct interpretation of items. Data collection occurred from June 26 to July 2, 2020.

A sample size calculation was done to determine a sample representative of the population of registered dentists in the country using the formula n = [EDFF*Np(1-p)]/ [(d2/Z21-α/2*(N-1)+p*(1-p)], considering a 50% prevalence of the outcome, a confidence interval of 99%, an absolute error of 5%, and the size of the population in June 2020 of 337,997 dentists.[14] To the calculated sample size of 663 individuals was added 13% to account for potential losses, totaling 750 dentists[15].

The link to the online search was distributed to dentists through social networks (WhatsApp, Facebook, Instagram, and Telegram) and sent to the 27 Regional Councils of Dentistry (CROs) asking to send the link to respective registered dentists. Four CROs, two from the Northeast region, one from the North, and one from the Midwest responded to our request. Recipients were informed of their anonymity and that participation was voluntary.

The questionnaire consisted of 42 items divided into 3 sections. The 1st section included 8 items about respondents' characteristics, such as region of the country, years since graduation, highest level of education/degree, and employment status. Section 2 consisted of 11 items about the knowledge of biosafety recommendations for the prevention and control of SARS-coV-2 infection with "agree" and "disagree" answers. Section 3 included 23 items related to biosafety

actions and measures taken during the pandemic, with “agree” and “disagree” answers. Items correctly answered received 1 point and incorrect items were given a 0.

Descriptive analysis was performed providing number and percentage of study variables. In addition, a knowledge score and actions and measures score were calculated, by adding the scores of answered questions. The mean score between groups was compared with the Kruskall-Wallis Test, with a significance level of 5%. For data analysis, the Stata software version 14.0 was used.

RESULTS

A total of 751 dentists answered the questionnaire, most of them female (70.8%), aged between 25 and 34 years (58.6%), with less than 5 years since graduation (57.8%), and from the Northeast region (79.9%). The majority of respondents had a DDS degree as the highest education level (38.3%), most were employed in the public service (26.0%), and had monthly income between 2,500 and 5,000 reals (49.5%). Most dentists reported attending a training course on prevention and control measures against the new coronavirus (54.9%), and most did so voluntarily (58.7%). The main source of information on ways to prevent the spread of the new coronavirus was scientific articles (Table 1).

Almost all (95.9%) dentists reported being aware of ANVISA's biosafety measures for dental practice. However, 14.5% of respondents considered providing alcohol gel and demanding the use of a mask in the waiting room exaggerated measures, 17.6% did not know the correct way to remove personal protection equipment, and 43.9% believed that symptomatic patients should not receive any type of dental treatment. In addition, 71.0% felt qualified to provide educational and preventive activities on the new coronavirus (Table 2).

Some respondents did not follow the biosafety actions and measures for dental practice recommended by health authorities. More than half of the respondents reported not using rubber dam isolation in procedures with high speed motors, 41.4% did not ask patients to do a mouthwash with hydrogen peroxide before treatment, 40.5% did not prioritize four-handed work with an assistant, 34.4% did not follow the recommended procedure for saliva aspiration, 46.6% did not use absorbable suture when possible, and 44.2% did not use extraoral mouth x-rays when possible. In addition, 19.0% provided dental treatment other than emergency treatment during the pandemic, and 61.3% provided preventive educational activities on the new coronavirus (Table 3).

The biosafety knowledge of dentists had a mean score of 9.41 (± SD = 1.28), with the minimum of 5 and maximum of 11 correct answers, and 50% of the sample had scores ≥10 (median = 10.0). A significant difference was found for type of employment and taking a training course on prevention and control measures. Dentists with other employment status and public servants had better scores than the other groups ($p = 0.004$). In addition, dentists that received training had higher scores ($p < 0.001$) (Table 4).

The mean score for biosafety measures for prevention and control of the spread of the new coronavirus was 15.22 (±SD = 3.31), with a minimum of 4, maximum of 20, and median of 15.0. Significant differences were found among all groups evaluated. Highest scores were observed for men (median = 16.0; $p = 0.040$), age ≥45 years (median = 18.0; $p < 0.001$), years from graduation ≥10 (median = 17.0; $p < 0.001$), public servants and the "other" employment category (median = 16 and 17.0, respectively; $p < 0.001$), those who had postdoctoral fellowship as the highest educational level (median = 18.5; $p < 0.001$), a monthly income above R$ 5,000.00 (median = 17.0; $p < 0.001$), and those who received training on the COVID prevention and control measures (median = 16.0; $p < 0.001$) (Table 5).

