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Prevention and control of healthcare-associated infection and SARS-CoV-2 in the work context of dentists of Family Health Strategy in a large municipality of the Brazilian Northeast

Prevenção e controle das infecções relacionadas à assistência à saúde e de SARS-CoV-2 no contexto de trabalho dos cirurgiões-dentistas da Estratégia Saúde da Família, em município de grande porte do Nordeste brasileiro

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ABSTRACT

Introduction: The health emergency related to the COVID-19 pandemic in Brazil and around the world, brought the need to reassess and implement new measures to protect the worker health. **Objective:** To analyze the work context of dentists from the Family Health Strategy (ESF) regarding the prevention and control of Healthcare-associated Infections (HAI) and SARS-Cov-2. **Methods:** This cross-sectional study was conducted with primary care dentists in Fortaleza, Ceará, in Northeast Brazil. In order to identify the sample of dentists from the ESF, a sample calculation was carried out, and 103 dentists participated. The selection of participants was carried out through a systematic probabilistic sampling. Data collection was carried out from June 8 to August 23, 2022, through an electronic questionnaire, which was accessed and completed electronically by a computer or smartphone, with questions that evaluated the offer of Personal Protective Equipment (PPE), equipment and infrastructure necessary for the good performance of the profession and the health conditions of workers in this context. A descriptive analysis was performed. **Results:** A total of 29.1% of respondents belonged to COVID-19 risk group. Overall, most participants had taken both doses and one (46.6%) or both (50.2%) booster doses and were vaccinated against influenza (81.6%). There is no 100.0% adherence to any of the PPE recommended by health authorities or by dentists. The availability of sufficient quantities of PPE in the service was always below the recommended level, and, in all situations, the quality of the PPE was considered questionable, potentially compromising work safety. Deficiencies related to the provision of equipment, devices, and infrastructure necessary for good performance were also verified. **Conclusions:** Despite the good vaccination practices of professionals, deficiencies in the process of implementing standards that provide for good practices in dental procedures were identified and needed to be implemented to avoid the risks inherent in the profession.

KEYWORDS: SARS-CoV-2; COVID-19; Personal Protective Equipment; Dentistry; Primary Health Care

RESUMO

Introdução: A emergência sanitária relacionada à pandemia da COVID-19, no Brasil e no mundo, trouxe a necessidade de reavaliar e implementar novas medidas de proteção à saúde dos trabalhadores. **Objetivo:** Analisar o contexto de trabalho dos cirurgiões-dentistas da Estratégia Saúde da Família (ESF), com relação à prevenção e controle das infecções relacionadas à assistência à saúde (IRAS) e do SARS-Cov-2. **Método:** Trata-se de um estudo de delineamento transversal realizado com cirurgiões-dentistas da atenção primária do município de Fortaleza, Ceará, no Nordeste do Brasil. Para a identificação da

amostra de cirurgiões-dentistas da ESF, realizou-se um cálculo amostral e participaram 103 dentistas. A seleção dos participantes foi realizada por meio de uma amostragem probabilística sistemática. A coleta de dados foi realizada no período de 8 de junho a 23 de agosto de 2022, através de questionário eletrônico, acessado e preenchido eletronicamente pelo computador ou *smartphone*, com perguntas que avaliaram a oferta de equipamento de proteção individual (EPI), equipamentos, aparelhos e infraestrutura necessários ao bom desempenho da profissão e às condições de saúde dos trabalhadores neste contexto. Realizou-se uma análise descritiva. **Resultados:** Dos respondentes, 29,1% pertenciam ao grupo de risco para COVID-19. No geral, a maioria havia tomado as duas doses e uma (46,6%) ou as duas (50,2%) doses de reforço, e estavam vacinados contra influenza (81,6%). Não existe uma adesão de 100,0% para nenhum dos EPI recomendados, pelas autoridades sanitárias, por parte dos cirurgiões-dentistas. A disponibilidade de EPI em quantidade suficiente no serviço está sempre abaixo do recomendado e, em todas as situações, a qualidade dos EPI foi considerada questionável, podendo comprometer a segurança do trabalho. Foram verificadas também deficiências relacionadas à oferta de equipamentos, aparelhos e infraestrutura necessários ao bom desempenho da profissão. **Conclusões:** Apesar das boas condições de vacinação dos profissionais, deficiências no processo de implementação das normas que dispõe sobre as boas práticas dos procedimentos odontológicos foram identificadas e precisam ser implementadas para evitar os riscos inerentes a profissão.

