

COVID-19 and changes in dental practices in the Brazilian Public Health System: perception of the oral health team

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Abstract: The aim of this study was to verify the perception of the oral health team regarding work safety and aspects related to changes in dental practices during the COVID-19 pandemic. A descriptive, exploratory, quantitative, and qualitative cross-sectional study was conducted using an electronic questionnaire sent via email to health professionals (n = 197) affiliated with the Brazilian Public Health System (SUS), from December 2020 to September 2021, in a municipality located in the northeast of the state of São Paulo, Brazil. The variables of interest were sociodemographic characteristics and those related to the professionals' perception of oral health care during the pandemic and its impact on these workers' occupational safety. Descriptive statistics were performed, and the absolute and relative frequencies of quantitative variables were calculated, whereas lexical analysis was performed for textual content using the descending hierarchical classification (CHD). Out of the total sample, elective and urgent/emergency care was provided by 58.95% (n = 56); physical barriers were absent between the teams in 54.74% (n = 52); minimally invasive techniques were applied in 71.58% (n = 68); personal protective equipment (PPE) was replaced in 81.05% (n = 77) between appointments; and occupational safety was reported by 49.47% (n = 47). Textual analysis showed a decrease in appointments and consultations, with a longer interval between appointments. The professionals noticed changes in dental practices during the pandemic, mainly regarding the use of PPE, the type of treatment performed, the number of treated patients, and the greater time interval between consultations. The physical infrastructure of health units and the availability of PPE to patients needed some adjustments. A significant number of workers felt safe in providing dental care during the pandemic.

Keywords: COVID-19; Practice Patterns, Dentists; Health Personnel.

Introduction

COVID-19 is a disease triggered by the SARS-CoV-2 virus, which causes respiratory infection. The infection is transmitted by inhalation of droplets and aerosols eliminated during coughing, sneezing, talking,



and breathing, as well as by aerosolization of bodily substances during airway management procedures.¹ This disease has affected millions of people worldwide, and it was declared a pandemic by the World Health Organization in March 2020.²

The pandemic has become a public health concern and a huge challenge for public and private health services all around the world. In Brazil, the Public Health System (SUS - *Sistema Único de Saúde*) was of great importance in containing the COVID-19 spread³ because it is a public, free, and universal health system.

In view of this scenario, it is important to emphasize that dental practice was particularly affected by COVID-19 due to proximity between professionals and patients and the generation of aerosols during consultations. The risks of contamination and cross-infection at the point of care were high, which directly impacted dental procedures around the world.⁴⁻⁷ Therefore, issues related to the provision of oral health care are important to ensure safety, quality of care, and effectiveness in clinical practice within the SUS framework.

Accordingly, several studies have been conducted in an attempt to overcome the challenges encountered by dental practices.⁴⁻⁷ However, it is necessary to assess dental work from different perspectives. It is essential to carry out research on the development of new techniques, instruments, and protocols that minimize aerosol generation during dental procedures, and also on issues related to the demand for health services, enhancing safety measures for both dental professionals and patients.

The investigation into the ease and difficulties experienced by health teams in their daily work can provide valuable insight and significantly contribute to the organization of dental services in different locations. The aim of this study was to verify the oral health care team's perception of changes in dental practices and occupational safety during the pandemic within the SUS framework.

Methodology

A descriptive, exploratory, quantitative, and qualitative cross-sectional study was carried out

with all oral health care team members, including dentists, oral health assistants, and oral health technicians from primary and secondary care units (n = 197) affiliated with SUS, in a municipality in the northeast of the state of São Paulo, Brazil. Professionals who were on paid leave or had been dismissed from the service (n = 5) were excluded, resulting in a total of 192 eligible participants, among whom 95 participated in the study and answered the survey.

Data were collected from December 2020 to March 2021. A questionnaire consisting of sociodemographic characteristics of the participants and professionals' perception of oral health care during the pandemic and its impact on occupation safety was applied. Participants were contacted via e-mail, in which they received a link to access the survey, and also the informed consent form containing the information about the research. The data collection instrument was adapted based on the World Health Organization "Risk assessment and management of exposure of health care workers in the context of COVID-19".⁸

To verify the suitability of the adapted data collection instrument and determine the appropriate method of analysis, we used the consensus decision-making technique known as Traditional Committee,⁹ which involved researchers and public health service management experts and allowed for an open discussion and exchange of ideas.