DISCUSSION

According to the collected data, most Brazilian dentists pursued up-to-date information on national biosafety standards for the new coronavirus, taking training sessions and referring to scientific articles as source of information. These actions reflect the worldwide alarming and unprecedented situation that has taken place with the COVID pandemic and the fear of infection during provision of dental care[16,17], motivating the pursuit for preventive guidelines.

According to Ghai et al. (2020)[18], knowledge about preventive measures on the new coronavirus can play an important role in helping dentists to adopt appropriate actions in their practice. However, while the availability of information about the pandemic is welcome, care must be taken with the reliability and authenticity of the source, to minimize the conveying of incorrect content[19]. Thus, workers should rely on official guidelines[11].

Despite the high interest about the COVID-19 pandemic information, essential steps to reduce the overall risk of contracting or transmitting the infection is neglected by many dentists, such as the use of rubber dam isolation, adequate saliva aspiration, and use of hydrogen peroxide-based mouthwash prior to treatment. Such practices aim to minimize the production of infected spills and aerosols, decreasing the risk of infection[10,20], and therefore, should be meticulously followed.

In addition, a large proportion of respondents believed that symptomatic patients should not receive any type of treatment, which is not the recommendations of the official bodies establishing that any emergency case must be treated within the recommended care. A study conducted in a dental emergency department in Beijing reported an increase in dental and oral infections with the start of the COVID-19 pandemic[21], indicating that the selection and postponement of care by dentists must be done with caution even in symptomatic respiratory patients to avoid the worsening of the dental condition, imposing subsequent risks for the patient.

This study also addressed the educational role of the dentist for the COVID prevention. Although most participants reported feeling confident of their ability to inform the population, 61.3% were not providing specific information. This may reflect insecurity in their role as a health promoting agent in the dental office, which should not be restricted to clinical practice. De Stefani et al. (2020)[22] highlight that all healthcare workers can help provide accurate information and stress the importance of social distancing and other measures to reduce the spread of the virus.

Dentists of the public network and those who reported taking a training course were more knowledgeable about biosafety in dental care. In addition, higher scores of biosafety actions and measures were associated with male dentists, those aged 45 and over, with more than 10 years since graduation, having a post-doctoral degree, and monthly income higher than R$ 5,000.00. These results suggest that professional experience associated with high levels of education has positive impacts on taking preventive measures against COVID-19. In addition, the higher scores of public servants are probably due to the support of the national health authorities and professional councils to dentists from the public health system since the beginning of the pandemic and the interruption of elective treatments[9,23]. This has increased the time available for training courses and allowed more time for each patient and in between appointments, in addition to having a fixed salary, factors that allow the adjustment to the recommended biosafety measures.

For private dentists, the interruption of elective treatments represents a critical financial loss[24]. Ethical and moral reflections are thus raised and concerns surpass clinical biosafety and social indifference. Government regulations must be sustainable in the long term with the aim of protecting private dentists, ensuring that their activities can be performed with dignity and safely while avoiding economic crises.

Considering the high risk of infection from COVID-19 and other respiratory diseases during dental care, biosafety measures are essential for the provision of a safe dental treatment[1,26]. In addition, as a future perspective, strategies and actions must be developed to ensure biosafety in the work environment and the quality of life of staff and patients.

Due to the pandemic, data collection methods have to be adapted. One effective method is the online survey, which, like any other research method, has advantages and limitations, but can still produce valid results. For this study, measures have been taken to reduce the effect selection bias, such as sending the questionnaire to all Regional Councils of Dentistry of Brazil. However, due to a low response rate from dentists in the South and Central West regions, the generalizability of the results is limited, and the results must be viewed critically.

The results of this study revealed that Brazilian dentists present good levels of knowledge about biosafety measures for COVID-19, however, many did not follow basic actions and recommended measures. In addition, the employment status and taking a course on the subject were factors associated with both greater knowledge and correct application of biosafety measures. Further studies with larger sample sizes are necessary for more accurate results.

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TABLES

Table 1: Characterization of dentist respondents by absolute and relative frequency. Brazil, 2020.