PALAVRAS-CHAVE: SARS-CoV-2; COVID-19; Equipamento de Proteção Individual; Odontólogos; Atenção Primária à Saúde

INTRODUCTION

In December 2019, cases of pneumonia of unknown etiology were identified in the city of Wuhan, Hubei province, China. It was a new coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes the disease called coronavirus disease-19 (COVID-19), which spread rapidly across all continents between January and March 2020.[1]

In the same period, the Brazilian Ministry of Health (MS), through Ordinance No. 454, of March 20, 2020, declared a nationwide Public Health Emergency of National Importance (ESPIN), due to the recognition of the community transmission status of SARS-CoV-2.[2]

Transmission of the disease can occur in various ways and in several contexts, and can be caused by close contact with the oral, nasal, and ocular mucous membranes of infected people, or by touching surfaces or objects contaminated with the virus. The spread of SARS-CoV-2 can also occur through droplets of saliva expelled via the oral and nasopharyngeal routes, through sneezing or coughing by infected people[3,4,5]. An important factor to note in relation to COVID-19 is that even patients who are asymptomatic, i.e. who do not show clinical manifestations of the disease, such as fever or cough, can also be responsible for transmitting the virus through direct contact with other people.[6]

Among the states of the Northeast Region of Brazil, the capital of Ceará, Fortaleza, was one of the first Brazilian cities to record sustained local transmission of the SARS-CoV-2 virus, with confirmation of autochthonous cases of COVID-19 in different neighborhoods of the city[7]. In Fortaleza, waves of COVID-19 were observed: the first epidemic wave occurred between April and May 2020, the second wave began in October 2020, gaining strength from January 2021, with the dominance of the new gamma variant. The third wave, with the dominance of the omicron variant, began in December 2021 and ended in February 2022. The fourth peaked in the transition between June and July 2022.[8]

In this way, various professional practices sought to readjust their work processes to reduce the spread of SARS-CoV-2[9]. The dental area, known for its close professional-patient contact, was soon identified as an area with a high potential for contamination by SARS-CoV-2 and therefore suffered a major impact, directly influencing changes in care, from screening to the performance of the most diverse procedures.[10]

National and global health authorities have issued technical documents with guidelines on the safe practice of health professions, including dentistry[11,12,13]. Thus, the Ministry of Health and the Brazilian National Health Surveillance Agency (ANVISA) have drawn up guidelines and technical notes, pointing to a risk assessment of the care provided by the professional, with the aim of preserving the safety of the oral health team and patients.[11,12]

The health emergency related to the COVID-19 pandemic in Brazil and around the world has brought about the need to rethink old issues of protecting workers' health, whether individual or collective[14,15,16,17]. In this perspective, dental care in the oral health network of the municipality of Fortaleza has undergone changes suggested by the launch of a technical note whose objective was to guide the work process of the oral health teams (ESB) of the Family Health Strategy (ESF), in the context of the COVID-19 pandemic.[18]

It is well known that environments such as clinics, offices and laboratories, as well as the procedures and work processes carried out in the dental environment bring risks, which can be of a physical, chemical, or biological nature. These risks can affect not only the people who frequent these environments, but also the professionals who work in them.[19,20]

It should also be noted that dentists are often in direct contact with saliva, blood, sharp objects that contain bodily fluids, and aerosols that may be contaminated with SARS-CoV-2 or other potentially pathogenic viruses (influenza A and B, respiratory

syncytial virus) that can adhere to surfaces and instruments in the office. Therefore, it is understood that this danger inherent in carrying out dental procedures is mainly due to potential exposure to the oral, conjunctival and nasal mucous membranes of dentists.

In the meantime, to promote the implementation and strengthening of programs for the prevention and control of healthcare-related infections (HAIs) at all levels of management and care, various actions are planned in the National Program for the Prevention and Control of Healthcare Associated Infections 2021-2025 (PNPCIRAS).[22]

Therefore, considering the various risks involved, it is essential that oral health professionals implement good operating practices in dental services, using personal protective equipment (PPE) correctly and that it is always available and of good quality[11,12]. In addition, it is important that there are procedures, organizational protocols, frequent hygiene of the dental environment, and that this environment complies with what is recommended by the regulatory bodies of dental practice, to promote the improvement of the quality and safety of the care provided.[22]

In view of the importance of the subject and the need to protect health professionals, this study aimed to analyze the work context of ESF dentists in relation to the prevention and control of HAIs and SARS-CoV-2 in a large municipality in northeastern Brazil.

