



# Impact of the absence of dental support on cancer patients during COVID-19 pandemic: a cross-sectional study

Verônica Caroline Brito Reia<sup>1</sup> · Maria Gabriela Robles-Mengoia<sup>2</sup> · Bernardo da Fonseca Orcina<sup>1</sup> · Milenka Gabriela Quenta-Huayhua<sup>1</sup> · Mailon Cury Carneiro<sup>1</sup> · Brenna Rodrigues Manzano<sup>1</sup> · Anderson Prestes<sup>3</sup> · Cássia Maria Fischer Rubira<sup>1</sup> · Paulo Sérgio da Silva Santos<sup>1</sup>

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## Abstract

**Purpose** This study identifies the impact of the absence of dental support for patients with cancer whose clinical dental care was interrupted by the coronavirus disease 2019 (COVID-19) pandemic.

**Methods** Individuals with oncologic diseases were selected from a telephone list of a Clinical Research Center (CRC) that specialized in the care of patients with cancer at the Bauru School of Dentistry, University of São Paulo (FOB/USP). The convenience sample comprised 280 patients (aged > 18 years) with a history of cancer that underwent dental treatment at the FOB/USP CRC in 2019 and did not receive care in 2020 owing to the pandemic. The participants completed a questionnaire sent via email or a text messaging application. Individuals receiving treatment or who were already treated for cancer were divided into two groups for data tabulation. Statistical analyses were performed using Fisher's and chi-square tests.

**Results** Of the 280 patients, 104 answered the questionnaire, and 75 (72.1%) were women. Among the women, 45 (60.0%) were receiving antineoplastic treatment, and 30 (40.0%) had already been treated. Among the men, 15 (51.7%) were receiving antineoplastic treatment, and 14 (48.3%) had already been treated. Regarding oral problems that arose during the pandemic, dental pain when eating hot or cold food or drinks (57.0%), muscle pain (53.8%), and difficulties when chewing (51.0%) were the most common reported among patients. Furthermore, most individuals reported not having received any type of remote dental follow-up, before being contacted by our team, which could contribute to reducing these oral problems.

**Conclusion** It is impossible to say whether the absence of dental support in cancer patients during the coronavirus disease 2019 (COVID-19) pandemic had a negative impact on oral issue rates.

**Keywords** Healthcare · Telemedicine · Mouth disease · Coronavirus infection · Online service

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✉ Paulo Sérgio da Silva Santos  
paulosss@fob.usp.br

Verônica Caroline Brito Reia  
veronicabr@usp.br

Maria Gabriela Robles-Mengoia  
magabrielarobles@usp.br

Bernardo da Fonseca Orcina  
bernardoforcina@usp.br

Milenka Gabriela Quenta-Huayhua  
milenkaquenta@usp.br

Mailon Cury Carneiro  
mailoncury@usp.br

Brenna Rodrigues Manzano  
brennamanzano@usp.br

Anderson Prestes  
anderprestes@fob.usp.br

Cássia Maria Fischer Rubira  
rubira@fob.usp.br

<sup>1</sup> Department of Surgery, Stomatology, Pathology, and Radiology, School of Dentistry, University of São Paulo, Alameda Octávio Pinheiro Brisola, 9-75, BauruBauru 17012-901, Brazil

<sup>2</sup> Department of Prosthodontics and Periodontics, Bauru School of Dentistry, University of São Paulo, Bauru, Brazil

<sup>3</sup> Clinical Center Research, Bauru School of Dentistry, University of São Paulo, Bauru, Brazil

## Introduction

In mid-March 2020, the World Health Organization declared the outbreak of the novel coronavirus disease 2019 (COVID-19) as a pandemic. Social isolation was one of the main strategies proposed to control it. The confinement of the population and the impact of the outbreak on healthcare systems have disrupted the routine care required by COVID-19-negative patients [1].

Dental practice involves a high risk of infection by the severe acute respiratory syndrome coronavirus 2 since the procedures performed require close approaches to the nasopharyngeal and oropharyngeal regions, which are directly linked to the pathophysiology of COVID-19. In addition, the frequent contact with saliva, blood, and other body fluids of patients; handling of sharp instruments; and production of aerosols also increase the risk of infection [2]. Given these factors, dental surgeons are the health professionals most vulnerable to disease infection [3, 4].

