

The impact of the COVID-19 pandemic on the provision of dental procedures performed by the Brazilian Unified Health System: a syndemic perspective

O impacto da pandemia de Covid-19 na oferta de procedimentos odontológicos realizados pelo Sistema Único de Saúde: uma perspectiva sindêmica

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ABSTRACT: *Objectives:* This study investigated the impact of the COVID-19 pandemic on the provision of dental care procedures performed by the Brazilian Unified Health System (SUS) nationally and by regions. Considering that the most underprivileged population disproportionately suffers with the reduction in dental care provision, the study hypothesis suggests the presence of a syndemic nature. *Methodology:* The SUS Outpatient Information System (SIA-SUS) was assessed to gather data on dental care activities and procedures performed between April and July 2018, 2019, and 2020 by dentists registered in the SUS. The 30 most frequent activities and procedures performed by dentists were selected and classified into three categories (urgent dental care, nonemergency dental care, and case-dependent urgency procedures), based on the guidance for dental care during the pandemic published by the American Dental Association. *Results:* Results demonstrated a reduction in the provision of dental care of all categories during the pandemic. Urgency dental consultations and procedures in primary and specialized dental care services decreased by 42.5 and 44.1%, respectively, between 2020 and 2019. Non-urgent procedures decreased by 92.3%. Although decreases in dental care activities and procedures were reported in all Brazilian regions, the largest relative decreases in urgent procedures – that should have been maintained during the pandemic – occurred in the North and Northeast regions, which are the poorest regions of the country. *Conclusions:* These results suggest that the COVID-19 pandemic has a syndemic behavior. Further investigation into the pandemic-syndemic impacts on oral disease burden is necessary. *Keywords:* Coronavirus infections. Pandemics. Dental care. Oral health. Healthcare disparities.

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RESUMO: *Objetivo:* O presente estudo investigou o impacto da pandemia de Covid-19 na oferta de atendimento odontológico pelo Sistema Único de Saúde (SUS) no Brasil. Considerando que a população de menor nível socioeconômico sofre desproporcionalmente com a redução da oferta de atendimento odontológico, a hipótese do artigo sugere a presença de caráter sindêmico nessa situação. *Métodos:* O Sistema de Informação Ambulatorial do SUS (SIA-SUS) foi utilizado para coletar os dados das atividades e procedimentos odontológicos realizados entre abril e julho de 2018, 2019 e 2020 por dentistas cadastrados no SUS. Os 30 procedimentos mais frequentes realizados por dentistas foram selecionados e classificados em três categorias (atendimento odontológico de urgência, atendimento odontológico não emergencial e atendimento de urgência dependente de casos), com base nas orientações para atendimento odontológico durante a pandemia em curso, publicadas pela Associação Odontológica Americana. *Resultados:* Houve uma redução na oferta de atendimento odontológico em todas as categorias durante a pandemia. As consultas e procedimentos odontológicos de urgência em serviços de atenção básica e especializada diminuíram 42,5 e 44,1%, respectivamente, entre 2020 e 2019. Os procedimentos não urgentes diminuíram 92,3%. Embora as reduções nas atividades e procedimentos odontológicos tenham ocorrido em todas as regiões brasileiras, as maiores quedas relativas aos procedimentos de urgência — que deveriam ter sido mantidas durante a pandemia de covid-19 — ocorreram nas regiões Norte e Nordeste, que são as mais pobres do país. *Conclusões:* Os resultados sugerem que a pandemia covid-19 possui um comportamento sindêmico. Uma investigação mais aprofundada sobre os impactos da pandemia-sindemia na carga de doenças bucais é necessária. *Palavras-chave:* Infecções por coronavírus. Pandemias. Assistência odontológica. Saúde bucal. Disparidades em assistência à saúde.

INTRODUCTION

The COVID-19 pandemic has been impacting healthcare services and systems worldwide¹. The need to guarantee and prioritize the provision of assistance for the diseased and the concern with contagion outlined a reaction scenario reflected in all healthcare areas. Dental care and oral medicine face a dilemma: considering the high risk of infection in the dental environment² – that adds up to the baseline risk of the pandemic – and the elective character of most procedures, should dental care be postponed?