METHOD

This is a cross-sectional study carried out with primary care dentists in the municipality of Fortaleza, the capital of Ceará, in northeastern Brazil. According to data from the Brazilian Institute of Geography and Statistics (IBGE), the capital has an estimated population of 2,703,391 inhabitants for the year 2021[23] and, at the time of the survey, the city was divided into six health regions. The municipality has ESBs in 113 health centers.

The inclusion criteria for the study were: being on the list of professionals provided by the Municipal Oral Health Coordination, with two or more years of service in the oral health team. The exclusion criteria were: professionals who were absent during the data collection period due to sick leave, maternity leave, premium leave, or vacation.

To identify the sample of ESF dentists, a sample calculation was carried out, with a sampling error of 8% and a significance level of 95%, in a universe of 306 professionals, requiring a minimum of 103 dentists to take part in the survey. Participants were selected using systematic probability sampling.

The instrument proposed for this research was a questionnaire designed using the form creation feature of Google Docs - a free package of online services integrated with Google's email service. This questionnaire was accessed and filled in electronically on the participants' computer or smartphone via a link sent individually via WhatsApp, an instant messaging application for smartphones.

The questionnaire was based on the Ministry of Health's Guidelines for Dental Care in the Context of COVID-19[12] and consisted of three blocks of information.

The first block covered sociodemographic and occupational data, with the following variables: gender, age, and level of training. The second block dealt with the health characteristics of ESF dentists, in relation to COVID-19, through the following variables: belonging to the risk group for COVID-19, diagnostic tests, and vaccinations for COVID-19 and influenza, in the year 2021.

The third block of information was made up of variables dealing with precautionary measures to control the spread of HAIs and SARS-CoV-2 in dental care. A Likert-type scale was used for the questions in this block.

Block 3 also includes questions on the performance of procedures that generate aerosols, the availability of powerful suction devices, respiratory isolation with negative pressure and Hepa (high efficiency particulate arrestance) filters, an air conditioning system with exhaust, windows, standard operating procedures (SOP) for processing health products, protocols for cleaning and disinfecting surfaces, and the Health Services Waste Management Plan (PGRSS).

Prior to data collection, a pilot test was carried out to check the suitability of the research instrument before it was applied definitively, with four dentists, two from the same municipality as the research and two from a neighboring municipality.

Data was collected from June 8 to August 23, 2022. The participation of the professionals was voluntary, as they agreed to take part in the study by selecting the option "I agree to take part in the study" at the end of the Informed Consent Form (ICF) presented electronically to the participants when they opened the online questionnaire before the data was collected.

The data collected was automatically saved by the Google Docs forms feature in a Microsoft Excel spreadsheet. The Excel spreadsheet generated was exported to the Statistical Package for the Social Sciences (SPSS) version 24.0.

Absolute and relative frequencies were calculated for the qualitative variables. Means and standard deviations were calculated for the quantitative variables. The results were organized using graphs and tables.

The study complied with the guidelines of Resolution No. 466 of December 12, 2012, of the National Health Council/MS/Brazil, and was approved by the Research Ethics Committee of the Health Sciences Center of the Federal University of Ceará, under opinion No. 5.413.135 and CAAE: 58270822.1.0000.5054, with the consent of the Coordination of Health Education, Teaching,

Research and Special Programs (COEPP) of the municipality of Fortaleza.

RESULTS

During the study period, of the 113 primary health care units (UAPS), seven were under renovation, so the study was limited to the 106 UAPS in operation. At the end of the data collection, 124 individuals were obtained, 21 of whom had to be excluded due to the exclusion criteria, resulting in 103 research subjects.

Of the 103 dentists who answered the questionnaire, the majority were female (76.7%), aged between 36 and 45 (61.2%) and with postgraduate degrees (96.1%), mainly specializations (Table 1).

With regard to the participants' health characteristics related to COVID-19, 30 (29.1%) belonged to a risk group. With regard to COVID-19 testing, the majority of participants said they had tested positive (63.1%) (Table 1). Of these, 55 (16.9%) said they felt safer to carry out their work activities after testing positive.