Variables	n	%
Gender		
Female	532	70.8
Male	219	29.2
Age		
Under 25	92	12.3
25 to 34 years	440	58.6
35 to 44 years	121	16.1
45 years or more	98	13.0
Years since graduation		
Less than 5 years	434	57.8
Between 5 and 10 years	130	17.3
Greater than 10 years	187	24.9
Region of the country in which it operates		
Midwest	8	1.1
Northeast	600	79.9
North	41	5.5
Southeast	91	12.1
South	11	1.5
Highest Education Level		
Graduation	288	38.3
Specialization/Residence	283	37.7
Master's degree	135	18.0
Doctor’s degree	33	4.4
Post-doctoral	12	1.6
Employment Bond		
Public Server	195	26.0
Private Company Employee	191	25.4
Private Clinic Owner	137	18.2
Two or more different employments	158	21.0
Other	70	9.3
Monthly Income		
Less than R$ 2,500	178	23.7
Between R$ 2,500 and R$ 5,000	372	49.5
Above R$ 5,000	201	26.8
Attended a training course on prevention and control measures against the new coronavirus		
Yes	412	54.9
No	339	45.1
Reason of sought to accomplish the training course		
Own will	291	58.7
Institutional requirement	88	17.7
Other	117	23.6
The most used medium to search informations regarding prevent and spread the new coronavirus		
Scientific articles	334	44.5
Online courses	152	20.2
Social networks	128	17.0
TV	68	9.1
Other	69	9.2

Table 2: Variables related to the knowledge of dental surgeons regarding biosafety in dental care during the COVID-19 pandemic. Brazil, 2020.

Variables	n	%
I have knowledge about the ANVISA guidelines biosecurity measures		
I agree	720	95.9
I disagree	31	4.1
Before dental care, it is recommended to ask if patients have any signs and / or symptoms of respiratory infection		
I agree	747	99.5
I disagree	4	0.5
I believe that providing alcohol gel and demanding the use of mask in the waiting room are examples of exaggerated behavior in preventing the spread of the new coronavirus		
I agree	109	14.5
I disagree	642	85.5
It is recommended to perform any type of dental care during the pandemic of the new coronavirus		
I agree	57	7.6
I disagree	694	92.4
Patients with suspected symptoms for the new coronavirus infection should not receive any type of dental care		
I agree	330	43.9
I disagree	421	56.1
I am aware of the correct sequence for removing personal protective equipment		
I agree	621	82.7
I disagree	130	17.3
I consider the need to wash hands before touching the patient, before performing a clean / aseptic procedure, after risk of exposure to body fluids, after touching the patient and after contact with surfaces close to the patient, an exaggeration		
I agree	132	17.6
I disagree	619	82.4
In the case of visible dirt on goggles / face shield, washing with soap and water should be preferred to alcohol gel		
I agree	694	92.4
I disagree	57	7.6
It is an exaggeration to consider every patient as possible infected with the new coronavirus		
I agree	59	7.9
I disagree	692	92.1
I feel qualified to promote preventive educational activities on the new coronavirus		
I agree	533	71.0
I disagree	218	29.0
Currently, social isolation is the main form of prevention and control of the spread of the new Coronavirus		
I agree	682	90.8
I disagree	69	9.2

Table 3: Variables related to dentists' attitudes and practices regarding biosafety in dental care during the COVID-19 pandemic. Brazil, 2020.

Variables	n	%
The scheduling of my patients is done in a sufficiently spaced way to minimize possible contacts between patients in the waiting room		
I agree	721	96.0
I disagree	30	4.0
I advise the patient not to bring a companion to the consultation, except in cases where assistance is needed (such as pediatric patients, people with special needs, elderly patients, etc.)		
I agree	736	98.0
I disagree	15	2.0
I adjusted the chairs in the waiting room at least 1 meter apart		
I agree	685	91.2
I disagree	66	8.8
I provide magazines and other reading materials, toys and other objects in the waiting room to help ease my patients' anxiety, even under current circumstances		
I agree	108	14.4
I disagree	643	85.6
I reinforce the need to clean and disinfect objects and surfaces properly, especially at the dental office and those most touched by patients		
I agree	745	99.2
I disagree	6	0.8
During the pandemic, I am only providing urgent and emergency dental care		
I agree	608	81.0
I disagree	143	19.0
I perform proper hand washing before and after contact with all patients		
I agree	735	97.9
I disagree	16	2.1
I use props such as rings, bracelets, cords, earrings and watches during clinical care		
I agree	59	7.9
I disagree	692	92.1
During clinical care, I prioritize work with 4 hands, with help of an auxiliary professional		
I agree	447	59.5
I disagree	304	40.5
I use continuous aspiration of residual saliva with a high-power suction system (vacuum pump)		
I agree	493	65.6
I disagree	258	34.4
I use 1.0% to 1.5% hydrogen peroxide as pre-procedure mouthwash for all patients		
I agree	440	58.6
I disagree	311	41.4
I use rubber dam isolation in procedures that need high-rotation motors		
I agree	353	47.0
I disagree	398	53.0
I try to guarantee the quality and renewal of the air of the dental office keeping the windows open or using air conditioning with exhaust		
I agree	579	77.1
I disagree	172	22.9
Whenever possible, I avoid aerosol-generating procedures, preferring dentine excavators and periodontal curettes, chemical-mechanical techniques and not using the triple syringe in its mist form		
I agree	662	88.1
I disagree	89	11.9
Where I work, there are visual informational alerts about to prevent covid-19 (such as posters and boards)		
I agree	540	71.9
I disagree	211	28.1
Whenever possible, I use resorbable suture thread		
I agree	401	53.4
I disagree	350	46.6
Whenever possible, I use extra-oral radiographs, such as panoramic x-rays or cone-beam computed tomography, instead of intraoral x-rays		
I agree	419	55.8
I disagree	332	44.2
I make sure that the entire oral health team uses complete personal protective equipment in the clinical setting		
I agree	715	95.2
I disagree	36	4.8
I have been carrying out preventive educational activities on the new coronavirus		
I agree	460	61.3
I disagree	291	38.7

