

# Impact of COVID-19 on the frequency of dental appointments and types of dental health care services

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## Abstract

**OBJECTIVES:** To investigate the impact of the COVID-19 pandemic on the frequency of provision of dental appointments and types of dental care services.

**MATERIALS AND METHODS:** The dental records of three dental health services, over 3 months, in the year before (2019) and a year during (2020) the pandemic were retrieved. The dental records were categorized according to the referral after diagnosis into prosthodontics, pedodontics, orthodontics, conservative, endodontics, periodontics, and oral surgery. The demographic variables and types of treatment provided were recorded and analyzed. The frequency of appointments was determined from overall dental records and departmental dental records. Chi square test was used to determine the effect of gender and age on dental appointments.

**RESULTS:** According to the dental records for 2019, 7286 appointments were provided, and this number decreased by 2.4-fold to 3090 appointments in 2020. The records indicated that the highest decreases were in non-urgent dental appointments in the periodontics, orthodontics and conservative departments (8, 8, and 4.6-fold, respectively). Statistically significant differences in dental pre-pandemic and pandemic appointments were identified for gender and age group. Female and older (>64 years old) subjects appeared to be less willing to attend dental appointments (OR=1.2 and 1.3, respectively) compared to their male and younger counterparts.

**CONCLUSION:** The COVID-19 pandemic has had significant influence on decreasing attendance at dental appointments and the records show that the highest decreases were in non-urgent dental departments.

**KEYWORDS:** COVID-19; pandemics; impact; dental care; dental health services

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## Introduction

The outbreak of COVID-19 in December 2019 in Wuhan, China has obliged many countries to take drastic measures to control the wide spread of infection, such as through surveillance and lockdown of cities [1]. Given its novelty and rapid transmission, authorities have found it necessary to provide certain

recommendations for public places and health sectors.

Health care workers and dentists are categorized as at high risk of infection [2] and evidence indicates that this could be due to the high risk of transmission posed by aerosol generating procedures (AGP) [3, 4]. According to the World Health Organization (WHO) and American

Dental Association (ADA), during the outbreak, dental clinics should, in general, be closed. However, for emergency and urgent cases, dental treatment can be carried out with implementation of safety and precautionary measures provided by these two bodies [5, 6].

Pain and swelling have been considered as the most common

dental emergencies [7]. Furthermore, in response to requests from several USA states, ADA developed a guideline that would allow dental care providers to manage emergency works only [8]. The dental emergency cases include but are not limited to pain associated with pericoronitis, pulpitis, dry socket following tooth extraction, local swellings/abscesses, dental trauma, tooth fracture and failure of temporary restorations [9]. This means that provision of other dental procedures, such as routine checkups, professional cleaning, making and fitting dental prostheses, treating non-painful caries, orthodontic appointments, cosmetic works, among others, has had to cease.

Meanwhile, the emergence of COVID-19 has had a significant impact on both dentists and patients. For example, high levels of fear and anxiety have been reported by dental care providers during the outbreak [10, 11], and dentists have been obliged to take drastic actions including practice modification and optimizing their safety and precautionary measures [12]. In addition, as in many life sectors, the pandemic and lockdown have had a profound economic impact on dentistry and the economic consequences are suggested to be disproportional; thus, urgent action from authorities has been called for [12, 13]. Similarly, high levels of fear and anxiety were reported amongst patients seeking dental treatment,

which consequently decreased their willingness to undergo dental treatments and increased the risk of oral mucosal diseases [14, 15].

Many countries, including Iraq, adopted the WHO and ADA guidelines for work carried out by dental professionals during the peak of the pandemic. The exact impacts of COVID-19 on numbers of dental appointments and types of dental treatment provided needed to be explored. Therefore, this study aimed to examine the overall impact of COVID-19 on dental appointments and types of dental procedure performed via comparing the pre-pandemic and pandemic dental appointments records.

