Saudi Dental Journal (2021) 33, 1018–1023

King Saud University

Saudi Dental Journal

www.ksu.edu.sa
www.sciencedirect.com

ORIGINAL ARTICLE

Impact of covid-19 pandemic on characteristics of dental emergencies and treatment services at tertiary care centre

Umesh Kumar [a,*], Arpit Gupta [b], Ashima Goyal [c], K. Gauba [d]

[a] Unit of Conservative Dentistry & Endodontics, Oral Health Sciences Centre, Post Graduate Institute of Medical Education & Research (PGIMER), Chandigarh 160012, India
[b] Unit of Public Health Dentistry, Oral Health Sciences Centre, Post Graduate Institute of Medical Education & Research (PGIMER), Chandigarh 160012, India
[c] Unit of Pediatric Dentistry, Department of Oral Health Science Centre, PGIMER, Chandigarh 12, India
[d] Department of Oral Health Science Centre, PGIMER, Chandigarh 12, India

Received 19 October 2020; revised 7 January 2021; accepted 1 June 2021
Available online 6 June 2021

KEYWORDS

Dental emergencies;
Tertiary care centre;
COVID 19 pandemic

Abstract *Purpose:* To categorize and compare the dental emergencies along with status of health services received in the tertiary dental health care centre during the pre covid- 19 periods and period of the complete lockdown in COVID 19 pandemic. Methods: A retrospective cross-sectional observational survey was conducted. Four different groups period were studied on patients who visited for dental emergencies at tertiary care centre. April 14 to 13 May 2020 assigned and analyzed as a test period group or group IV. The control period group i.e. group III was 14 February 2020 to 17 March, pre lockdown COVID 19 month when there was no consideration of epidemic in India. Same as periods of group II and IV, group I and II from last year 2019 were also assigned and analyzed. The tertiary care centre provision of health services during this pandemic was also inquired and evaluated. The information was recorded regarding availability of health services like non-emergency dental treatments, emergency dental services, and online professional consultation. To compare four different time period of obtained data, Analysis of variance (ANOVA) and Chi square test were used. Results: The overall proportion and percentage of dental emergencies were raised. The reason for emergency visits to dental clinic were the main problem related with pulpal (46.0%) followed by abscess (16.6%), periapical lesions (15.0%), cellulitis (4.1%) or trauma (0.3%). In lockdown most of the dental emergencies 228(265) were endodontic related (86.1%) which

* Corresponding author at: Unit of Conservative Dentistry & Endodontics, Oral Health Sciences Centre, Post Graduate Institute of Medical Education & Research (PGIMER), Chandigarh 160012, India.
E-mail address: kumar.umesh@pgimer.edu.in (U. Kumar).
Peer review under responsibility of King Saud University.

Production and hosting by Elsevier

https://doi.org/10.1016/j.sdentj.2021.06.004

managed mostly through '3A" approach (advise, analgesics and antibiotics) (60.1%) and remaining (26.0%) through extraction.

1. Introduction

Severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) was initially identified in patients presenting with pneumonia of unknown origin in Wuhan, China, in December 2019 (Zhu et al., 2020) and was later established to be the causative agent of corona virus disease-2019 (COVID-19). On January 30, 2020, the World Health Organization (WHO) declared the spread of this disease as a public health emergency owing to the high mortality rate of 3.4% (Sohrabi et al., 2020, WHO, 2020). Because of the rapidly transmissible nature of the disease, people were unwilling to go to public places, including hospitals (Harrel and Molinari, 2004). In this scenario, it is important to note that majority of dental procedures produce aerosols/droplets, and due to the exposure to saliva and blood, clinicians are at a high risk of the contagion (Peng et al., 2020). During dental procedures, transmission of SARS-CoV-2 from the infected individuals can occur through the inhalation of aerosols/droplets or by direct contact with the mucous membrane, oral fluids, and contaminated instruments and surfaces (Ali et al., 2020). Given the exposure risk for different professional categories, dental practitioners face the greatest threat. As dental treatments pose the highest risk during the pandemic, all routine procedures have been suspended worldwide, allowing only emergency care (Ather et al., 2020). Hence, when the pandemic is on the rise; it is challenging to respond to dental emergencies in terms of changes made by the institutions in the utilization of services. The public tertiary care centers play a key role in providing easily accessible, reliable and affordable health care services to patients belonging to all strata of the society (Guo et al., 2020).