Study variables comprised sociodemographic characteristics, including sex, age, and time (years) working at the Local Health Department and dental practices at the service, such as courses on biosafety standards, work in pairs, guidance on replacing rotary instrument with hand instruments, rotary instrument use, application of minimally invasive techniques, manual instrument cleaning, care for patients with suspected COVID-19, care for patients at risk for COVID-19, and change of personal protective equipment (PPE) between visits. All of these variables were dichotomous, with yes or no answer options. The other variables related to dental practice were nominal polytomous, addressing disposable protector use and dental equipment replacement frequency, PPE replacement timing in

the care of patients with COVID-19, office cleaning frequency, items included in office cleaning, variety of care provided (elective, emergency or both), existence and types of physical barriers between offices; equipment for room ventilation, PPE used by patients at the time of care, and types of PPE worn and changed between each service. For better illustration of the office physical structure, the variable indicating the pieces of dental equipment was categorized as 1 to 4, 5 to 9, and more than 10 pieces of equipment.

In addition to the dichotomous variable assessing the perception of occupational safety for dental care during the pandemic, a scale with ordinal variables ranging from 1 to 5 (1=none and 5=extremely) was used, on which professionals indicated how unsafe they felt about contamination with COVID-19.

To understand the changes in the demand of patients for dental care during the pandemic, an open-ended question was created in which professionals from the oral health team were asked about the changes in users' access; organization of dental appointments, care routines, and referral and counter-referral system.

To examine the data, descriptive statistics were performed, and the absolute and relative frequencies of quantitative variables were calculated.

A lexical analysis was performed to assess textual context using the descending hierarchical classification (DHC) technique, which is a qualitative and multivariate analysis method,¹⁰ performed using the IRAMUTEQ software.¹¹ In DHC, text segments are classified according to their words and their set is divided based on frequency of reduced forms, derived from the root of words and organized into a dendrogram. Based on the classes, word frequency, and/or chi-square (χ^2) statistical test, the researcher assigns a title to these classes according to their semantics. In this research, words with a value greater than 3.84 in the chi-square test (χ^2), $p < 0.0001$, were selected.¹² The study was approved by the Research Ethics Committee, in compliance with Resolution 466/12 of the Brazilian National Research Ethics Council and other provisions.

Results

The profile of the research participants ($n=95$) showed that 78.94% ($n=75$) were female, with a mean age of 48.13 years (\pm SD = 9.18); 65.26% ($n = 62$) were dental surgeons; the average working experience was 21.00 years (\pm SD = 10.90); 65.26% ($n = 62$) had completed higher education; and 58.95% ($n=56$) worked in the morning and afternoon shifts.

Table 1 presents the oral health care team's perspectives regarding the dental care provided by SUS during the pandemic. Their perspectives included office physical structure, adequacy, and type of care offered to patients. Note that 58.95% of professionals performed both urgent or emergency and elective treatments; 67.37% of the offices had between 1 and 4 pieces of equipment; 54.74% reported no physical barrier between the teams; 55.79% reported ventilation flow was facilitated through windows and air conditioning; 44.21% said that the offices were cleaned for each patient and that the dental chair was the item most often included in the cleaning (83.16%); 50.53% reported that the disposable protective equipment was changed for each patient; and 67.37% reported that no PPE was provided to the patients.

Concerning the aspects related to the work of the oral health team in dental practice during the pandemic, 75.79% reported working in pairs; 55.79% performed manual cleaning of the instruments; 57.89% used disposable protectors on dental equipment; 51.58% did not attend to patients with suspected COVID-19; 82.11% received guidance from managers on the cautious use of rotary instruments; 62.11% used rotary instruments during the pandemic; 71.58% used minimally invasive techniques; 54.74% participated in training for COVID-19; 55.79% took a biosafety course; 63.16% treated patients at risk for COVID-19; 49.47% felt safe to carry out dental treatment; and 81.05% replaced PPE between the services (Table 2).

Procedure gloves (88.42%), disposable aprons (83.16%), followed by the N95 mask (81.05%) and face mask (81.05%), were the most frequently used PPE by professionals from the oral health team during dental care (Figure 1).

Table 1. Aspects related to services provided at dental practices affiliated with the Brazilian Public Health System during the pandemic perceived by oral health care team professionals, from December 2020 to March 2021, in a municipality in northeastern São Paulo, Brazil.