As a preventive measure, most countries suspended elective dental care [5]. Brazil was no exception, and both the Federal Council of Dentistry and the National Health Surveillance Agency recommended limiting dental care to urgent and emergency cases [4, 6]. With the suspension of routine services, a considerable number of the population has presented with acute oral changes without proper treatment [7].

Oral health has a key impact on the quality of life of immunosuppressed patients, such as those receiving organ and tissue transplants and those who are or have been receiving treatment for cancer [3], since the dental support to these individuals mitigates the repercussions arising from the therapies for these diseases [8], a dental follow-up being extremely important before the start of cancer therapy, during cancer therapy, and post-cancer therapy, to minimize the acute and late effects provided mainly by head and neck radiotherapy and antineoplastic chemotherapy. The suspension of clinical care and lack of dental care for these individuals may exacerbate the adverse effects of medical treatments, thus causing pain and discomfort in the mouth. Therefore, dental surgeons are increasingly seeking alternative approaches to provide supportive care to these groups of patients to reduce the impact of oral problems on their quality of life.

Teleconsultation is one of the tools used for distance care during the pandemic in various areas of health, using applications and social media [9]. While it facilitates communication and guidance between the professional and the patient, this practice has not yet been established by the regulatory authorities of dentistry. Therefore, we aimed to identify the impact of the absence of dental support on

patients who were being treated or had been treated for cancer and who had their clinical dental care interrupted by the COVID-19 pandemic.

## Methods

Approval was obtained from the Human Research Ethics Committee of the Bauru School of Dentistry, University of São Paulo (CAAE: 39,316,520.2.0000.5417). The procedures used in this study adhered to the tenets of the Declaration of Helsinki.

## Sample

This cross-sectional study was conducted at the Clinical Research Center (CRC) of Bauru School of Dentistry of the University of São Paulo (FOB/USP), which specializes in the care of systemically compromised individuals in the areas of oncology, hematopoietic stem-cell transplantation, and solid organ transplants. Dental care and follow-up are performed before the start of cancer therapy, during cancer therapy, and post-cancer therapy, to minimize the acute and late effects provided mainly by head and neck radiotherapy and antineoplastic chemotherapy. The convenience sample consisted of 280 patients registered in the electronic system and treated at the CRC during 2019. This study included individuals older than 18 years of age with a history of cancer who underwent dental treatment at the CRC of FOB/USP in 2019 but did not receive care in 2020 owing to the pandemic.

Individuals who could not communicate via email or text messaging application (owing to social distancing) were excluded. From the institution's updated phone list, the 280 patient contacts were randomly divided by Microsoft Office Excel 2016 (Microsoft Corporation; Redmond, WA, USA) into five groups, each containing the name and phone number of 56 patients. Five of the nine authors received the list of patients from one of the five groups being group 1 (V.C.B.R.), group 2 (M.G.R.M.), group 3 (B.F.O.), group 4 (M.G.Q.H.), and group 5 (M.C.C.). Phone calls were made to each individual to check their health status, availability, and possibility of participating in this study. Those who could participate were asked to respond to an online questionnaire that was sent via email or the text message application. Before sending the questionnaire, patients were informed about which questions would be carried out, so that any doubts could be resolved in this initial period. In addition, the team emphasized that if they had questions while filling in the responses, they could contact any team

member before submitting them. This information was gathered from November 2020 to January 2021.

## Questionnaire

A two-part online questionnaire was designed, elaborated, and sent by the authors via Google Forms platform: (I) sociodemographic and health data and (II) a structured questionnaire (along with an informed consent form). The first part included sex, age, occupation, underlying disease (location), and type of systemic and/or antineoplastic treatment. The second part comprised previously established structured questions and questions about their overall oral problems when they had no access to dental care during the COVID-19 pandemic. The questionnaire was pre-tested among the authors three times, with submission by email or text message to verify that it was recording responses in a secure and confidential manner.