So the primary objective of this study was to analyze and compare the hospital records and categorize the dental emergency cases received in a tertiary dental health care center during the COVID-19 pre-lockdown period of February 2020 and the complete lockdown period of April 2020 and compare them with the corresponding periods in 2019. The secondary objective was to assess the status of health service provision in tertiary care hospitals during the COVID-19 pandemic.

2. Materials and methods

A retrospective cross-sectional observational survey was conducted at OPD clinic, Oral Health Science center, Post Graduate Institute of Medical Education and Research, a autonomous tertiary care hospital, Chandigarh, India, after obtaining ethical approval from the institution's ethics committee (No: INT/IEC/2020/SPL-745). Data regarding the total number of patients visited, percentage of new and old cases, and male and female patients were collected from the advanced hospital information system *"e-sushrut*." Four groups of different periods were studied with regard to the patients who visited the Oral Health Sciences Centre for dental emergencies. Groups I & II were assigned as periods from 2019. The control period group, i.e. group III, ranged from February 14, 2020 to March 17, 2020, which was assigned as the pre-lockdown month during which considerable spread of the epidemic had not happened in India. The period from April 14, 2020 to May 13, 2020 was assigned as the test period group or group IV. The records of patients who visited the dental emergency department were screened and reviewed. The inclusion criteria for the patients were: 1) presenting to dental emergency outpatient department (OPD). 2) age $\geq$ 16 years. If the same patient visited two or more times, it was counted as different as we were recording the data of per day emergency visit and the pandemic created the need to postpone elective care for emergency patients. Relevant information was extracted by trained and calibrated investigators under the supervision of a senior professor using a specially designed study proforma, and the kappa score was >0.8. The data were extracted independently by two researchers. Discrepancies, if any, were discussed in the presence of a third member to arrive at a consensus. A random sample comprising 5% of the extracted records was re-assessed to ensure the accuracy of the evaluated data.

During this pandemic, information regarding the availability of health services such as non-emergency dental treatment, emergency dental service, and online professional consultation provided by the tertiary care center was assessed and recorded.

General descriptive analysis was performed on the obtained data. Mean and standard deviation were used to present the continuous variables; frequency and proportion were used for the categorical variables. To compare the data obtained during four different time periods, analysis of variance (ANOVA) and Chi square test were used. Statistical significance was set at $p < 0.05$. All statistical analyses were performed with the SPSS 20.0 software (IBM Corp, Armonk, NY).

3. Results

A total of 8034 patients in group I, 8110 in group II, 8045 in group III, and 521 in group IV visited the dental OPD of the tertiary care center.

General descriptive analysis of the groups was performed. During the period ranging from February 14 to March 17, 2019 (group I), a total of 8034 patients visited the department, of which 4242(52.8%) were men and 3789(47.2%) were women. In group II, 8110 patients visited, of which 4156 (51.2%) were men and3954 (58.8%) were women. In the control group or group III, a total of 8045 patients visited, of which 4255 (52.8%) were men and 3786(47.2%) were women. In the test group, i.e. group IV, 521 patients visited, of which 306 (58.7%) were men and 215 (41.3%) were women. No statistically significant difference was seen in age and gender among the four analyzed time periods or groups (Table 1). The largest age range was 31–45 years (66.8%) in all groups.

Table 1 Demographic characteristics of patients who visited dental service centre.

Group period	total	Age (n (%)a or mean(SD)			Gender (n (%)	
		16–30	31–45	46–60	Male	Female
Group 1 (14 feb-17 march 2019)	8034	2345 (29.2%)	4132 (51.4%)	1557 (19.4%)	4242 (52.8%)	3789 (47.2%)
Group 2 (14 april-13 may 2019)	8110	3143 (38.7%)	3482 (42.9%)	1485 (18.3%)	4156 (51.2%)	2954 (58.8%)
Group 3 (14 feb-17 march 2020)	8045	2569 (31.9%)	4268 (53.0%)	1208 (15.1%)	4253 (52.8%)	3786 (47.2%)
Group 4 (14 april-13 may 2020)	521	104 (19.9%)	348 (66.8%)	69 (13.3%)	306 (58.7%)	215 (41.3%)

Upon comparing the four groups of dental emergency visits, the number of visits identified in group I, group II, and group III were 395 (4.9%), 406 (5%), and 387 (4.8%), respectively. In the test group period, the number of visits was 265 (51.7%), which was significantly different from the other three groups (Table 2). The overall proportion and percentage of dental emergencies had increased, and a significant difference was seen between the test and control groups as well as between 2020 and the same periods of the preceding year (groups I and group II).