Variables	n	%
Type of care performed during the pandemic		
Emergency	20	21.05
Elective	4	4.21
Both	56	58.95
Other	4	4.21
Did not answer	11	11.58
Number of existing equipment		
1–4 pieces of equipment	64	67.37
5–9 pieces of equipment	8	8.42
More than 10 pieces of equipment	12	12.63
Did not answer	11	11.58
Physical barrier between pieces of equipment		
Folding screen	10	10.53
Half wall	6	6.32
No physical separation between dental chairs	52	54.74
Entire wall	7	7.37
Other	4	4.21
Did not answer	16	16.84
Ventilation flow equipment		
Air conditioning	9	9.47
Window	4	4.21
Window, air conditioning	53	55.79
Window, floor or column fan, air conditioning	1	1.05
Window, air conditioning, door	1	1.05
Window, ceiling fan, air conditioning	14	14.74
Window, ceiling fan, floor or column fan, air conditioning	1	1.05
Ceiling fan, air conditioning	1	1.05
Did not answer	11	11.58
Office cleaning frequency		
Each patient	42	44.21
Once every service period	18	18.95
Once a day	11	11.58
Other	3	3.16
Did not answer	21	22.11
Items included in office cleaning		
Dental chair	79	83.16
Bench	73	76.84
Floor	67	70.53

Continue

Continuation		
Chair	67	70.53
Wall	19	20.00
Other	4	4.21
Did not answer	12	12.63
Disposable equipment protector replacement frequency (e.g., PVC film)		
Do not use this type of barrier	29	30.53
Yes, for each patient	48	50.53
Yes, once every service period	4	4.21
Once a day	3	3.16
Did not answer	11	11.58
PPE made available to patients during care		
TNT disposable apron	13	13.68
Safety goggles	15	15.79
Disposable cap	15	15.79
Other	3	3.16
Did not use	64	67.37
Did not answer	11	11.58

PVC: Polyvinyl chloride; PPE: personal protective equipment; TNT: polypropylene.

Table 2. Aspects related to oral health care team professionals in dental practice for facing the pandemic, from December 2020 to March 2021, in a municipality in northeastern São Paulo, Brazil.

Variables	Yes		No		Did not answer	
	n	%	n	%	n	%
Worked pairs	72	75.79	11	11.58	12	12.63
Performed manual cleaning of instruments	53	55.79	30	31.58	12	12.63
Used disposable protectors on dental equipment	55	57.89	29	30.53	11	11.58
Treated suspected COVID-19 patients	34	35.79	49	51.58	12	12.63
Received guidance from managers on the cautious use of rotary instruments	78	82.11	6	6.32	11	11.58
Used rotary instruments during the pandemic	59	62.11	25	26.32	11	11.58
Changed PPE between the services	77	81.05	7	7.37	11	11.58
Used minimally invasive techniques	68	71.58	15	15.79	12	12.63
Participated in COVID-19 training	52	54.74	42	44.21	1	1.05
Took biosafety course	53	55.79	32	33.68	10	10.53
Treated a patient at risk for COVID-19	60	63.16	23	24.21	12	12.63
Felt safe to carry out dental treatment	47	49.47	37	38.95	11	11.58

PPE: personal protection equipment.

To better illustrate the professionals' perception of occupational safety, Table 3 shows some conceptions about dental work during the pandemic from the perspective of workers, with scores 2 and 3 on the scale in 46.32% of the cases, indicating some sense of

unsafety about dental care. Professionals also reported that they often dreaded contracting COVID-19 during dental care - score 2 (25.26%) - and from co-workers - score 3 (30.53%), and that dental procedures could contaminate the patients - score 2 (24.21%).