Overall, 50.5% of those vaccinated against COVID-19 said they had taken the two recommended doses and two booster doses (Table 1). When asked about their feeling of safety when carrying out their work activities after being vaccinated against COVID-19, 67.0% said they felt safe. Most of the participants had also been vaccinated against influenza (81.6%).

Regarding the frequency of PPE use, the majority of respondents said that they always use procedure gloves (99.0%), a disposable cap or hat (92.2%), a disposable apron (84.5%), closed shoes (76.7), a N95/PFF2 mask (65.0%), a face shield (59.2), and goggles (55.3%) in their procedures. When it came to wearing surgical masks, 41.7% said they always wore them (Table 2).

Regarding the availability of PPE in the service, the equipment mentioned as "always" available were: procedure gloves (66.0%), disposable cap or hat (62.1%), goggles (60.2%). Disposable aprons (42.7%), surgical masks (36.9%), N95/PFF2 masks (35.0%), face shields (28.2%), and surgical gloves (19.4%) were the least available (Table 3).

Regarding the variable purchase of PPE by the dentist themself, considering that it is a multiple choice question, it was found that: 64.1% of respondents said they had bought face protection; 48.5%, N95/PFF2 mask; 23.3%, surgical mask; 15.5%, goggles; 7.8%, cap or bonnet; 5.8%, disposable apron; 4.9%, surgical gloves; and 3.9%, procedural gloves (data not shown in table).

The quality of the PPE made available for use in the dental service is excellent in the opinion of only 5.8% of the participants when it comes to surgical masks, 3.9% for N95/PFF2 masks, 13.6% for procedure gloves and 12.6% for surgical gloves, 9.7% for caps, 14.6% for goggles, and 4.9% for face shields (Table 4). It can be seen that in all situations the quality is considered questionable and could compromise work safety.

The dentists also reported that 20.4% of the UAPS "always" make mouthwash available in sufficient quantities for the dental service to function, followed by 35.9%, "often", 30.1%, "sometimes", 11.7%, "rarely", 1.9%, "never"; 3.9%, which "always" make material available for absolute isolation, followed by 4.9%, "often", 10.7%, "sometimes", 21.4%, "rarely", 59.2%, "never"; 21.4% "always" provide high rotation tips, followed by 39.8% "often", 18.4% "sometimes", 11.7% "rarely", 8.7% "never"; and 27.2% "always" provide cleaning material, followed by 42.7%

Table 1. Characteristics of dentists according to gender, age group, postgraduate degree, and health conditions. Fortaleza, Ceará, 2022 (n = 103).

Variable	N	%
Gender		
Female	79	76.7
Male	24	23.3
Age group		
25 to 35 years old	2	1.9
36 to 45 years old	63	61.2
46 to 55 years old	24	23.3
56 to 65 years old	11	10.7
66 and over	3	2.9
Postgraduate		
Yes	99	96.1
No	4	3.9
Postgraduate level		
Specialization	65	65.6
Multiprofessional residency	2	2.0
Master's Degree	30	30.4
Doctorate	2	2.0
Belongs to the risk group for COVID-19		
Yes	30	29.1
No	73	70.9
Positive test for COVID-19		
Yes	65	63.1
No	38	36.9
Regarding the COVID-19 vaccine		
Vaccinated with both doses	3	2.9
Vaccinated with both doses and a booster dose	48	46.6
Vaccinated with two doses and two booster doses	52	50.5
Vaccinated against influenza in 2021		
Yes	84	81.6
No	19	18.4

Source: Prepared by the authors, 2022.

Table 2. Frequency of use of personal protective equipment by dentists in clinical and surgical procedures. Fortaleza, Ceará, 2022.

Variable	Always n (%)	Often n (%)	Sometimes n (%)	Rarely n (%)	Never n (%)
Surgical mask	43 (41.7)	5 (4.9)	12 (11.7)	7 (6.8)	36 (35)
N95/PFF2 mask	67 (65.0)	18 (17.5)	10 (9.7)	5 (4.9)	3 (2.9)
Procedure glove	102 (99.0)	-	-	-	1 (1.0)
Disposable apron	87 (84.5)	10 (9.7)	2 (1.9)	2 (1.9)	2 (1.9)
Disposable cap	95 (92.2)	-	4 (3.9)	2 (1.9)	2 (1.9)
Goggles	57 (55.3)	11 (10.7)	9 (8.7)	5 (4.9)	21(20.4)
Face shield	61 (59.2)	14 (13.6)	7 (6.8)	11 (10.7)	10 (9.7)
Closed shoes	79 (76.7)	11 (10.7)	12 (11.7)	-	1 (1.0)

Source: Prepared by the authors, 2022.