Upon comparing other categorical variables of dental emergencies, no statistically significant differences were seen among all the groups (Table 2). There were fewer male patients than female patients in group I, II, and IV. However, during the pre-lockdown period of the COVID-19 epidemic ($p < 0.001$), i.e. in group III, the situation was reversed. The main reason for emergency visits to the dental clinic in group IV was pulpal (46.0%), which was followed by abscess (16.6%), periapical lesions (15.0%), cellulitis (4.1%), and trauma (0.3%) (Table 3).

Although the total numbers and patients per type declined owing to the fear of COVID-19, the distribution of dental problems had increased significantly after the pandemic. For instance, there was a hike in dental trauma cases from 0.3% to 2.2%. (Fig. 1). There was a significant reduction in the number of patients seen from 8045 to 521 during the pre-lockdown period of COVID 19, especially during the early weeks of the lockdown (see Fig. 2).

Upon comparing the activity of dental health services between the lockdown month and the same period in 2019, there was a drastic change. The hospital suspended all routine dental procedures and the main focus was to provide treatment for acute tooth ache, oral and maxillofacial trauma, cellulitis, and abscess.

The change in dental health services offered was notified to the public through official web-based and mobile networks. During the lockdown, most of the dental emergencies (228/265) were related to endodontics (86.1%), which were managed mostly through the "3A" approach (advise, analgesics, and antibiotics) (60.1%) and the remaining (26.0%) through extraction.

4. Discussion

In response to the COVID-19 outbreak, the Government of India (GOI) announced a series of measures (including lockdown) on March 22, 2020 to curb the spread of the virus and sustain the capacity of the national health services. During this period, there has been a substantial decrease in the emergency visits to tertiary care hospitals and the treatment services offered (NHS, MoH&FW, GOI, 2020). We retrospectively reviewed the characteristics of dental emergencies and their immediate effects on treatment services in a tertiary care center during the lockdown period. Furthermore, we described and compared the activity over the same period (April 14–May 13, 2020) with the pre-lockdown period of COVID-19 (February 14–March17, 2020) and corresponding period of 2019.

In our study, the total number of patients who visited the dental OPD during the lockdown was 521, with the maximum percentage being in the age group of 31–35 years (66.8%). The numbers of patients in the corresponding periods of 2019 were 8110 and 8034, which were similar to those reported by other studies on COVID-19 and SARS-CoV-2003 (Chen et al.,2020, Meng et al., 2020, Carter et al., 2020, Samaranayake and Peiris, 2004, Li et al., 2004, Cochrane Oral Health, 2020). During the pandemic period, routine dental care was mostly suspended and only emergency cases were seen. This was the

Table 2 Characteristics of dental emergencies.

Group period	Total	Dental emergency total	Dental emergency characteristics							
			Male n (%)	Female n(%)	New cases n (%)	Old cases n (%)	Referred n(%)	Non referred (DIRECT) n(%)	Endo related n (%)	Others n(%)
Group 1 (14 feb-17 march 2019)	8034	395 (4.9%)	182 (46.1%)	213 (53.9%)	274 (69.3%)	123 (30.7%)	168 (42.5%)	227 (57.5%)	322 (81.5%)	73 (18.5%)
Group 2 (14 april-13 may 2019)	8110	406 (5%)	196 (48.2%)	210 (51.7%)	302 (74.3%)	104 (25.7%)	90 (22.1%)	316 (77.9%)	356 (87.6%)	50 (12.4%)
Group 3 (14 feb-17 march 2020)	8045	387 (4.8%)	202 (52.2%)	185 (47.8%)	309 (79.8%)	78 (20.2%)	65 (16.8%)	322 (83.8%)	303 (78.3%)	84 (21.7%)
Group 4 (14 april-13 may 2020)	521	265 (51.7%)	141 (53.2%)	124 (46.8%)	212 (80%)	53 (20%)	49 (18.5%)	216 (81.5%)	228 (86.1%)	37 (13.9%)

Table 3 Characteristics of endodontic related emergencies.