Oral diseases are a critical public health issue, affecting about half of the global population³. In August 2020, the World Health Organization (WHO) published a set of guidelines entitled *Considerations for the provision of essential oral health services in the context of COVID-19*, in which it advises that routine non-urgent oral healthcare and aesthetic treatments should be delayed until there has been sufficient reduction in COVID-19 transmission rates or according to official recommendations. Nonetheless, urgent or emergency dental care should be provided⁴. According to the American Dental Association (ADA), dental emergencies are potentially life-threatening situations, and urgent dental care is focused on the relief of severe pain or risk of infection and on alleviating the burden on hospital emergency departments; both require immediate care⁵.

The Brazilian Unified Health System (*Sistema Único de Saúde* – SUS) has a national oral health program that provides dental care including a wide range of dental procedures,

health promotion and prevention as well as dental clinical care in primary and specialized dental services that are spread throughout the country. To the best of the authors' knowledge, there is no comprehensive, national analysis of the extent at which the COVID-19 pandemic affected the provision of dental care. Analyzing the SUS register constitutes a unique opportunity to provide detailed information on the amount of disruption in dental care delivery systems caused by the current pandemic.

Health authorities have characterized the outbreak of COVID-19 as a syndemic⁶. This concept recognizes this disease and its consequences as a social and biologically broader process, which results in the mutual worsening of individuals' health and life conditions⁷. SARS-CoV-2 infection is more severe in patients with comorbidities; at the same time, COVID-19 makes preexisting conditions worse. In this context, social inequalities overturn the balance, as the most economically vulnerable individuals tend to have more comorbidities – mainly uncontrolled ones –, while they are less likely to keep themselves safe from the infection and have access to health care. This cycle feeds back and portrays the syndemic nature of this pandemic^{6,8}. This study assumes that the lack of access to dental services is one of the drivers of the syndemic – along with drivers such as aging, unemployment, lack of social support, and other factors at the contextual level. The study hypothesis is that there are inequalities related to access, meaning that the negative impact of the pandemic on the organization of public dental services – i.e., the reduction in dental care provision – has been more severe in the most impoverished regions of Brazil.

The first death by COVID-19 in Brazil occurred on March 17, 2020. Since then, the country has accumulated more than 230 thousand deaths and more than 9 million confirmed cases (data referring to February 2021)⁹. This study aims to investigate the impact of the pandemic – considering its peak months – in the provision of dental care by SUS, nationally and by regions, identifying the nature of dental care delivery (urgent or elective). Furthermore, it aims to identify whether this negative impact on the organization of public dental care provision has been more accentuated in the poorest regions of the country, indicating that differences suggest the syndemic nature of the COVID-19 pandemic.

METHODS

The SUS Outpatient Information System (*Sistema de Informação Ambulatorial* –SIA-SUS) was the source of data on delivered dental care procedures. Data on all the dental procedures performed in April, May, June, and July 2018, 2019, and 2020 by dentists registered in the SUS were collected under six categories that include all general dentists and dentists with specialization in dental public health. PubData collection (by month and according to five Brazilian regions – South, Southeast, Midwest, Northeast, and North) was carried out using Tabwin, a proprietary tabulation tool of SUS that is of public access and provides information without any individual identification.

North and Northeast are the poorest regions of the country in terms of Gross Domestic Product (GDP) per capita (BRL 17,213.30 and 12,954.80, respectively) and Human Development Index (HDI) (0.667 and 0.663) – for the Southeast, these metrics are 34,789.78 and 0.766, respectively. While in the Southeast, South, and Midwest regions less than 3.5% of the population lives in extreme poverty, this percentage in the North and Northeast is 11.4 and 13.7%, respectively^{10,11}. Regarding oral health, the North region has the highest average of the sum of the number of decayed, missing due to caries, and filled teeth in the permanent teeth (DFTM) at 12 years of age (3.16), and the highest average of missing teeth among older adults (27.4) – with the Northeast region occupying the second-worst position in both metrics¹².