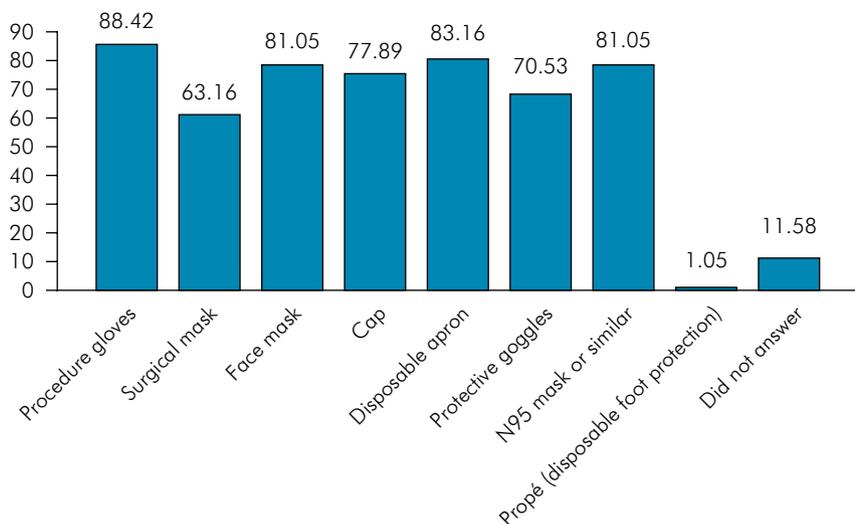


Figure 1. Percentage of personal protective equipment used by oral health care team professionals during dental care during the pandemic, from December 2020 to March 2021, in a municipality in northeastern São Paulo, Brazil.

Table 3. Conceptions about dental work during the pandemic from workers' perspective from December 2020 to March 2021. São Paulo, Brazil.

Variables	1		2		3		4		5		Did not answer	
	n	%	n	%	n	%	n	%	n	%	n	%
How unsafe they feel about dental care	15	15.79	22	23.16	22	23.16	11	11.58	13	13.68	12	12.63
Frequency at which they think about contracting COVID-19 during consultations	11	11.58	24	25.26	20	21.05	17	17.89	11	11.58	12	12.63
Frequency at they think about contracting COVID-19 from co-workers	10	10.53	25	26.32	29	30.53	9	9.47	10	10.53	12	12.63
Frequency at which they think procedures can contaminate patients	15	15.79	23	24.21	22	23.16	14	14.74	9	9.47	12	12.63

The lexical analysis of textual content allowed for a more detailed investigation into patient flow in dental care, thus providing additional information. According to the DHC analysis, 1,040 words were found, of which 291 were distinct words, with an average frequency of 12.53 words for each form in the text corpus. Of the total number of words found, 72.29% were matched through the DHC in the text segments, indicating the degree of similarity in vocabulary, resulting in five word classes, namely: class 1 – Scheduling; class 2 – Type of care provided; class 3 – Care of patients in the risk group; class 4 – Interval between consultations; and class 5 – Volume of patients.

The largest clusters were found in classes 5 and 3, representing 23.3% of the text corpus for each class. Class 2 had a rate of 21.7% compared to class 1, with 16.7%, and class 4, with 15%. Classes 1, 4, and 5 derive from the same branch and, therefore, tend to have a greater connection with each other. The same applies to the other branch, which includes classes 2 and 3 (Figure 2).

The analysis of the branch in which classes 1, 4 and 5 are included reveals their significant representation in the text corpus and indicates the patient flow during the pandemic period, according to oral health care team professionals' perception. From this perspective, there seems to have been a decrease in the number

