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Patient care in the restorative clinic of a public dental school after COVID-19 lockdown

Kennedy Santana de Macedo[1], Alana Cristina Machado[1], Maria Angela Pita Sobral[1*]

[1] Restorative Dentistry Department, School of Dentistry, University of São Paulo (FOUSP), São Paulo, SP, Brazil.

Corresponding author:
Maria Angela Pita Sobral
Address: Department of Restorative Dentistry, School of Dentistry, University of São Paulo - Av. Prof. Lineu Prestes, 2227 - Cidade Universitária, São Paulo - SP, 05508-000.
E-mail: mapsobra@usp.br
Tel: +55 1126488014

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Aim: This study, with the aim of checking some of the changes in patients' daily habits and their reasons for needing restorative treatment was conducted at a public university immediately on return to attendance after the COVID-19 pandemic lockdown. **Methods:** This survey consisted of interviews held by applying 2 questionnaires to students and patients. A single researcher collected data in all the restorative dentistry clinics at the university after the return to face-to-face activities in the period between 02/02/2021 and 07/30/2021. Data obtained by means of the questionnaires were submitted to descriptive analysis. **Results:** Ninety (90) participants answered the patient questionnaire. When considering possible associations between being in social isolation or not, significant values were found for changed type of diet (p=0.0011), frequency of eating (p=0.011) and toothbrushing (p=0.034). Data about 417 restorations were collected and among the reasons for restorative intervention, 33.03% were restoration replacement, 31.87% treatment of primary caries and 24.40% of dental wear/non-carious lesions. **Conclusion:** Patients who isolated themselves during the pandemic tended to change their eating habits and frequency of oral hygiene. Toothache was the main reason for seeking dental treatment and the replacement of pre-existing restorations was the main reason for restorative treatments.

Keywords: COVID-19. Coronavirus. Dental clinics. Operative dentistry. Universities.

Introduction

On March 11, 2020, the World Health Organization (WHO) declared a pandemic status, making the outbreak of the new coronavirus (COVID-19) a major public health challenge[1-6]. Due to its high rate of transmissibility and in order to reduce the number of people infected with the virus, preventive measures were implemented around the world, the main ones being lockdown or social distancing[3-7].

Considering the pandemic scenario, the authors speculated about what the conduct of patients would be in relation to oral health in this critical period of time. Perhaps they would be more careful because of the fear of visiting a dental office during the pandemic and this would, therefore, lead to patients developing fewer or no oral pathologies. Or an opposite situation might be found, in which patients might neglect their oral health because they were at home without social contact, or their smile would be covered by a face mask whenever they needed to be in public places in person, consequently they would be more likely to develop oral pathologies.

Previous studies have investigated the reasons for placement and replacement of direct restorations[8-14] and have shown that primary caries was the main reason for performing restorations. Wilson et. al. [8] (1997) revealed that over half of direct restorative practice consisted of replacing existing restorations. Replacements of pre-existing restorations occur mainly due to secondary caries, and to a lesser extent, due to restorative material failure, such as, for example, marginal degradation, fractures and loss of anatomical shape[8-14]. Moreover, in a study conducted in Brazilian's private clinics, Braga et al.[12] (2007) reported that they found similar results, and the second ranked reason for performing restorations was non-carious lesions, and the patients' desire for the use of more aesthetic material, such as composite resin, was the main reason for replacement of amalgam restorations[12].

There are few studies in the literature that have proposed to evaluate the profile of patients who receive care at dental university clinics, specifically where restorations placed with direct materials are concerned. The results were similar to those found in studies conducted in private clinics. Primary caries lesions were the main reasons for performing restorations and the main reason for replacing pre-existing restorations was the presence of secondary caries[9,13].

In view of the possibility of changing the patient's behavioral profile, the advances in public oral health policies and considering the context of the COVID-19 pandemic, the aim of this study was to check some of the changes in daily habits of patients who sought dental treatment at the Dentistry School of the University of São Paulo, in addition to verifying the reasons that caused the need for restorative treatment, immediately on return to face-to-face activities after the COVID-19 pandemic lockdown.