Group period	Total DENTAL emergency	Endo total	characteristics of endodontic related emergencies				
			Pulpal N (%)	PA N(%)	Cellulitis N (%)	Abscess N (%)	Dental trauma N (%)
Group 1 (14 feb-17 march 2019)	395	322 (81.5%)	159 (40.2%)	78 (19.7%)	44 (11.1%)	35 (8.8%)	06 (1.5%)
Group 2 (14 april-13 may 2019)	406	356 (87.6%)	179 (44%)	93 (22.9%)	11(2.7%)	64 (15.7%)	09 (2.2%)
Group 3 (14 feb-17 march 2020)	387	303 (78.2%)	182 (47.0%)	69 (17.8%)	19 (4.9%)	28 (7.1%)	05 (1.2%)
Group 4 (14 april-13 may 2020)	265	228 (86.0%)	122 (46.0%)	40 (15.0%)	11 (4.1%)	44 (16.6%)	01 (0.3%)

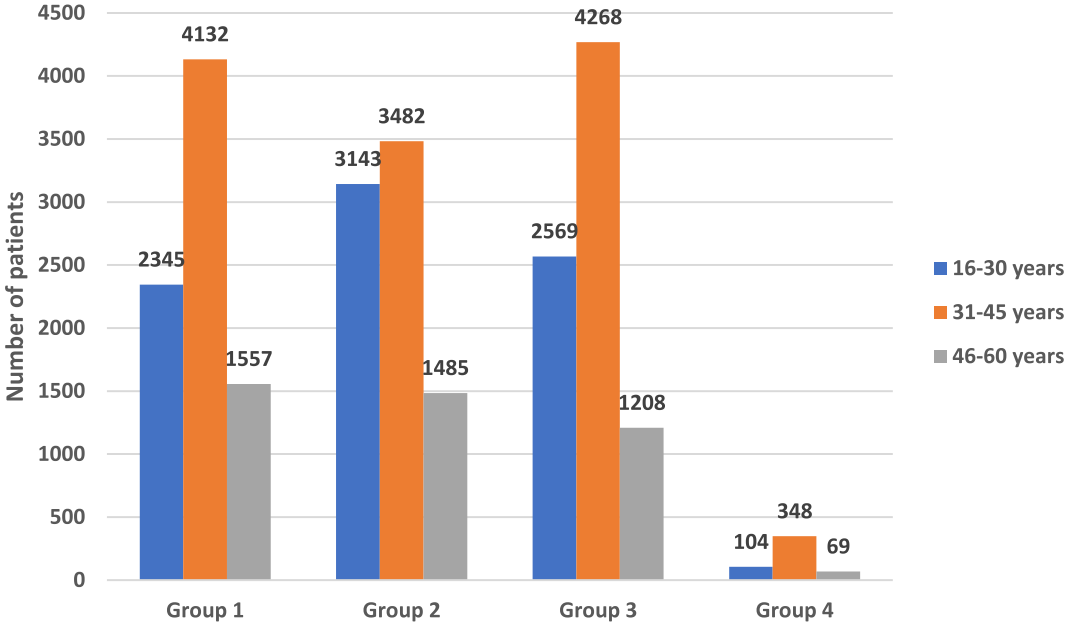

Fig. 1 Age-wise distribution of patients across the groups.