## Material and Methods

### Study design

The current study was a retrospective cross-sectional study based on the records from three main governmental primary dental care centers in the city of Baghdad, Iraq. The patients can attend these centers directly without referral or prior arrangement. The survey covered three months (June, July and August) of the year 2020, the period of the strictest lockdown measures, as compared to the same period in the previous year. Access to the records was officially granted by the Iraqi Ministry of Health (Ref #72156 in 23/11/2020). Furthermore, the study was approved by the ethical committee of the College of

Dentistry, University of Sulaimani (ethical approval # 16/21) in accordance with Helsinki Declaration and its later amendments.

### Eligibility criteria and Data source

Records from the dental centers were organized according to patient referrals to different departments for the required treatment. All records for referring new patients were included while those with missing information or for patients with follow-up visits were excluded.

The departments included diagnosis, prosthodontics, pedodontics, orthodontics, conservative dentistry, endodontics, periodontics, and oral surgery. The number of patients referred to each of the aforementioned departments was recorded. In addition, the sex and age of each patient was recorded. Data entry was performed by one of the authors (M.L.A) using Excel spreadsheets (Microsoft Excel 2016, Microsoft Corporation, USA) and checked by another author (Y.A.S.). The primary outcome was to determine the fold changes in frequency and type of dental treatment during COVID-19 crisis as compared to pre-pandemic period.

### Statistical analysis

Statistically, the numbers of patients were expressed using frequency and percent. Fold change in the number of patients in the two years was calculated by dividing the number of patients during 2019 by their number

in 2020. Association of the number of patients with different demographic variables was determined by using Chi square test, while the strength of association was calculated by odds ratio (OR). Regarding the OR for age groups, the age group 0 to 5 years was used as a reference for comparison with other age groups. Statistical difference was considered significant at  $p < 0.05$ . All statistical analyses were performed by using GraphPad Prism (version 8, USA) software.

## Results

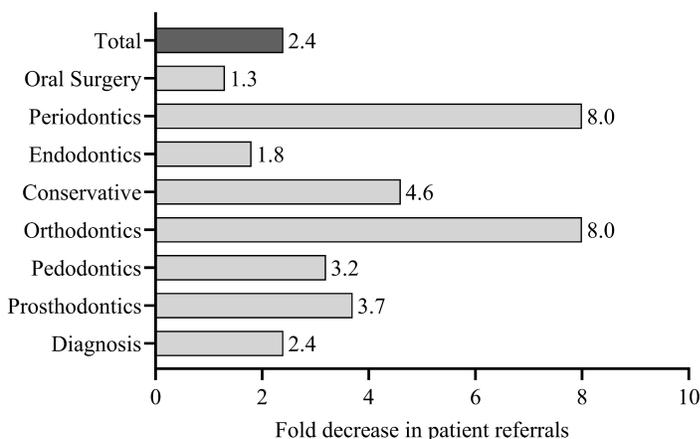
Analysis of records showed that the number of patient referrals in the three selected months during 2019 was 7286 (mean age=  $27.8 \pm 16.2$ ), while the number of patients during the same period in 2020 was 3090 (mean age=  $29.4 \pm 15.1$ ). During 2019, the highest frequency was associated with those referred for endodontic treatment (1385, 19%) and those seeking a diagnosis (1318, 19%), followed by patients needing surgical interventions (1310, 18%) (Table 1). For the same year, the lowest number of patients was observed in referrals for prosthodontic treatment (204, 2.8%) (Table 1). However, during the pandemic, the pattern changed as the highest number of patient referrals was seen in the oral and maxillofacial department (1016, 32.9%), followed by endodontics (751, 24.3%) (Table 1).

Regarding the fold changes in numbers of patients, the lowest

decreases were associated with the surgical (1.3-fold) and endodontic (1.8-fold) treatments, whereas the highest decreases were observed in periodontics and orthodontics (8-folds each), followed by the conservative treatment (4.6-folds). Other types of treatment recorded decreases ranging from 2.4 to 3.7-fold. Overall, the number of patients in 2020 decreased by 2.4-fold as compared to the same period in 2019 (Figure 1).