## Data analysis and statistical

The individuals' response record was jointly verified by all the authors through the Google Forms platform tabulated using Microsoft Office Excel 2016 (Microsoft Corporation; Redmond, WA, USA) spreadsheets. Subsequently, individuals receiving treatment and those already treated for cancer were divided into two groups to perform analyses and comparisons. Descriptive statistical analyses were performed on the data obtained from the open-ended questions, and Fisher's tests in IBM SPSS 21.0 software (IBM; Armonk, New York, USA) and chi-square ( $\chi^2$ ) tests in Jamovi Project 2020 (version 1.2) and R Core Team 2019 software (version 3.6) were used for the questions in which the answers were *yes* or *no*. Frequency tables with percentages and graphs were used to verify the possible associations between the variables evaluated. Significance was set at  $p < 0.05$ .

## Results

### Sociodemographic and health data

A total of 280 patients with a history of oncologic disease were recruited through the CRC's phone book. Of these, it was possible to establish remote contact prior to sending the questionnaire with the 151 individuals who agreed to participate in the online survey. The remaining 129 individuals did not participate in the survey for the following reasons: 42 had died during the pandemic; 8 were minors; 19 did not answer the calls after several attempts; 9 answered, but the number did not correspond to the individual; 33 phone numbers could not receive calls or were outside the coverage area; 15 did not agree to participate in the survey; and 3 were bedridden/inpatients. In

the final sample, 104 individuals completed the questionnaire through the Google Forms platform, and 75 (72.1%) were women. Among the women, 45 (60.0%) were receiving antineoplastic treatment, and 30 (40.0%) had already been treated. Among the men, 15 (51.7%) were receiving antineoplastic treatment, and 14 (48.3%) had already been treated. Forty-seven (45.2%) individuals were older than 60 years old, 43 (41.3%) were 46–60 years old, 8 (7.7%) were 31–45 years old, and 6 (5.8%) were 18–30 years old. Forty-eight (46.2%) were retired; 18 (17.3%) were housekeepers; and 38 (36.5%) had other vocations, such as teaching, working in the public area, practicing law, hairdressing, and masonry. Breast cancer was the most prevalent cancer, which affected 35 (33.7%) patients. As for the antineoplastic treatments, 89 (85.6%) received chemotherapy and 43 (41.3%) received radiotherapy of the head and neck (Table 1). Furthermore, 64 (61.5%) had no complaints regarding their general health. In addition, eight (7.7%) patients had a confirmed diagnosis of COVID-19, with mild symptoms in six patients (5.8%) and severe symptoms in two (1.9%). Regarding general health, 57 (54.8%) had a worsened status because of a lack of dental care.

### Oral complications during the pandemic

When questioned about the difficulty in performing daily activities caused by problems in the teeth and/or mouth, 74 people (71.1%) said that they did not experience any difficulties. In contrast, 51 (49.0%) patients sought dental care during the pandemic, and 30 (58.8%) of these were still undergoing oncologic treatment. Forty-two (40.4%) individuals postponed their treatments other than dental care; however, 93 (89.4%) said their teeth brushing frequency did not vary throughout the pandemic and social isolation. In addition, 94 (90.4%) individuals did not receive any type of supervision or monitoring via telephone during the pandemic; of these, 56 (53.8%) were still receiving oncology treatment (Table 2).

Regarding the oral problems of individuals who were left without dental care during the COVID-19 pandemic, there was no significant difference between those who were and were not being treated for cancer. Regarding oral problems that arose during the pandemic in the 104 cancer survivors, the most commonly reported was dental pain when eating hot or cold food or drinks ( $n = 59$ , 57.0%) ( $p = 0.712$ ), followed by muscle pain ( $n = 56$ , 53.8%) ( $p = 0.797$ ) and difficulties when chewing ( $n = 53$ , 51.0%) ( $p = 0.069$ ). In contrast, the least reported were the presence of purulent secretion ( $n = 31$ , 29.8%) ( $p = 0.716$ ), spontaneous gingival bleeding ( $n = 33$ , 29.8%) ( $p = 0.302$ ), and spontaneous dental pain ( $n = 37$ , 35.6%) ( $p = 0.393$ ). However, even though these were reported by the individuals, the rates of oral problems were non-significant (Table 3).