Subsequently, the 30 most frequent dental procedures delivered in the country between April and July 2019 were selected. These procedures were classified into three categories, based on an adaptation of the ADA guidance for dental care during the pandemic, as follows: urgent dental care, nonemergency dental care, and case-dependent urgency procedures – i.e., those in which the classification as urgent depends on the severity of each case. This third category was developed in order to consider the relative nature of some procedures, which may or may not represent an urgency situation. The procedures are presented in Table 1.

RESULTS

From April to July 2019, general dentists and public health dentists delivered and promoted 34,300,275 dental procedures and activities on SUS – considering the 30 most frequent types of these activities. In the same period of 2020, that number was 3,967,176, representing a reduction of 88.4% in dental productivity during the first four months of the COVID-19 pandemic in Brazil.

There was a significant decrease in productivity in the three analyzed categories. Non-urgent procedures and activities decreased by 92.3%, when comparing 2020 with 2019. In this category, all dental public health procedures showed more than 90% of decrease. Procedures that are strictly of preventive nature, such as dental sealants (-97.3%) and dental plaque disclosing (-95.4%), also significantly decreased. Case-dependent urgency procedures decreased by 89%. This category includes some of the most common dental procedures, such as restoration of posterior permanent teeth and extraction of permanent teeth – with reductions of 95.6 and 87.9%, respectively. Urgent dental care showed the lowest decrease, but this was still relevant (-72%). Urgency dental consultations in primary and specialized dental care services decreased by 42.5 and 44.1%, respectively (Table 1).

All regions of Brazil showed significant reductions in the number of dental procedures and activities delivered in the initial months of the COVID-19 pandemic when compared with the same months of 2019. The Southeast was the only region where urgent dental procedures surpassed non-urgent and case-dependent urgency procedures. The largest relative decreases in urgent procedures were verified in the North and Northeast regions (Figure 1).

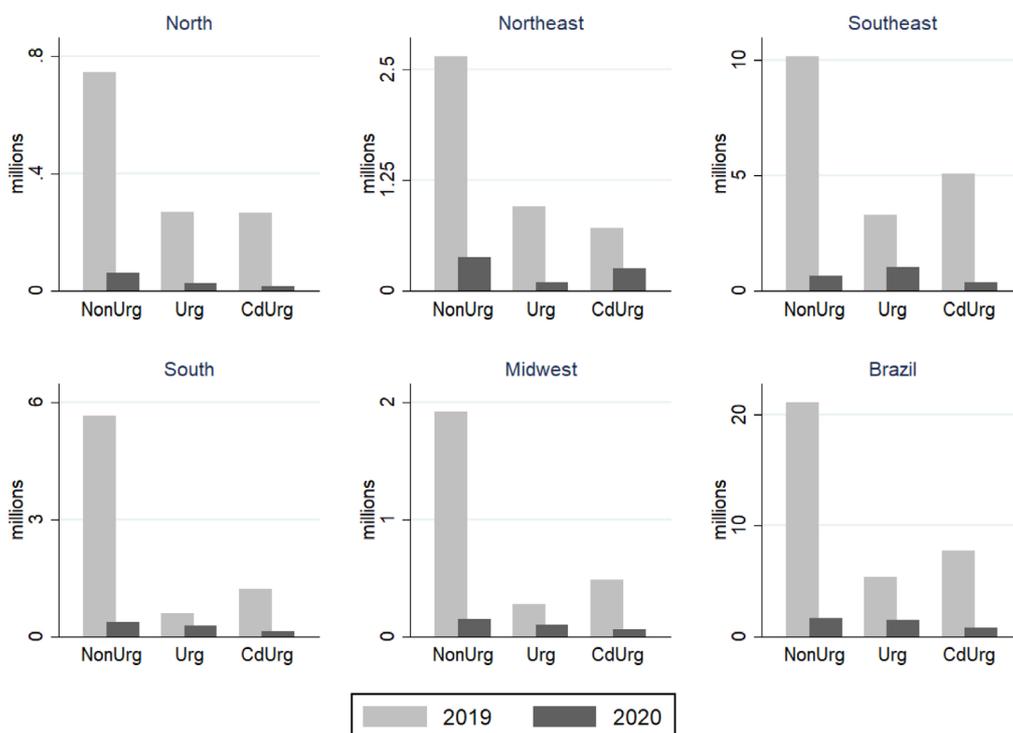
Table 1. Number of dental procedures performed in April, May, June, and July, 2018- 2020, and percent of change, comparing 2020 to 2019. Brazil and its regions.