Modifications made to the flow of patients for dental care during the pandemic

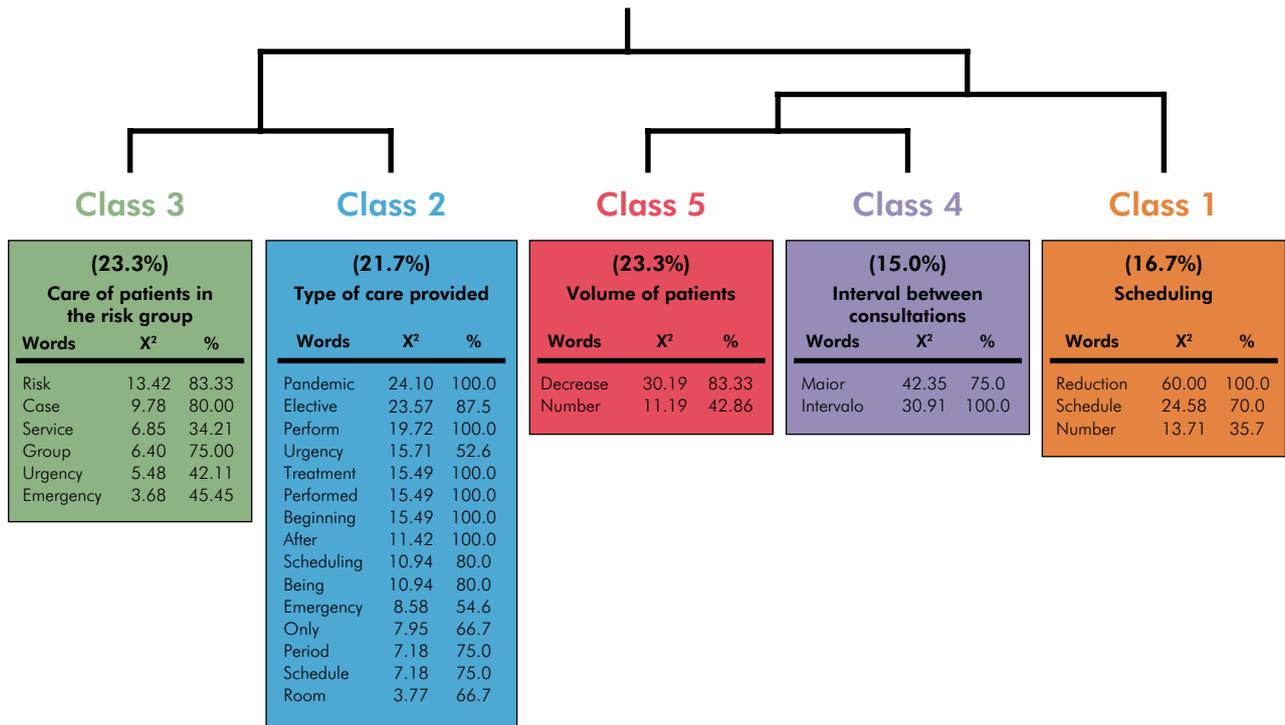


Figure 2. Descending Hierarchical Classification dendrogram with partitions and research corpus content, São Paulo, Brazil.

of scheduled and treated patients, with a longer interval between consultations, as demonstrated in the excerpts below:

[...] Reduction in the number of patients scheduled and consultation turnover within offices with more than 2 teams
[...] Class 1 (P.40)

[...] Longer interval between consultations, lower number of consultations and lower occupancy of polyclinic rooms [...]
Class 4 (P.11)

Classes 2 and 3, from the participants' perspective, represented the types of care provided and how they were administered to a specific category of patients. In this scenario, phone calls appear to have been prioritized in emergency care, as this was the type of care recommended for patients at risk of COVID-19, and there was no change in referral and counter-referral systems, as demonstrated in the excerpts below:

[...] Initially, from March to October, only emergency care was performed and after this period, elective treatments and spontaneous demand were performed with a reduction of half of the agenda, there were no changes in the reference system and counter-referrals [...]
Class 2 (P.61)

[...] patients in the risk group for COVID-19 only in cases of emergency [...]
Class 3 (P.27)

[...] The number of appointments was reduced by half, care for pregnant women, children, older adults and risk groups were suspended, except for cases of great need, emergency care was maintained [...]
Class 3 (P.56)

Discussion

This study on the perception of oral health care team professionals of changes in dental practices affiliated with the SUS during the pandemic, in a municipality in northeastern São Paulo, evidenced that most participants reported changes in their

daily work routine in order to reduce the risks of contamination with COVID-19 among professionals and patients.

The use of PPE is an essential prerequisite for providing dental care, particularly during a pandemic. However, despite advances in dental practices to confront the pandemic, the use of PPE is still a major challenge. In this research, most professionals reported changing PPE between appointments; however, none of the equipment had 100% reported usage rate. Studies recommend that the oral health team wear gloves, disposable aprons, caps, goggles with complete sealing, face protection, and N95/PFF2 mask without valves.^{2,12-14} A systematic review concluded that the use of N95 respirators by healthcare professionals who perform aerosol-generating procedures was unanimously recommended as protection against COVID-19, when compared to the surgical mask, according to national and international technical guidance documents.¹⁵ N95 masks or equivalent are recommended for dental procedures, including clinical examination.^{16,17} Face shields should also be used as a barrier to protect the face and its mucous membranes from airborne body fluids.¹⁸ Studies show that they need to be used in conjunction with other protective equipment such as an N95 mask.¹⁹

Patients must also be protected (head, eyes, and thorax), and the use of a fenestrated field or other solutions is suggested to guarantee patient protection;²⁰ however, in this research, most professionals reported that they did not use any PPE on patients during dental care.