**Table 1** Sociodemographic, occupation, and data about cancer

		Individuals under treatment ( <i>n</i> = 60) <i>n</i> (%)	Individuals already treated ( <i>n</i> = 44) <i>n</i> (%)	
Sex	Women	45 (75.0%)	30 (68.2%)	
	Men	15 (25.0%)	14 (31.8%)	
Age	Between 18 and 30 years old	1 (1.7%)	5 (11.4%)	
	Between 31 and 45 years old	7 (11.7%)	1 (2.3%)	
	Between 46 and 60 years old	24 (40%)	19 (43.2%)	
	Over 60 years old	28 (46.7%)	19 (43.2%)	
	Occupation	Retired	31 (51.7%)	17 (38.6%)
	Housekeeper	10 (18.3%)	8 (18.2%)	
	In exercise of profession	19 (31.0%)	19 (43.2%)	
Baseline disease (location)	Breast	25 (41.7%)	10 (22.7%)	
	Head and neck	11 (18.3%)	18 (40.9%)	
	Oncohematologic	8 (13.3%)	11 (25.0%)	
	Digestive tract	6 (10.0%)	1 (2.3%)	
	Female reproductive system	5 (8.3%)	2 (4.5%)	
	Kidney transplant recipients	2 (3.3%)	0 (0.0%)	
	Prostate	1 (1.7%)	0 (0.0%)	
	Kidney cells	1 (1.7%)	0 (0.0%)	
	Pancreas	1 (1.7%)	0 (0.0%)	
	Sarcoma	0 (0.0%)	1 (2.3%)	
	Osteosarcoma	0 (0.0%)	1 (2.3%)	
	Antineoplastic treatment	CT:	52 (86.7%)	37 (84.1%)
		Yes		
No		8 (13.3%)	7 (15.9%)	
RT of the head and neck:		16 (26.7%)	27 (61.4%)	
Yes				
	No	44 (73.3%)	17 (38.6%)	

CT chemotherapy, RT radiation therapy, *n* number of patients, % percentage

## Discussion

Most participants were women, and breast cancer was the most prevalent type of cancer, in line with the estimates and projections of this cancer both in the southeastern region of Brazil and globally [10, 11]. Chemotherapy was the most prevalent treatment in both groups of patients. For the 52 (50%) who were still undergoing antineoplastic treatment, the need for monitoring by a specialized dental service to mitigate the acute complications of this treatment was highlighted [12]. Similarly, patients who were undergoing head and neck radiotherapy with the likely demand for the acute effects of radiotherapy [13] and even those who had already received this therapeutic modality required consistent monitoring to avoid or treat the late manifestations of radiotherapy treatment [14].

Globally, numerous governments have mobilized their forces to mitigate COVID-19, thus making the enforcement of non-pharmacological interventions, such as keeping the population at home and closing non-essential services,

indispensable. Furthermore, these large-scale measures were effective in reducing the spread of the virus [15], given that only eight individuals in the study tested positive for the disease. In contrast, some public dental care services had to be closed, which caused a decrease in pediatric dentistry services, prosthetic rehabilitation treatments [16], and oral pathology and medicine services [17, 18].

Owing to social isolation, remote work in some service sectors, and the dismissal of employees from companies that needed to reduce costs, some individuals experienced decreases in or a loss of their income, which possibly aggravated the negative effects on oral health. Most participants receiving antineoplastic treatment were retired (52%). Among those who had completed therapy, most were currently active in their professions (43%). Nutrition and oral hygiene, as well as other behavioral changes such as smoking, were adapted to the new reality of patients due to a lack of dental care and the onset of oral problems during the pandemic [19]. In times of epidemics, people experience the fear of becoming infected with the virus/

**Table 2** Previously established structured questions related to the general health status of individuals who did not access