Material and methods

Experimental design and ethical aspects

This clinical, observational, analytical, cross-sectional, single-center study was conducted at the School of Dentistry of the University of São Paulo after approval by the local Research Ethics Committee (process number 4.520.017/CAAE 40941820.9.0000.0075). This survey consisted of interviews with application of two questionnaires: 1. to students enrolled in the clinical discipline of restorative dentistry and, 2. to patients who were treated by these students. A single researcher collected the data at all the clinics available at the university after the return to face-to-face activities in the period between 02/02/2021 and 07/30/2021.

Sample and survey

To qualify students for answering the questionnaire, they had to meet the following inclusion criteria: they had to be enrolled in the Restorative Dentistry 2 discipline; have performed restoration(s) in their patients and had to accept participation in the research. For patients, the inclusion criteria were being over 18 years old and accepting to participate in the research.

After signing the term of free and informed consent, 78 pairs of students and 90 volunteer patients who met the inclusion criteria and accepted to participate in the research answered the questionnaires.

The student questionnaire, based on previous studies[12], was applied in all clinics on the conclusion of the restorative procedure, and it took approximately 2 minutes to answer. The patient questionnaire was applied only once during the entire study, in the waiting room while the patient was waiting to be called. On average, patients took approximately 8 minutes to answer all the questions. All patients and students that met the inclusion criteria answered the questionnaire.

Statistical analyses

The data obtained by means of the questionnaires were tabulated in spreadsheets and submitted to descriptive statistical analysis that allowed the researchers to discuss the impact of the pandemic on the patients' oral health-related behaviors and whether this impact had any influence on the service profile of the restorative dentistry clinic.

To compare some of the data collected in the two questionnaires obtained, contingency tables were constructed to enable the relationship between two sets of variables to be understood. The chi-square test ($p<0.05$) was applied to assess statistical significance and Fisher's Exact Test was applied to some data ($p<0.05$).

Results

Patients' age varied between 18 and 72, with a mean age of 43 years; 52% were male and 48% female. Among the participants 14% were students, 11% retired, 10% unemployed and 65% reported that they had a profession.

As regards the reasons for seeking dental care at the university, 123 reasons were reported by the participants, considering that among the 90 participants, some had more than one reason. The main reason for seeking care was pain (22.8%); waiting for a long time for treatment (15.4%); aesthetics (14.6%); tooth/restoration fracture (13.8%); presence of cavity (11.4%); indication of another discipline (11.4%) and return consultation (10.6%) (Figure 1).

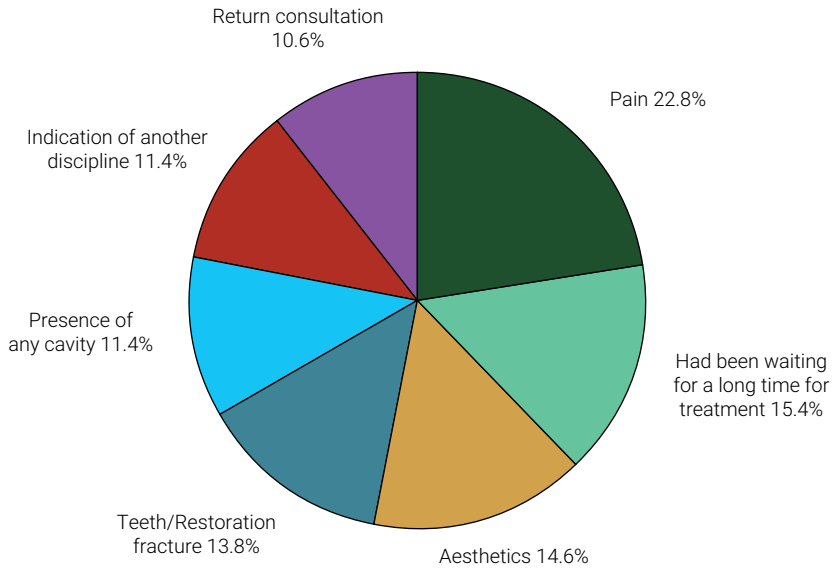

Figure 1. Distribution (%) of factors that led to patients seeking dental treatment at the dental clinic of the School of Dentistry of the University of São Paulo.