**Table 1:** Frequencies of patient referrals to dental departments during 2019 and 2020.

Department	2019		2020	
	Frequency	%	Frequency	%
Diagnosis	1381	19	584	18.9
Prosthodontics	204	2.8	55	1.8
Pedodontics	1225	16.8	378	12.2
Orthodontics	456	6.3	57	1.8
Conservative	908	12.5	197	6.4
Endodontics	1385	19	751	24.3
Periodontics	417	5.7	52	1.7
Oral Surgery	1310	18	1016	32.9
Total	7286	100	3090	100



**Figure 1:** Fold change of the patients referred to dental the departments in 2020 as compared to 2019. Highest decrease was observed in number of patients seeking periodontal and orthodontic treatment (8-fold each). While the lowest decrease was associated with those referred to oral surgery (1.3-fold) and endodontic (1.8-fold) departments.

Regarding association of frequency of patient referrals with sex, a significant decrease was observed in the number of females seeking dental treatment as compared to males ( $p < 0.05$ , OR 1.279). Similarly, a significant association was observed in relation to age group ( $p < 0.05$ ). The highest number of patients seeking

dental treatment during the pandemic was recorded in the age range of 19 to 48 years (OR 1.6) as compared to the younger and older age groups (Table 2).

**Discussion**

According to WHO and ADA recommendations, dental practices

should remain closed and only emergency dental treatments should be performed [5, 6]. The rationale behind this study was to determine the impact of COVID-19 on frequency and types of dental services provision via comparing pre-pandemic with pandemic dental records. The study presents a descriptive analysis of

**Table 2:** Associations of frequency of patient referrals with demographic variables

	2019 <sup>†</sup>	2020 <sup>†</sup>	P value*	95% CI	OR <sup>§</sup>
Sex					
Male <sup>‡</sup>	3365, 46.2	1617, 52.3	0.001	1.176 to 1.392	1
Female	3921, 53.8	1473, 47.7			1.279
Age group					
0-5 <sup>‡</sup>	358, 4.9	106, 3.4			1
6-13	1358, 18.6	368, 11.9	0.479	0.854 to 1.392	1.093
14-18	789, 10.8	321, 10.4	0.013	1.071 to 1.764	1.374
19-33	2288, 31.4	1149, 37.2	0.001	1.354 to 2.133	1.696
34-48	1531, 21.0	752, 24.3	0.001	1.317 to 2.092	1.659
49-64	813, 11.2	332, 10.7	0.012	1.077 to 1.767	1.379
65-78	137, 1.9	60, 1.9	0.039	1.019 to 2.147	1.479
79-98	12, 0.2	2, 0.1	0.451	0.062 to 2.260	0.563
Total	7286, 100	3090, 100			

<sup>†</sup> Frequency, percent

\* Significance at  $p < 0.05$  by Chi square test

<sup>§</sup>OR: Odds ratio

CI: confidence interval

<sup>‡</sup> Reference variable

dental records and meaningful findings of reduced frequency of dental patient appointments as well as a significant decrease in the number of non-urgent dental patients. There was overall a 2.4-fold decrease in the number of dental appointments (from 7268 to 3090), which can be explained by the fact that during the pandemic (June, July and August of 2020) most of the dental services were closed and according to the Iraqi authorities only urgent treatment was to be provided. Furthermore, fear and anxiety among patients was having a significant impact on their willingness to attend dental appointments unless the situation was urgent and the

discomfort could not be tolerated [14, 15].

Since this study was based on analysis of retrospective data, it was not possible to determine whether the referred patients received the intended treatment or if they complied to the given dental appointment. In addition, retrospective studies are prone to selection bias as the controls are recruited by convenience sampling which is unavoidable limitation in this type of studies. Furthermore, it was not possible to obtain a feedback from the patients to evaluate the access to health care.