Table 4: Comparison of knowledge score averages about biosafety in dental care during the COVID-19 pandemic. Brazil, 2020.

Variables	Knowledge Score			P value
	Median	Average	DP	
Gender				
Female	10	9.43	1.26	0.587
Male	10	9.35	1.34	
Age				
Under 25	9	9.43	1.08	
25 to 34 years	10	9.46	1.29	0.210
35 to 44 years	10	9.38	1.37	
45 years or more	9	9.17	1.30	
Years since graduation				
Less than 5 years	10	9.45	1.25	
Between 5 and 10 years	10	9.49	1.33	0.135
Greater than 10 years	9	9.26	1.29	
Employment Bond				
Public Server	10	9.61	1.11	
Private Company Employee	9	9.19	1.45	
Private Clinic Owner	9	9.19	1.29	0.004*
Two or more different employments	10	9.50	1.31	
Other	10	9.66	1.14	
Highest Education Level				
Graduation	10	9.45	1.28	
Specialization/Residence	9	9.28	1.37	
Master's degree	10	9.49	1.12	0,299
Doctor’s degree	10	9.61	1.12	
Post-doctoral	10	9.83	1.19	
Monthly Income				
Less than R$ 2,500	9	9.35	1.21	
Between R$ 2,500 and R$ 5,000	10	9.40	1.31	0.447
Above R$ 5,000	10	9.47	1.28	
Attended a training course on prevention and control measures against the new coronavirus				
Yes	9	9.12	1.33	<0.001*
No	10	9.64	1.19	

* Statistically significant at the 5% significance level.

Table 5: Comparison of averages of the biosafety attitudes and practices score in dental care during the COVID-19 pandemic. Brazil. 2020.

Variables	Score attitudes and practices			P value
	Median	Average	DP	
Gender				
Female	15	15.07	3.40	0.040*
Male	16	15.58	3.07	
Age				
Under 25	15	14.93	3.13	
25 to 34 years	15	14.55	3.26	<0.001*
35 to 44 years	17	16.52	3.05	
45 years or more	18	16.87	3.00	
Years since graduation				
Less than 5 years	15	14.71	3.22	
Between 5 and 10 years	15.5	14.94	3.37	<0.001*
Greater than 10 years	17	16.59	3.11	
Employment Bond				
Public Server	16	16.03	2.92	
Private Company Employee	15	15.07	3.47	
Private Clinic Owner	14	14.10	3.58	<0.001*
Two or more different employments	15	15.34	2.90	
Other	17	15.99	3.33	
Highest Education Level				
Graduation	15	14.73	3.26	
Specialization/Residence	15	15.05	3.24	
Master's degree	17	16.07	3.25	<0.001*
Doctor’s degree	18	16.45	3.80	
Post-doctoral	18.5	17.75	1.60	
Monthly Income				
Less than R$ 2,500	15	14.82	3.45	
Between R$ 2,500 and R$ 5,000	15	14.97	3.21	<0.001*
Above R$ 5,000	17	16.02	3.26	
Attended a training course on prevention and control measures against the new coronavirus				
Yes	14	14.37	3.55	<0.001*
No	16	15.91	2.93	

*Statistically significant at the 5% significance level.