Distribution of patient responses related to COVID-19, eating, oral care, and socioeconomic factors during the pandemic are shown in Table 1.

Table 1. Distribution of patients' answers related to COVID-19, eating, oral care, and socioeconomic factors during the pandemic.

	N	%
Did you have COVID-19?		
Yes	10	11.11%
No	80	88.89%
Did any close family member have COVID-19?		
Yes	42	46.67%
No	48	53.33%
Did you practice social isolation?		
Yes	66	73.33%
No	18	20.00%
Just a few days (less than 30 days)	6	6.67%

Continue

Continuation		
Did your pattern of eating behavior change during the pandemic?		
Yes	55	61.11%
No	35	38.89%
Did your frequency of eating change during the pandemic?		
Increased	47	52.22%
Decreased	13	14.44%
Continued the same	30	33.33%
Did your frequency of toothbrushing change during the pandemic?		
Increased	19	21.11%
Decreased	16	17.78%
Continued the same	55	61.11%
Did you have toothache during the pandemic?		
Yes	37	41.11%
No	53	58.89%
Did any tooth or restoration fracture during the pandemic?		
Yes	44	48.89%
No	46	51.11%
Did you have to seek dental emergency care during the pandemic?		
Yes	33	36.67%
No	57	63.33%
Did you face financial difficulty?		
Yes	55	61.11%
No	35	38.89%
Have you avoided going back for/ or seeking dental treatment?		
Yes	24	26.67%
No	66	73.33%
Were you worried about your dental aesthetic appearance?		
Yes	62	68.89%
No	28	31.11%

For statistical purposes, we compared patients that did practice isolation with those that did not. In the group "No = did not practice isolation", we included patients who had not practiced isolation and patients who did so, but within a period of less than 30 days (Table 2.).

Table 2. Frequency of the outcomes evaluated considering social isolation.

Outcome Evaluated	Social isolation		p-value
	Yes (n = 66)	No (n = 24)	
Changed type of eating	n = 47 (71.21%)	n = 8 (33.33%)	0.0011
Frequency of eating	n = 49 (74.24%)	n = 11 (45.83%)	0.011
Frequency of toothbrushing	n = 30 (45.45%)	n = 5 (20.83%)	0.034
Toothache	n = 27 (40.91%)	n = 10 (41.67%)	0.95
Tooth or restoration fracture	n = 33 (50.00%)	n =11 (45.83%)	0.73

When applying statistics to these data, patients in social isolation changed their type of eating pattern to a significantly greater extent than patients who did not remain in social isolation (p=0.0011), as well as the frequency of eating (p=0.011) and frequency of tooth brushing (p=0.034).

There was no significant difference for toothache (p=0.95) and tooth or restoration fracture (p=0.73) between those who were in social isolation and those who were not.

From the student questionnaire were collected data about 417 restorative procedures; that is, 417 teeth were submitted to intervention at the direct dentistry clinic during the period of data collection. Relative to these 417 teeth a total of 433 reasons were given to justify the restorative procedure.

It is worth mentioning that of these 433 reasons, 143 were replacements, 101 were composite resin replacements with 147 reasons that justified the intervention; 21 amalgam replacements that had 23 reasons for the intervention and 21 replacements of temporary restorations by definitive types, as shown in Table 3. The Table also shows the distribution (%) of the following topics: teeth that underwent the procedures, cavities (Black's classification), and restorative material used.