		Individuals under treatment ( <i>n</i> =60) <i>n</i> (%)	Individuals already treated ( <i>n</i> =44) <i>n</i> (%)	<i>p</i> -value
Main complaint, regarding health in general, in times of pandemic and social isolation	Yes	22 (36.7%)	18 (40.9%)	0.666
	No	38 (63.3%)	26 (59.1%)	
Confirmed diagnosis for COVID-19	Yes	4 (6.7%)	4 (9.1%)	0.647
	No	56 (93.3%)	40 (90.9%)	
Worsening of general health due to lack of dental care	Yes	30 (50.0%)	27 (61.4%)	0.250
	No	30 (50.0%)	17 (38.6%)	
Difficulties performing your daily activities because of problems with your teeth or mouth	Yes	15 (25.0%)	15 (34.1%)	0.312
	No	45 (75.0%)	29 (65.9%)	
Sought dental treatment	Yes	30 (50.0%)	21 (47.7%)	0.819
	No	30 (50.0%)	23 (52.3%)	
Postponed any treatment other than dental treatments	Yes	24 (40.0%)	18 (40.9%)	0.926
	No	36 (60.0%)	26 (59.1%)	
Decreased frequency of tooth brushing	Yes	7 (11.7%)	4 (9.1%)	0.673
	No	53 (88.3%)	40 (90.9%)	
Dental supervision or monitoring via telephone or virtual methods (telephone assistance)	Yes	4 (6.7%)	6 (13.6%)	0.234
	No	56 (93.3%)	38 (86.4%)	

COVID-19 coronavirus disease 2019, *n* number of patients, % percentage Fisher's test and chi-square test

disease, which results in anxiety, stress, and depression [20]. Thus, despite their demands for dental care, the population remained in social isolation [21]. This fact could explain why only 49.0% of the sample (51 patients) sought dental care services over the year, even if 59 patients (56.7%) reported feeling “tooth pain when eating hot or cold food and/or drinks.”

The COVID-19 pandemic has led to increased rates of anxiety (31.9%) and depression (33.7%) in the normoreactive population [22]. In contrast, in patients undergoing cancer treatment, trait and state anxiety were found in 59.1% and 48.4%, respectively [23]. An aggravating factor generated by stress is periodontal disease, which was referred to as “tooth mobility” in the questionnaire. The changes in the patients' supporting tissues may have made them flag this issue. The frequency of periodontal disease in individuals exposed to stress was 15–36% higher than that in healthy individuals [24]. Therefore, in our sample, 48 individuals (46.1%) reported tooth mobility, which could suggest some periodontal complications.

Similarly, both temporomandibular dysfunction and bruxism (sleep or wakefulness) can be caused by psychosocial factors, such as anxiety, stress, depression, and catastrophizing, which are commonly present in patients with cancer [25–28]. This fact could justify why more than half of the sample reported “difficulties when chewing” and “muscle pain in the jaw area when waking up.” Moreover, it has already been discussed in the literature that patients experienced an intensification of bruxism and temporomandibular dysfunction symptoms during the pandemic [29].

The accessibility of the Internet and the development of new technologies may favor the use of tools for remote care during the pandemic, such as telesupport in dentistry. It is relevant, given the changes in the provision of health services [30]. From this perspective, patients had a novel experience in terms of aid when the team employed remote technologies to approach this research. Most individuals, including those receiving antineoplastic treatment and those who had already been treated, reported not having received any type of supervision or dental monitoring via telephone or virtually (telesupport) before being contacted by our team, thus highlighting the novelty of the teleconsultation tool in society [31].

Data from a previous study reported that patients' quality of life and emotional functioning were not affected during the pandemic [32], which corroborates our finding that general health-related quality of life (QoL) did not change during the pandemic for most individuals. As reported by several patients during the teleconsultation, the greater proximity to family members during the pandemic made them feel safe despite their oral conditions. As they form a high-risk group, this emotional closeness helped most people feel well cared for, thus fostering a good quality of life even in the absence of dental support [33]. However, in 20% of our sample, there was a worsening in the quality of life during the pandemic, thereby revealing another reality of the impact of COVID-19 on this group of patients [34].

A lack of regular dental visits and poor oral hygiene has been associated with poorer survival rates in patients with cancer [35]. It is noteworthy in this study that the two groups

**Table 3** Oral problems that appeared during the last months since the pandemic began and social isolation was required