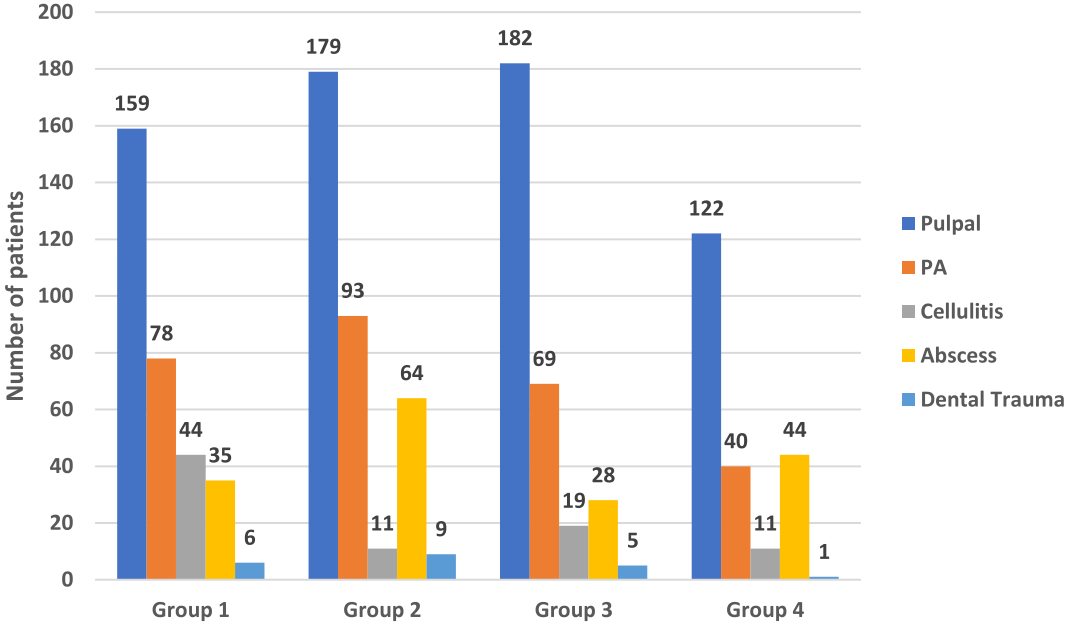

Fig. 2 Characteristics of endodontic related emergencies.

main reason behind the reduced count of the overall dental emergency patients.

Upon comparing the dental emergency visits among the groups, the overall percentage of emergency visits was 4.9% (345/8034) in group I, 5% (406/8110) in group II, 4.8% (387/8045) in group III, and only 51.7% (265/521) in group IV. However, no significant difference in gender was seen among the groups.

In the present study, nearly the same ratio of new-to-old cases and referred-to-unreferred cases was seen in all four groups unlike the other studies (Guo et al., 2020, Cochrane Oral Health, 2020, Yu et al., 2020) that had shown a greater percentage of male patients presenting with dental emergencies. The most common reason for visits in group IV of dental emergency was related with endodontics, i.e. 86.1% (228/265), and the diagnosis was pulpal-related diseases, i.e. symptomatic irreversible pulpitis (53.1%, 122/265 patients), followed by abscess (16.6%, 44/265), symptomatic apical periodontitis (15.0%, 40/265), cellulitis (4.1%, 11/265), and dental trauma (0.3%, 01/265).

Upon comparing with previous studies in the literature, the results of endodontic emergency were similar (Guo et al., 2020, Cochrane Oral Health, 2020, Yu et al., 2020). The number of trauma cases was reduced since the government authorities limited outdoor activities, all vehicular movement, construction work, and industrial activities and the national highways remained closed during the lockdown to reduce exposure and limit transmission. With changes in lifestyle and with more people working from home, there might have been a reduction in overall injuries. Besides, owing to fear of the pandemic, people were reluctant to venture out and report to hospitals.

One concern in the present study was the increase in the overall number of patients with acute dental infections visiting the center for treatment during the lockdown period when compared with the pre-lockdown period and the corresponding periods of 2019.

The treatment service of dental emergencies was challenging during the COVID-19 pandemic owing to potential exposure to the virus, making it a high risk procedure. Thus, patient consent should be taken before arriving at any treatment decision (Kamate et al., 2020, Quadri et al., 2020). Treatments such as extractions should be prioritized over restorative procedures, but intensive care is required when infections threaten the airway. To minimize repeated patient contact, digital (for instance, through video calls) follow-up should be preferred to ensure the safety of the patients and the clinicians. Telephonic consultations have been commenced for most of the outpatient visits (Estai et al., 2018; ADA Policy on Teledentistry., 2020; Daniel et al, 2014; Khan and Omar, 2013). The backlog of non-urgent cases being delayed owing to the disruption caused by COVID-19 due to reducing elective services protects the patients from in-hospital viral transmission and the associated post operative pulmonary complications. Changes in working pattern, such as the time-consuming wearing of personal protective equipment (PPE), and modified ways of working, such as the use of triage helpline to limit gathering and maintain social distancing, have reduced the number of patients seen per session. This number needs to be further reduced by embracing approaches such as telephonic and video consultations through virtual clinics to facilitate careful evidence-based practice, besides providing education and preventive care (Daniel et al., 2018). COVID-19 testing should be undertaken with the same high priority in dental professionals as in other healthcare workers. The risk of becoming COVID-19 positive for a dental practitioner attending emergency dental services should not be underestimated (ADA Policy, 2020; Harrel and Molinari, 2004). The possible health consequences of people's fears as the public attention is mostly on the direct causes and control measures of COVID-19 should not be overlooked. Future dental needs should be predicted only after understanding the present situation (Federico et al., 2020). The present study speculates that the requirement for dental services might grow explosively in the post-COVID-19 period.