Table 3. Numerical frequency and percentage of dentists' perception of the availability of personal protective equipment in sufficient quantity for the operation of the dental service. Fortaleza, Ceará, 2022.

Variable	Always n (%)	Often n (%)	Sometimes n (%)	Rarely n (%)	Never n (%)
Surgical mask	38 (36.9)	19 (18.4)	24 (23.3)	9 (8.7)	13 (12.6)
N95/PFF2 mask	36 (35.0)	36 (35.0)	23 (22.3)	6 (5.8)	2 (1.9)
Procedure glove	68 (66.0)	31 (30.1)	2 (1.9)	-	2 (1.9)
Surgical glove	20 (19.4)	9 (8.7)	14 (13.6)	32 (31.1)	25 (24.3)
Disposable apron	44 (42.7)	48 (46.6)	10 (9.7)	-	1 (1.0)
Disposable cap	64 (62.1)	34 (33.0)	4 (3.9)	-	1 (1.0)
Goggles	62 (60.2)	16 (15.5)	11 (10.7)	7 (6.8)	7 (6.8)
Face shield	29 (28.2)	13 (12.6)	26 (25.2)	17 (16.5)	18 (17.5)

Source: Prepared by the authors, 2022.

Table 4. Numerical and percentage distribution of the quality of personal protective equipment made available for use in the dental service. Fortaleza, Ceará, 2022.

Variable	Excellent n (%)	Very good n (%)	Regular n (%)	Bad n (%)	Very bad n (%)
Surgical mask	6 (5.8)	26 (25.2)	51 (49.5)	12 (11.7)	8 (7.8)
N95/PFF2 mask	4 (3.9)	19 (18.4)	40 (38.8)	21 (20.4)	19 (18.4)
Procedure glove	14 (13.6)	40 (38.8)	44 (42.7)	4 (3.9)	1 (1.0)
Surgical glove	13 (12.6)	29 (28.2)	39 (37.9)	8 (7.8)	14 (13.6)
Disposable cap	10 (9.7)	25 (24.3)	41 (39.8)	15 (14.6)	12 (11.7)
Goggles	15 (14.6)	32 (31.1)	41 (39.8)	9 (8.7)	6 (5.8)
Face shield	5 (4.9)	8 (7.8)	24 (23.3)	25 (24.3)	41 (39.8)

Source: Prepared by the authors, 2022.

"often", 24.3% "sometimes", 4.9% "rarely", 1.0% "never" (data not shown in table).

Regarding performing hand hygiene following the "five moments of hand hygiene" using the appropriate technique, 41.7% of the participants always follow the five moments. 52.4% of respondents were instructed to rinse their mouths with antiseptic mouthwash before dental procedures, while 53.4% of respondents were instructed to carry out procedures that generate aerosols in the workplace (Table 5).

The use of absolute isolation during clinical procedures that generate aerosols was mentioned by only 1.0% of the respondents. Among the 103 participants, it was found that only 7.8% said they always had a 30-minute interval between appointments for disinfecting equipment and decontaminating the environment (Table 5).

Table 5. Numerical frequency and percentage of procedures carried out, such as: hand hygiene, mouthwash, procedures that generate aerosols, absolute isolation, and 30-minute interval between appointments, in the workplace. Fortaleza, Ceará, 2022.

Variable	Always n (%)	Often N (%)	Sometimes N (%)	Rarely n (%)	Never n (%)
Hand hygiene	43 (41.7)	29 (28.2)	12 (11.7)	16 (15.5)	3 (2.9)
Mouthwash with antiseptic	54 (52.4)	24 (23.3)	14 (13.6)	5 (4.9)	6 (5.8)
Performing procedures that generate aerosols	55 (53.4)	38 (36.9)	7 (6.8)	1 (1.0)	2 (1.9)
Absolute isolation	1 (1.0)	1 (1.0)	6 (5.8)	9 (8.7)	86 (83.5)
30 min interval between appointments	8 (7.8)	10 (9.7)	29 (28.2)	30 (29.1)	26 (25.2)

Source: Prepared by the authors, 2022.