Procedures	2018	2019	2020	% Change
Nonemergency dental care				
Primary dental care consultation	2,942,075	3,254,469	352,409	-89.2
Initial dental consultation	2,612,736	2,189,679	478,357	-78.2
Consultation in specialized dental care service	574,221	603,498	191,703	-68.2
Dental scaling, planing, and polishing	3,250,198	2,753,890	103,217	-96.3
Topical fluoride application	1,110,441	1,366,662	56,334	-95.9
Root scaling and planing	1,305,423	1,151,853	57,771	-95.0
Dental cleaning	1,524,532	1,146,313	35,511	-96.9
Dental plaque disclosing	1,368,581	671,635	30,706	-95.4
Dental sealant application	430,077	368,947	9,817	-97.3
Biofilm removal	261,268	275,806	37,060	-86.6
Group action of supervised toothbrushing	5,129,600	3,892,881	177,454	-95.4
Group action of fluoride mouth rinse	1,597,684	1,400,434	24,101	-98.3
Oral epidemiological examination	1,618,369	961,358	18,395	-98.1
Group action of fluoride gel application	1,392,083	648,701	13,562	-97.9
Group dental education in primary care	601,058	446,025	34,916	-92.2
Total	25,718,346	21,132,151	1,621,313	-92.3
Urgent dental care				
Urgent dental consultation in primary care	1,656,796	949,764	546,584	-42.5
Urgent dental consultation in specialized care	314,784	300,929	168,344	-44.1
Temporary dental restoration	866,737	1,407,238	253,917	-82.0
Dental abscess drainage	37,737	835,348	13,082	-98.4
Removal of sutures	410,618	623,552	216,677	-65.3
Dental pulp capping	551,208	397,020	44,376	-88.8
Access to and medication of the dental pulp	644,646	396,735	135,677	-65.8
Temporary endodontic treatment	323,262	306,733	111,237	-63.7
Dental pulpotomy	495,402	182,559	19,657	-89.2
Total	5,301,190	5,399,878	1,509,551	-72.0

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Table 1. Continuation.

Procedures	2018	2019	2020	% Change
Case-dependent urgency				
Posterior permanent tooth restoration	3,115,526	3,009,722	133,876	-95.6
Permanent tooth extraction	2,211,527	2,172,611	263,305	-87.9
Anterior permanent tooth restoration	1,064,177	909,225	77,667	-91.5
Primary tooth extraction	314,586	674,285	43,436	-93.6
Primary tooth restoration	633,067	556,244	244,183	-56.1
Interproximal or periapical radiograph	432,662	446,159	73,845	-83.4
Total	7,771,545	7,768,246	836,312	-89.2



NonUrg: non-urgent procedures; Urg: urgent procedures; CdUrg: case-dependent urgency procedures.

Figure 1. Number of dental procedures in April, May, June, and July, 2019-2020. Brazil and its regions.

DISCUSSION

This study investigated the provision of dental care in the public health system of Brazil, SUS, during the first four months of the COVID-19 pandemic. The decrease in oral health prevention and promotion initiatives is recommended and follows the social distancing guidance. The American Dental Association and the World Health Organization advised postponing activities, such as dental cleaning and aesthetic dental procedures, during the pandemic and keeping urgent dental care functioning⁵. Our findings showed that the urgent dental care provision dramatically reduced in Brazil, demonstrating a general lack of preparedness of the Brazilian health system. Certainly, abscesses that lead to severe dental pain and swelling cases did not simply vanish because of the pandemic. Possible reasons may include lack of government communication to the population about the services available during the pandemic, and the inability of public services to maintain the provision of essential care. The fear of exposure to contamination may also have distanced patients with dental needs from healthcare services¹³. In addition to pain, suffering, and the risk of worsening infections that unattended patients may have experienced, the repressed demand is likely to overburden the dental care services network in the post-pandemic period.