Emergency dental care includes treatment of pain and swelling which

can be provided in oral surgery and endodontic and oral diagnosis departments [7]. This explains why the lowest fold of reductions was found in the dental records of these departments (oral surgery = 1.3-fold, endodontics = 1.8-fold and oral diagnosis = 2.4-fold). Meanwhile, the non-urgent dental care departments, such as periodontics, orthodontics and conservative dentistry, recorded the highest reductions. Again, this can be related to the authorities' guidance to provide treatment for dental emergency cases only. Moreover, the shortage of personal protection equipment in dental practices resulted in high levels of anxiety and fear among Iraqi dentists; [12] thus, lengthy procedures and those which require the use of AGP, such as filling teeth and scaling and polishing, were avoided.

A statistically significant difference was identified between male and female dental records regarding the decrease in total patient numbers. Under normal conditions, females have tended to be more compliant in attending dental appointments than males; [16] however, their fear and anxiety about the COVID-19 pandemic had made them less willing to attend these appointments. This is in line with the data reported by other studies which indicates that females are more emotionally affected by difficult situations and consequently more likely to express feelings such as stress and anxiety [17]. Perhaps, females were more

anxious about the overall situation created by COVID-19 pandemic from such as general health, economic and social distancing aspects, with dental appointments seen as nonessential and capable of being addressed when the pandemic is under control [18].

Moreover, a statistically significant association was observed between reduction in dental appointment attendance and age group. It was to be expected that attendance would be more greatly reduced among older age groups as the COVID-19 mortality rate has been higher in older age groups [19]. This is supported by the data of the present study as the dental records showed that the highest reduction was in the age group of >65 years old. Similarly, the dental records for children younger than 13 years old showed a significant decrease in referrals. This could be explained by the uncertainty about the impact of COVID-19 on children and their parents not wanting to risk attending dental appointments unless the condition required urgent treatment. On the other hand, the 19 to 48 years age group recorded the highest attendance at dental practices. This result could be related to the fact that the prevalence of dental caries and periodontal diseases is high among Iraqi residents [20-22]. Thus, despite the fear and anxiety surrounding COVID-19, people still have to attend dental practices for treatment of urgent illnesses such as severe pulpitis, swelling and cellulitis. In addition, the

incidence of severe symptoms and mortality due to COVID-19 has been low among younger people [23, 24], which has made them less fearful of seeking dental treatment during the pandemic.

In early 1980s, Penchansky and Thomas proposed a multidimensional-model to assess the fit between the patient and the health care system [25]. The criteria of this theory are based on five dimensions (affordability, availability, accessibility, accommodation, and acceptability). In the current study, accessibility seem to be compromised due to application of strict lock-down measures that limited the mobility of individuals and transportation or fear from infection which discouraged subjects from seeking dental services. In addition, acceptability was also affected by the precautions and preventive measures including longer operation time due to application of a fallow period, minimizing referrals, and reducing number of patients treated by the dentists. Since these dental centers are supported by the government; therefore, other aspects were either not or minimally affected including the cost, quality of treatment, infrastructure, and supplies before or during the pandemic.

While the focus during this pandemic has been more on stopping the spread of COVID-19, the future health consequences, including consequences associated with dental

health, should not be underestimated. Analysis of the current situation is helpful for predicting the future dental needs. Based on the results of the present study, people's need for dental services can be expected to increase dramatically in the post pandemic period. Dental care authorities should implement a comprehensive program to address the future dental care needs and prevent collapse of the dental care system, especially regarding departments managing non-urgent dental illnesses. Caution should be considered for the generalization of results from the current survey due to its dependence on retrospective data analysis. Therefore, further prospective studies are required to assess the long-term impact of COVID-19 on dental services and health care providers.

### Conclusion

The results of this study suggested that COVID-19 is having a strong influence on reducing the overall number of dental appointments, with emergency dental treatments showing the lowest numbers of decreases.

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