On the other hand, they said that in 92.2% and 66.0% of the UAPS there are, respectively, windows in the dental offices and SOPs for the Processing of Health Products, and regarding the SOPs, 24.3% did not know about their existence (data not shown in table).

Regarding the PGRSS in the UAPS, only 47.6% said that it existed, but 42.7% said they didn't know (data not shown in table).

DISCUSSION

This study allowed us to identify the characteristics of dentists who work in the UAPS of a large municipality in the Northeast of Brazil, and their work context in relation to the prevention and control of HAIs and SARS-CoV-2.

In this study, women took part the most. The literature on the health workforce points to the occurrence of the phenomenon of feminization in all positions involved in the production of care for individuals, and therefore on the front line of the fight against COVID-19.[24,25]

In a literature review carried out by Teixeira et al.[26], the risk of contamination was the main problem identified by health professionals directly involved in dealing with the COVID-19 pandemic, in addition to sleep disorders, mental health problems, such as burnout, depression, mental fatigue, and generalized anxiety disorder, which may be a reflection of the lack of conditions that guarantee worker safety.[27]

This risk increases when we have professionals who are in the risk group for COVID-19[28]. As of November 8, 2021, 640,573 suspected cases and 6,399 confirmed cases of COVID-19 have been reported among dentists.[29]

In the study, the feeling of insecurity among those who claimed to have tested positive for COVID-19 and the low adherence to vaccination were worrying findings, since 50.5% of the participants had taken the two recommended doses and the two boosters. Similarly, by November 2022, in Fortaleza, only 51.6% of the population had received the third dose, as observed in the vaccinometer made available by the State Health Department.[30]

COVID-19 has shown the world that individual freedom is not absolute when set against the essential needs of communities. The logic that structures vaccination actions from a public health perspective is based on the so-called "collective immunity" that is achieved when vaccination is massively carried out, reaching high coverage. This immunity provides, in addition to the individual protection of the vaccinated person, the elimination of the circulation of the infectious agent in the environment and the indirect protection of susceptible people.[31]

ANVISA's Resolution of the Collegiate Directorate (RDC) No. 63, of November 25, 2011, which provides for the Requirements of Good Operating Practices for Health Services, in the section on the protection of workers' health, determines that they must guarantee guidance mechanisms on immunization against: tetanus, diphtheria, hepatitis B and other biological agents to which workers may be exposed.[32]

On the other hand, despite being essential and recommended by the health authorities[12], there is no 100.0% adherence to any of the PPE by the dentists who took part in the study, which is no different from other national[24,33,34,35] and international[36,37,38] studies.

Protecting the health of healthcare workers is essential to prevent the transmission of HAIs and COVID-19 in healthcare facilities, and it is necessary to adopt infection control protocols and provide good quality PPE, leading to an increased sense of security. In a literature review carried out by Ribeiro et al.[39], most of the articles addressed the use of PPE as one of the measures considered most relevant to avoid contamination by COVID-19 during the care of suspected or confirmed patients with the disease.

In a study carried out in Pakistan involving general dentists and specialists working in public and private dental practices, hospitals, and academic institutions, it was found that around 50.0% of professionals used PPE in accordance with the country's health recommendations, which was already facing the presence of COVID-19 in its territory.[36]

In the case of the study carried out in France, the authors found that the use of PPE was higher during aerosol-generating

procedures than during non-aerosol-generating procedures and found that the use of a surgical mask in non-aerosol-generating procedures increased the risk of professionals contracting COVID-19, recommending the use of N95 and PFF2 masks in both situations.[37]

The fact that dentists don't follow the recommendations puts them at risk of being infected by HAIs or SARS-CoV-2, especially during consultations with asymptomatic patients. Increasing and reinforcing educational measures and training in the use of PPE is essential, given the new variants that are constantly threatening the world. On the other hand, it is understandable that non-adherence to PPE may be influenced by the discomfort that some equipment brings to professionals[33,40]. Remember that, in the case of face shields and goggles, they are essential when performing procedures with high and low speed motors.[34]

The risk of biological contamination is constant in the dental environment, noting that the virus that causes COVID-19 has been mutating, meaning that dentists must always be prepared to carry out their work in appropriate biosafety conditions. In this context, the World Health Organization (WHO) defines that the complete use of PPE is essential: apron, cap, gloves, eye protection (goggles or face shield), and surgical mask or respirators (N95, FFP2, or FFP3), as well as frequent hand hygiene and cleaning of the work environment.[41]