		Individuals under treatment (n = 60) n (%)	Individuals already treated (n = 44) n (%)	p-value
Mouth sores	Yes	21 (35.0%)	19 (43.2%)	0.793
	No	39 (65.0%)	25 (56.8%)	
Difficulty chewing	Yes	26 (43.3%)	27 (61.5%)	0.069
	No	34 (56.7%)	17 (38.6%)	
Difficulty swallowing	Yes	19 (31.7%)	21 (47.7%)	0.201
	No	41 (68.3%)	23 (52.3%)	
Decreased amount of saliva	Yes	25 (41.7%)	22 (50.0%)	0.141
	No	35 (58.3%)	22 (50.0%)	
Impaired eating	Yes	24 (40.0%)	20 (45.5%)	0.567
	No	36 (60.0%)	24 (54.5%)	
Difficulty resting because of problems with teeth and/or mouth	Yes	25 (41.7%)	20 (45.5%)	0.577
	No	35 (58.3%)	24 (54.5%)	
Spontaneous gingival bleeding	Yes	18 (30.0%)	15 (34.1%)	0.302
	No	42 (70.0%)	29 (65.9%)	
Gingival bleeding induced during tooth brushing	Yes	23 (38.3%)	23 (52.3%)	0.293
	No	37 (61.7%)	21 (47.7%)	
Dental pain when eating hot or cold food or drinks	Yes	32 (53.5%)	27 (61.4%)	0.712
	No	28 (46.7%)	17 (38.6%)	
Spontaneous dental pain	Yes	22 (36.7%)	15 (34.1%)	0.393
	No	38 (63.3%)	29 (65.9%)	
Purulent secretion	Yes	16 (26.7%)	15 (34.1%)	0.716
	No	44 (73.3%)	29 (65.9%)	
Tooth mobility	Yes	29 (48.3%)	19 (43.2%)	0.564
	No	31 (51.7%)	25 (56.8%)	
Muscle pain in the jaw area on waking	Yes	32 (53.5%)	24 (54.5%)	0.797
	No	28 (46.7%)	20 (45.5%)	
Bad breath	Yes	24 (40.0%)	18 (40.9%)	0.881
	No	36 (60.0%)	26 (59.1%)	

n number of patients, % (percentage) Fisher's test and chi-square test

of patients interviewed did not report a reduced frequency of toothbrushing in this period. Probably, the oral health education activities performed by specialized professionals [36] in the care of these patients made individuals aware of the importance of performing oral hygiene routinely, thus resulting in the reduction of oral damage during one of the largest health crises worldwide.

A limitation of this study is the possibility of selection bias; although we selected adult patients who could communicate via email or messaging applications, it was not possible for all individuals who agreed to participate to answer the questionnaire through the Google Forms platform because some reported having difficulty with the application. Forty-seven patients could not complete the questionnaire, and the data from this group of patients may have influenced the results. Furthermore, as the questions were open-ended, there may have been biased interpretations. We do not know whether the questionnaire and the application used are the best ways to collect this information. In future research, it would be

interesting to explore other types of tools that can obtain additional information and that are easy to use for patients of any age group.

In conclusion, telephone support in dentistry and the use of digital tools was a practical and useful way to follow-up with patients with cancer during the pandemic. However, it cannot be stated that the absence of dental support in patients with cancer during the COVID-19 pandemic negatively impacted oral problem rates.

**Author contribution** Conceptualization: [Verônica Caroline Brito Reia, Maria Gabriela Robles, Bernardo da Fonseca Orcina, Milenka Gabriela Quenta-Huayhua, Mailon Cury Carneiro]; methodology: [Verônica Caroline Brito Reia, Maria Gabriela Robles, Bernardo da Fonseca Orcina, Milenka Gabriela Quenta-Huayhua, Mailon Cury Carneiro; Brena Rodrigues Manzano, Anderson Prestes, Cássia Maria Fischer Rubira, Paulo Sérgio da Silva Santos]; statistical analysis [Brena Rodrigues Manzano]. All the authors reviewed and approved the final version of the manuscript and certified that they comply with the ethical guidelines for publishing in the Supportive Care in Cancer.

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**Data availability** All data and material are available on reasonable request.

**Code availability** Not applicable.

## Declarations

**Ethics approval and consent to participate** This study was approved by the Human Research Ethics Committee of the Bauru School of Dentistry, University of São Paulo (CAAE: 39316520.2.0000.5417), and the procedures used adhered to the tenets of the Declaration of Helsinki.

**Consent for publication** Patients provided written informed consent regarding publishing their data with the assurance that identifying details would be removed.

**Competing interests** The authors declare no competing interests.

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