Table 3. Distribution of students' answers related to the restorative procedure they performed

	n	%
Tooth group		
Incisor	107	25.66%
Canine	41	9.83%
Premolar	119	28.54%
Molar	150	35.97%
Black's cavity classification		
I	115	27.58%
II	106	25.42%
III	54	12.95%
IV	35	8.39%
V	93	22.30%

Continue

Continuation		
Restorative material used		
Composite resin	375	89.93%
Amalgam	4	0.96%
Glass ionomer cement	34	8.15%
Others	4	0.96%
Reasons for restorative intervention	433	
Restoration replacement	143	33.03%
Primary caries	138	31.87%
Dental wear/non-carious lesion	110	25.40%
Dental fracture	28	6.47%
Others	14	3.23%
Replacements	143	
Composite resin	101	70.63%
Amalgam	21	14.69%
Temporary restorations for definitive ones	21	14.69%
Reasons for composite resin replacement	147	
Secondary caries	55	37.41%
Material wear	21	14.29%
Inappropriate anatomical shape	20	13.61%
Fracture of the restoration	19	12.93%
Discoloration of the restoration	13	8.84%
Displacement of restoration	7	4.76%
Marginal discoloration	6	4.08%
Pain/Sensitivity	6	4.08%
Reasons for amalgam replacement	23	
Fracture of the restoration	15	65.22%
Secondary caries	6	26.09%
Displacement of the restoration	1	4.35%
Inappropriate anatomical shape	1	4.35%

Discussion

It is well known that due to COVID 19 pandemic many daily habits and social conditions were altered and one of these was the recommendation of practicing social isolation. This study raised important information regarding the impacts of this condition on restorative dentistry procedures to help the scientific community and clinical dentists to recognize its possible after effects and to provide guidance to avoid an increase in oral diseases.

Quarantine or social isolation is an unfamiliar and unpleasant experience that involves separation from friends and family, and a change in usual everyday routines[15]. The

majority of patients in this survey, 73.33%, were concerned about the social isolation proposed as a health measure to contain the virus. They complied with this recommendation and reported that they did not have COVID-19, although over 50% of the patients knew a close family member who had the disease.

Patients who complied with social isolation reported more changes in daily habits such as eating pattern, frequency of eating and tooth brushing, when compared with those who were not isolated. With regard to change in eating habits, our results were in agreement with those of a systematic review[16] that suggested that people exposed to the preventive measures of restricting physical contact during the COVID-19 pandemic may have experienced changes in food intake from several aspects such as increase in consumption of both healthy and unhealthy foods, restrictive eating behaviors, uncontrollable eating, behavior of eating outside of the home, and/or binging food from outside into the home[16]. Whereas relative to brushing frequency, previous studies have shown that the subjects were brushing their teeth fewer times per day due to the use of masks, and people were less concerned about oral hygiene[17].

As regards toothache, social isolation did not seem to be an impact factor, since both patients who were isolated and those who were not isolated had toothache in the same proportion, with no statistical differences. However, toothache was the most prevalent condition for patients seeking dental care, as has also been reported by previous studies in which the most frequently mentioned reason for seeking dental treatment during the COVID 19 pandemic period was toothache[17,18].

Among the participants, only 37% reported having sought emergency dental care during the pandemic. It can be speculated that this number was not higher because patients were afraid of exposing themselves to the dental environment or leaving home during the period of social isolation[19]. This number could also have been attributed to the financial difficulty faced by the population during the pandemic[19,20], which prevented them from seeking care by private professionals, since the free service at the university was suspended for a long period during the pandemic.

Financial difficulty was confirmed by over half of the patients in the sample collected. 61% of the patients reported having faced financial difficulties, which also impacted the access to health services[20]. The university clinic serves a more socioeconomically vulnerable population, which may explain the main reasons for seeking care, such as pain and dental or restoration fractures.

Something intriguing that emerged from the survey was the fact that 69% of participants claimed that they were concerned about dental aesthetics during the pandemic. Theoretically, people would end up caring less about this factor since they were isolated and when in public they would be wearing a facial mask, however, even in the pandemic scenario, aesthetics was a concern. This result corroborated the findings of previous studies that showed that even with the use of face masks, aesthetic factors such as tooth color followed by tooth alignment were the main complaints of the subjects, as had occurred before the COVID 19 pandemic period[17,21,22].

The results found in this survey are of great concern because an unbalanced diet can represent a cariogenic or acidic diet. When this is associated with deficient tooth-

brushing and reduced opportunity to seek dental care, the dietary factor may increase the risk for oral diseases such as dental caries, erosive tooth wear, gingivitis and periodontal infection and could perhaps change the profile of the restorative dentistry procedures performed in the dental clinic.