In addition to the use of common PPE in dental practice (gloves, goggles, cap, and mask), N95/PFF2 masks are recommended due to their better filtration and sealing efficiency when compared to disposable surgical masks. You should also wear face shields, a long-sleeved coat/apron, and foot protection.[26,42,43,44,45]

ANVISA's RDC No. 63/2011 stipulates that health services must make biological, chemical, physical, occupational, and environmental safety standards and conducts available to all workers, as well as work clothing, including the provision and instructions for the use of PPE, in sufficient numbers and compatible with the activities carried out.[32]

Regarding the availability of sufficient PPE in the service, it was found that, in the opinion of dentists, it is always below what is recommended. This situation is not very different from that found by Danigno et al.[46], before and during the pandemic. The high consumption of PPE during the peaks of the COVID-19 pandemic, limited production capacity, the consequent increase in costs, and the fact that they are uncomfortable or considered ineffective by some may explain this situation.[47]

In this study, in all situations, the quality of the PPE was considered questionable and could compromise work safety. A very different result was found in the research carried out by Lotta et al.[48], which sought to understand the impacts of the pandemic on public health professionals in Brazil, by applying an online survey to 2,138 participants. The study found that of the health professionals who received PPE, 22.8% considered it to be of excellent quality, 53.6% said it was good and 23.5% low or very poor quality.

This situation contradicts ANVISA's RDC No. 63/2011, which states that health services must provide all the resources, including physical infrastructure, equipment, supplies and materials necessary for their operation with adequate quality standards. Therefore, if quality deviations occur, measures must be taken to prevent recurrences. [32]

Therefore, dentists working in the UAPS in the municipality of Fortaleza should be instructed to write a report based on scientific evidence justifying the poor quality of dental consumables. The poor quality of the PPE provided at the UAPS and the need to ensure their safety at work have led some dentists to buy their own PPE.

Protective measures also aim to avoid or reduce procedures that produce droplets or aerosols and include preparation of the oral health team, adjustments to PPE and recommendations for cleaning and disinfecting surfaces.[15]

However, the data from this study shows that some of these changes have not been incorporated into the daily lives of dentists, as can be seen from the results obtained on the frequency of use of PPE, the lack of sufficient quantities of mouthwash, material for absolute isolation, high rotation tips and cleaning materials.

The study also revealed that the majority of UAPS did not have powerful suction devices (vacuum pumps), nor did they have a respiratory isolation area with negative pressure and Hepa filter, nor did they have an air conditioning system with exhaust, but the majority did have a window, a situation not dissimilar to that found by Turini et al.[24] and Silva Júnior et al..[28]

The situation found in the UAPS in Fortaleza is worrying, since this study showed that there are still flaws in the infection control process with a view to preventing HAIs and SARS-CoV-2. Previous studies, such as the one by Neves et al.[49], which carried out a multilevel analysis considering the performance of curative dental care in Brazil, also pointed to a worrying dental care scenario. The study by Dias et al.[50], which assessed the physical structure, sanitary conditions and infection control in dental services offered by Primary Health Care in Brazil, identified gaps in the dental infection control process in public establishments.

Workplaces can play a relevant role in the spread of viruses and, therefore, their organization is a determining factor in preventing illness. Understanding how different occupational groups are exposed to infections and diseases in their workplaces can help public health responses and risk management for COVID-19.[51]

Therefore, in order to prevent the spread of pathogens, it is recommended to use the air-conditioning system in exhaust mode, ensuring air exchange, or, if the system is not

available, to keep the windows open during care. Good ventilation is necessary because, for the most part, dental care generates a significant amount of aerosols that can be contaminated with microorganisms, especially SARS-CoV-2, and a ventilation system, natural or mechanical, can reduce the concentration of infectious aerosols. You can also use a portable Hepa air filtration unit, which is a piece of equipment used to purify the air inside the office, making it essential for appointments that require procedures to be carried out using aerosol-generating equipment. [43,50]

Although 34.0% of the surgeons said that there are no SOPs available in the UAPS, the Municipal Health Department of the municipality has produced a manual with the Norms and Standard Operating Procedures in Primary Health Care, including those for the hygiene of dental offices and the processing of dental articles and sterilization.[52]