With the need to postpone elective procedures due to the high risks of contamination of the dental environment and even the lack of personal protective equipment¹⁴, the COVID-19 pandemic sparked the discussion about what are dental urgencies and emergencies. Fortunately, unlike definitions that do not reach consensus in the literature (such as “essential oral health care” and “basic oral health care”), dental urgencies and emergencies seem to be classifications with universally-adopted concepts. During the pandemic, articles and official documents reinforced and even refined these classifications. Benzian et al.¹⁵ merged some definitions to simplify the concept of urgent oral health care: it “describes interventions for oral diseases and conditions that are serious in terms of bleeding, infection, swelling, or pain or that otherwise impact with significant consequences if left unattended, therefore requiring treatment or referral without delay.” However, the guidance that dental professionals should only attend dental urgencies and emergencies during the pandemic is not a consensus in the literature, although these are recommendations of the most influential institutions in dentistry¹⁵.

Urgent dental consultations did not decrease in the same proportion as urgency procedures. A possible explanation would be that dentists managed dental pain using a pharmacological approach to avoid procedures and their aerosols. Nonetheless, the effectiveness of pharmacological management of dental pain in the long-term needs to be analyzed. An urgent dental consultation is registered whenever a dentist attends a patient who has a dental emergency, even if there is no clinical procedure (e.g., in the case of a consultation that only resulted in a prescription). If a procedure is performed, the dentist reports both activities: the procedure and the consultation. Furthermore, wealthier regions (South and Southeast) presented less dramatic reductions in urgent dental care, reinforcing inequalities in the provision of dental care that are known to exist in the country. Many studies reported

expressive regional inequalities in dental care in Brazil^{16,17}. The North and Northeast regions have a lower provision of dental care and reduced access to health services in general¹⁷. The results of the present study suggest that the pandemic period is exacerbating these regional inequities.

To the best of the authors' knowledge, this study is the first to assess the syndemic nature of the COVID-19 pandemic in relation to its deleterious impact on the provision of oral health care. According to epidemiological data, the infection and mortality by SARS-CoV-2 have been unequally spreading, with more vulnerable groups being disproportionately affected because of inequalities in noncommunicable diseases and the social determinants of health that intensify existing health conditions^{6,8}. The existence of significant barriers to the access to healthcare services for the most disadvantaged populations is an effect of the pandemic that can exacerbate existing inequities. The present study indicates that, in Brazil, this undesirable pattern reached oral health services.

Recently, two wide-ranging publications highlighted the need to rethink the provision of oral health care, concluding that what dentistry has been delivering worldwide is insufficient to deal with the enormous burden of oral diseases^{3,18}. The pandemic impact on dental care must be pondered, as the findings reported in this study for Brazil may be taking place in other contexts as well. In other words, similarly unprepared dental care delivery systems that are not able to provide timely and required care globally. This is aggravated by the fact that most health systems often neglect oral health¹⁸.

The COVID-19 pandemic has been negatively affecting dental care provision in Brazil. Analyses that indicate significant decreases in the provision of biopsies of oral soft tissues and prostheses performed by SUS have already been published^{19,20} and are complemented by results of clinical dental care reported in the present study. The rate of performing soft tissue biopsies of the mouth provided by SUS – which is considered a nonelective procedure – decreased by almost 70% in Brazil, when comparing May with March 2019 with the same period of 2020²⁰. A study that assessed the impact of the pandemic on pediatric dental treatments performed by SUS found that the productivity related to dental procedures of May 2020 was more than 90% lower than that of May 2019²¹. The pandemic seems to have negatively impacted even the care of head and neck cancer: data from referral services in Brazil and other countries indicate significant reductions in surgeries and hospital visits of patients undergoing treatment^{22,23}.

The most vulnerable populations are the most dependent on SUS. This study showed a reduction in the supply of dental care of all types during the pandemic period – preventive, restorative, and urgent. Along with the economic recession scenario that the pandemic has exacerbated and with the history of repressed dental demands in the country, mainly concentrated in the most vulnerable populations, the post-pandemic period reserves critical challenges for the SUS oral healthcare network. This study reported the pandemic impacts on the field of public oral health, highlighting that the reorganization of these services will require extensive resources and efforts. Future studies evaluating the impacts of the pandemic on oral disease burden are of strategic relevance to support the formulation

of innovative care models that are responsive to the population's oral health needs and to address the social determinants of oral health.

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