Retrospective observational study design, sample size of the test group, and choosing a single tertiary care center are among the limitations of this study. The universal validity of the study regarding the dental emergency characteristics are subject to the risk of referral bias, which might have affected the outcome.

5. Conclusion

Within the limitations of this study, our results suggest that the COVID-19 pandemic had a strong influence on the number of emergency dental visits and the overall number of visitors reduced significantly. Health service provision was also considerably disrupted during the pandemic. The utilization of telehealth was significantly higher during the lockdown than during the pre-lockdown period as it helped in lowering the risk of SARS-CoV-2 transmission by reducing the exposure and limiting the treatment time.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

All the authors made substantial contributions to the conceptualization, design of work, data acquisition, validation, drafting the work or revising it critically. All the authors have read and approved the final version of the manuscript and agreed to be accountable for all aspects presented in the article.

Funding

The authors have not received a grant for this article from any funding agency in the public, commercial or not-for-profit sectors.

Patient consent for publication

Not required.

Provenance and peer review

Not commissioned; internally peer reviewed.

References

Ali, S. et al, 2020. Transmission routes and infection control of novel Coronavirus-2019 in dental clinics–a review. J. Islamabad Med. Dent. Coll. 9, 65–72.

American Dental Association, 2020. ADA Policy on Teledentistry. Available at https://www.ada.org/en/about-the-ada/ada-positions-policies-and-statements/statement-on-teledentistry (accessed May).

Ather, A. et al, 2020. Coronavirus disease 19 (COVID-19): implications for clinical dental care. J. Endo. 46, 584–595.

Carter, E. et al, 2020. The first six weeks-setting up a UK urgent dental care centre during the COVID-19 pandemic. Br. Dent. J.228, 842–848.

Chen, N. et al, 2020. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lanc. 395, 507–513.

Cochrane Oral Health, 2020. Recommendations for the re-opening of dental services: a rapid review of international sources. Dent Serv. Evid. Rev Work. Gr;(May), 1–45.

Daniel, S.J. et al, 2014. Teledentistry: a key component in access to care. J. Evid. Based Dent Pract. 14, 201–208.

Estai, M. et al, 2018. A systematic review of the research evidence for the benefits of teledentistry. J. Telemed. Telecare. 24, 147–156.

Federico, A.V. et al, 2020. COVID-19 and dentistry: prevention in dental practice, a literature review. Int. J. Environ. Res. Pub Healt. 17, 4609–4621.

Guo, H. et al, 2020. The impact of the COVID-19 epidemic on the utilization of emergency dental services. J. Dent Sci. 15, 367–368.

Harrel, S.K., Molinari, J., 2004. Aerosols and splatter in dentistry: a brief review of the literature and infection control implications. J. Am. Dent Assoc. 135, 429–437.

Khan, S.A., Omar, H., 2013. Teledentistry in practice: literature *review*. Telemed. J. E. Health. 19, 565–567.

Li, R.W. et al, 2004. Severe acute respiratory syndrome (SARS) and the GDP. Part II: implications for GDPs. Br. Dent J. 197, 130–134.

Meng, L. et al, 2020. Coronavirus disease 2019 (COVID-19): emerging and future challenges for dental and oral medicine. J. Dent. Re. 99, 481–487.

National Health Service (NHS) on COVID-19: Lockdown across India, in line with WHO guidance". UN News. 24 March 2020.

Peng, X. et al, 2020. Transmission routes of 2019-nCoV and controls in dental practice. Int. J. Oral Sci. 12, 9–13.

Samaranayake, L.P., Peiris, M., 2004. Severe acute respiratory syndrome and dentistry: a retrospective view. J. Am. Dent. Assoc. 135, 1292–1302.

Sohrabi, C. et al, 2020. World Health Organization declares global emergency: a review of the 2019 novel coronavirus (COVID-19). Int. J. Surg. 76, 71–76.

WHO director-general's opening remarks at the media briefing on COVID-19 - 3 March 2020.

Yu, J. et al, 2020. Characteristics of Endodontic Emergencies during Coronavirus Disease 2019 Outbreak in Wuhan. J. Endod. 46 (6), 730–735.

Zhu, N. et al, 2020. A novel coronavirus from patients with pneumonia in China. N. Engl. J. Med. 382, 727–733.