The systematization of professional practice and the establishment of SOPs are important tools for providing technical information and supporting the routines of professionals, minimizing the occurrence of errors and deviations, as well as facilitating the planning and execution of work, ensuring continuous improvement in the quality of the actions and services offered.[53]

Another worrying aspect was the fact that 9.7% of the participants said that there was no PGRSS in the UAPS where they worked and 42.7% could not say whether the plan existed. The PGRSS is mandatory in all public and private healthcare establishments. Waste generators who are required to draw up a Waste Management Plan (PGRS) are defined by Article 20 of Federal Law No. 12.305 of August 2, 2010, which establishes the National Solid Waste Policy (PNRS). [54]

In Fortaleza, the Municipal Department of Urbanism and Environment launched the Waste Management Plan Manual in 2015, with guidelines on how to draw up the plans in the modalities defined by Municipal Decree No. 13.732, of December 28, 2015, which includes the PGRSS[55]. RDC No. 222, of March 28, 2018, which provides for the Technical Regulation for the Management of Health Service Waste, defines the PGRSS as a document that points out and describes the actions related to the management of solid waste, observing its characteristics and risks, within the scope of health establishments, covering aspects related to generation, segregation, packaging, collection, storage, transportation, treatment and final disposal, as well as actions to protect public health and the environment.[56]

Given the changes to be adopted to reduce the risk of transmission of SARS-CoV-2 to users and professionals, it is necessary to prepare the UAPS and ESB. Health managers were instructed to make adjustments to the ambience of dental offices, based on measures such as the purchase of air filters, the insertion of partitions in offices shared by teams and the purchase of high-pressure pumps. However, even with the guidance given to managers about adapting the environment, in this study we did not find these changes, specifically in relation to the items surveyed.

Although the WHO declared the end of the public health emergency related to COVID-19 in May 2023, we cannot let our guard down, as the virus has not ceased to be a health threat and it is important to consider prevention and control measures for future emergencies[57]. At the same time, an increase in cases associated with influenza A and B viruses and respiratory syncytial virus has also been recorded in Brazil, leading to severe acute respiratory syndrome[58]. Continuing to vaccinate against COVID-19 and influenza are important protective measures for the current epidemiological situation.

The following are some limitations of the study: the use of self-reported data may have underestimated or overestimated the results. The data was collected when vaccination against COVID-19 was already underway, with the application of the 2nd booster dose, which may have influenced the behavior of some dentists with regard to the use of PPE. However, this behavior may change due to the new emerging variants that have emerged over time. The fact that the professionals did not feel comfortable answering questions about the frequency of use of appropriate PPE in their practice and its availability and quality may have interfered with the results of the study. Another limitation of the study concerns the lack of evaluation of the care taken by dentists when putting on and removing PPE and the identification of the determining factors in the inappropriate use of PPE, which could contribute to the better design of educational activities to be undertaken in the service.

CONCLUSIONS

Dentists are well vaccinated against COVID-19 and influenza. However, the study showed that there are gaps in the process of implementing the rules on good practice in dental procedures, as well as in the supply of equipment, devices and infrastructure necessary for the proper performance of the profession.

Regarding the availability of PPE in sufficient quantity in the service, it was found that, in the perception of dentists, it is always below what is recommended, and, in all situations, the quality of the PPE was considered questionable and could compromise work safety.

There was little knowledge among dental professionals about the presence of POP and PGRSS in the UAPS where they work.

The emergence of mutations and subvariants of the coronavirus, such as the recently identified omicron BQ.1 and BE.9, makes concern about COVID-19 a constant, even with the WHO's declaration of the end of the public health emergency of international importance. The presence of other respiratory viruses (influenza A and B and respiratory syncytial virus) is also a concern. It is therefore recommended that dentists implement the protection and control measures recommended by the health authorities and professional bodies in order to carry out their work and deal with the risks inherent in the profession in the best possible way.

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Authors' Contribution

Melo EA, Aquino TM, Arrais PSD - Conception, planning (study design), acquisition, analysis, data interpretation, and writing of the paper. Almeida MEL, Florêncio CMGD - Analysis, data interpretation, and writing of the paper. All the authors approved the final version of the paper.

Conflict of Interest

The authors inform that there is no potential conflict of interest with peers and institutions, political or financial, in this study.