The scenario presented in this study shows other challenges, such as the total absence of physical barriers separating dental equipment the same environment. This can be a huge hindrance to the care provided concomitantly in two or more chairs, due to the known dispersion of aerosols produced during consultations.^{21,22}

With the dispersion of aerosols, office cleaning becomes relevant as a potential means of transmission of COVID-19 in dental practice.^{5,16} Studies suggest that the SARS-CoV-2 virus can remain on inanimate surfaces such as metal, glass or plastic for up to 9 days but can be easily inactivated with surface

disinfection procedures.²³ However, not even half of the professionals reported cleaning the offices between each visit in this study.

Some professionals reported not changing disposable protectors, such as plastic film, for equipment between one patient and the next, which is a cause for concern. Disposable guards should be applied to work surfaces, to the dental chair, and to other devices to prevent direct contamination.²⁴

Another crucial aspect is office ventilation. In this research, most participants reported that the service rooms had air conditioning and windows for air circulation. Authors suggest that doors and windows should remain closed during and after each consultation, and adequate office ventilation and cleaning should be carried out. It is necessary to consider the possibility of opening windows during the service if there is no risk of contamination of adjacent areas and its implication in the movement and permanence of people.²⁴

In addition to the aforementioned adaptation of biosafety measures, dental procedures were also rethought around the world to reduce cross-infection in dentistry during the pandemic.²⁵ Studies have addressed the problem associated with the use of high-speed handpieces, as they generate a sizable amount of aerosols;¹⁶ therefore, reducing this production is strongly recommended for mitigating SARS-CoV-2 transmission.¹⁴ The use of manual instruments such as cures, chisels, sickles, hoes, and periodontal files are thus recommended.²⁶ In this research, most professionals used minimally invasive techniques, but a significant number still used rotary instruments, despite having received guidance from managers on the cautious use of these instruments.

Concerning the perception of occupational safety, this study showed that, even though most professionals felt safe during dental care during the pandemic, a significant number of them reported feeling unsafe. Research shows that unsafety, fear, and concern among health professionals, especially dental surgeons, has been very present during the pandemic.^{27,28} Studies suggest that 90% of dental surgeons reported concern about contracting COVID-19 and 95% about transmitting

the virus to their families.²⁷ Another study found that only 10% of the interviewed professionals felt confident about dental treatment, which was more related to patients' fear of contracting COVID-19 and increased treatment costs due to the need to implement additional infection control procedures.²⁸

A study²⁸ identified that dental surgeons would feel safer during dental care if all patients were tested for COVID-19 before consultations; however, in a country such as Brazil, with so many social differences and economic difficulties, such expectation is unrealistic.

The lexical analysis of textual content referring to patient flow in dental care demonstrated a decrease in the number of scheduled and treated patients, with a longer interval between consultations. This interval is recommendable and important to allow for aerosol sedimentation and air circulation.²⁴

The findings of this study regarding the precedence given to emergency treatments over elective treatments, reported by professionals, are in line with the technical recommendations and clinical protocols suggested by researchers^{16,24} and international health agencies.²⁹ According to some authors, performing dental procedures indiscriminately during the pandemic can be considered a greater harm to the population than providing assistance itself.¹⁶

This research is, therefore, important for providing information on changes in dental practices affiliated with the SUS during the pandemic. However, the findings and the hypotheses raised herein demonstrate the difficulties encountered by oral health care team

professionals and managers to overcome this scenario. The challenges posed by the pandemic require almost instantaneous reinvention and innovation of the SUS, as well as efforts to tackle pre-existing chronic problems in the health care system.³⁰

Notwithstanding the contributions made by this research, it has some limitations, such as sample size and regionalization of the collected data. This occurs because Brazil is a very large country with great economic and social differences. More comprehensive studies with a greater number of professionals and a diverse range of municipalities would be necessary to gain a better understanding of the real situation of dental practices affiliated with the SUS during the pandemic.

Conclusion

By looking at the oral health care team's perception, we can conclude that changes did occur in dental practices during the pandemic, mainly regarding PPE use, type of treatment performed, number of treated patients, and greater interval between consultations. However, there is still a need for adjustments in the physical infrastructure of health units, the availability of PPE to patients, and the maintenance of office cleanliness to ensure that safety recommendations are taken into account during dental care.

The number of participants who felt safe while providing dental care during the pandemic was significant, but there are still some professionals who reported unsafety.

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