Considering the factors that determined the reason for the restorations, the main factor would appear to be the replacement of restorations, which has become an increasing part of the day-to-day work at the dental clinic. This topic was also reported in a recent literature review that included studies with similar methodology about the reasons for placement and replacement of direct restorations. The research was last updated in 2017[14] and demonstrated an increase in the percentage of restoration replacements since 1981 up to the present time.

As regards the replacement of composite resin restorations, the main reasons for replacement were the recurrence of caries (37.41%); material wear (14.29%); inadequate anatomical shape (13.61%); restoration fracture (12.93%); restoration discoloration (8.84%); displacement of the restoration (4.76%); marginal discoloration (4.08%) and pain/sensitivity (4.08%). In other studies, including systematic reviews, the literature has also pointed out that the main reason for replacing composite resin restorations was the recurrence of caries followed by material fracture and aesthetics[23,24].

In our results, there were no statistical differences between patients who were in social isolation and those who were not, relative to the factor tooth/restoration fracture (p=0.73), since 44 patients (48.89%) reported dental/restoration fractures. Although the literature has shown that the high rate of anxiety due to the COVID-19 pandemic led to the increase of bruxism[25-27], an oral condition that may have dental and restorations fractures[28] as consequences. In this study, only 54 restorations were related with fractures: 28 teeth, 19 composite resin restorations and 15 amalgam restorations. Considering the change in eating pattern, frequency of eating and toothbrushing, there was statistical difference for those who were isolated and those who were not, and these factors can represent a clinical impact on carious lesions. This fact could also explain why the main reasons for placement and replacement of restorations were primary or secondary caries, and not fractures.

As far as the restorative material was concerned, composite resin was the most frequently used for restorations (89.93%), followed by Glass Ionomer Cement (8.15%), Amalgam (0.96%) and Others (0.96%). Composite resins with better mechanical characteristics have been developed, consequently they are materials with good clinical performance. The adhesive and aesthetic characteristics combined with the best mechanical behavior of the composite resins developed in recent years, have made them the direct restorative material of choice[24,29].

In view of the results observed, some difficulties faced during the research period could be pointed out, such as the fact that the university clinics in general only attended a reduced number of patients and many of the requested and scheduled appointments made by patients could not take place. At the above-mentioned clinics, consultations for clinical care were restricted to a single patient per stu-

dent pair per day. The time of clinical care duration was reduced. Many patients were rotated through 2 or 3 different classes, in other words, the same patient was being treated by several different students. There was no prior triage due to the pandemic and several patients who arrived for treatment by the discipline were referred to another pair of students or class. These facts were the reality in dental clinics all over the world since dentistry was profoundly impaired by the pandemic scenario and the consultation model that was used could not be sustained until there was improvement in COVID-19 pandemic situation, which probably resulted in impact on patients' oral health. In addition, it could explain some important limitations of this study such as the impossibility of conducting a pilot study, the low number of attendances permitted, and low number of responses obtained in the patients' questionnaires (90 responses) for the period proposed for the survey.

In conclusion, patients who isolated themselves during the pandemic tended to change their eating habits and the frequency of performing oral hygiene and eating meals. Dental pain was the main reason for seeking dental treatment, in patients whether they were isolated or not, while fear and economic difficulties led to postponed treatment despite concerns about aesthetics. The replacement of pre-existing restorations was the main reason for the restorative treatment, with composite resin being the restorative material most frequently used.

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Data availability

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

Conflict of interest

None.

Author Contribution

Kennedy Santana de MACEDO: Conceptualization, Methodology, Survey application, Data collection, Writing - Original Draft and Funding acquisition.

Alana Cristina MACHADO: Conceptualization, Methodology, Writing - Review and Editing.

Maria Angela Pita SOBRAL: Project administration, Conceptualization, Methodology, Data Curation, Formal analysis, Writing - Review and Editing.

All authors actively participated in the manuscript's findings, revised, and approved the final version of the manuscript.

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