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Did the March 2020 lockdown cause an increase in patients presenting to the emergency department with odontogenic pain and infection? A single centre, retrospective analysis

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Abstract

On the 25 March 2020 the Chief Dental Officer (CDO) published guidance to restrict the provision of routine dental care in England due to the rapid spread of the severe acute respiratory syndrome Coronavirus 2 (COVID-19). We analysed the impact of the pandemic on the number of patients presenting with odontogenic pain and infection to the emergency department (ED) of an urban-based teaching hospital, the Bristol Royal Infirmary (BRI). Furthermore, we investigated the severity of infection at first presentation to the ED. The study period encompassed three phases that represented the stages of pandemic restrictions: phase 1 prior to lockdown measures, with no restrictions to dental practice; phase 2 during the government lockdown, with the severest restrictions on dental practices; and phase 3 following the ease of lockdown measures, with return to limited dental services. Data were collected retrospectively from electronic patient records (EPR) regarding adult patients presenting to the ED with dental pain. The rate of presentations (per week) was calculated for each timepoint and compared. A severity score was assigned to each patient using a grading system based on signs of clinical infection and treatment modality. Patients' presentations were analysed at each phase of the pandemic. There was a 42.8% increase in attendance with oral facial pain and infection to ED from phases 1 to 3. The COVID-19 pandemic resulted in restrictions to routine primary dental care services, which were deemed necessary to reduce the spread of the virus. However, this increased demand on secondary care services, as patients increasingly struggled to access primary dental care to manage dental pain.

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Introduction

COVID-19 created significant challenges for the National Health Service (NHS) and introduced significant limitations to dental services in both primary and secondary care. The

World Health Organization declared COVID-19 a global pandemic on 11 March 2020.¹ A nation-wide lockdown was enforced in the United Kingdom on 24 March 2020.² Following this, the CDO published guidance to cease the practice of non-urgent and routine dental care in England on the 25 March 2020.³

This resulted in a shift from face-to-face clinical practice to a remote telephone triage service, focussed on offering 'Advice, Analgesia and Antibiotics' (AAA). Patients requiring urgent, face-to-face treatment had to fulfil strict criteria to be referred to an Urgent Dental Care Centre (UDCC) via

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their general dental practitioner (GDP) or NHS 111.³ These measures impacted access to primary dental care and left many patients with unresolved dental concerns. Studies have demonstrated an increase in the prescription of antibiotics for dental conditions which, under normal circumstances, could have been managed operatively in a primary care dental setting.⁴ As a result, during the March 2020 lockdown, patients' dental issues were not being resolved as efficiently.

On the 8 June 2020, following the relaxation of lockdown measures, the CDO issued new guidance to restart face-to-face clinical practice in primary care, as part of a phased transition to the reopening of dental practices.⁵ Implementation of enhanced infection prevention and control measures to reduce COVID-19 transmission generated changes in practice that increased costs and reduced the number of patient appointments available. To begin with, practices had to acquire their own adequate personal protective equipment (PPE), to comply with new infection control measures. This was made challenging by supply issues, which caused further delays in the initial opening of practices.⁶ This improved with NHS practices ordering PPE from the government PPE portal. Additionally, 'fallow time' - the period of time a dental surgery must be left empty after the completion of an aerosol generating procedure (AGP) - was mandated, which resulted in longer appointments and compromised the total number of patients seen per day.

A survey conducted by the Royal College of Surgeons Dental Faculty reported that only 40% of the surveyed NHS GDPs were performing AGPs from the 8 of June until September 2020, with many reporting large reductions in the number of patients seen per session compared to pre-pandemic sessions.⁷ As a result of the lockdown, and COVID-19 risk management measures, dental services in the UK were severely truncated. An increase in patient presentations to secondary care ED services, which had limited resources and different skill sets than those needed to treat dental problems, was not appropriate in an already stretched resource. A study in Mid Yorkshire Hospital Trust showed that a reduction in access to primary care dentistry adversely affected the provision of early treatment for odontogenic infections, which resulted in an increased severity of disease presenting to their ED.⁸

The aim of this analysis was to explore the impact of the pandemic on the number of patients presenting to the ED at the BRI with odontogenic pain and infection. In addition, it assessed the severity of infection at first presentation to the ED both during primary dental care restrictions and after, when dental services re-opened with some restrictions.

Material and methods

Data were collected retrospectively from EPR regarding adult patients attending the ED of the BRI, from 1 January 2020 to 1 January 2021. Inclusion criteria were patients presenting with odontogenic pain and/or odontogenic infection. Dentoalveolar trauma was excluded. Data from the EPR were collected on patient demographics such as age and

gender, details of their condition, indicators of infection severity, and details of treatment provided. A full list of recorded variables is shown in [Table 1](#)

Patients were separated into three groups based on attendance date. The first group (phase 1) corresponded to 1 January to 24 March 2020, with no COVID-19 restrictions. The second group (phase 2) assessed 25 March to 7 June 2020 during closure of routine primary dental care. The third group (phase 3) covered 8 June 2020 to 1st January 2021, when primary dental care reopened, albeit with tight restrictions. As the relatively short duration of phase 2 meant numbers of attendance were low, phases 2 and 3 were combined in statistical analyses to create a post COVID-19 restriction phase. Each attendance was counted as a single event, even if the patient had attended previously. The number of patient attendances were calculated per day and per week during each phase ([Table 2](#)).

Severity of the patient's condition was assessed by grading signs and symptoms and the management implemented. Scores for systemic features of infection, treatment, antibiotics, signs of sepsis, and intensive treatment unit (ITU) admission were assigned a numerical value ([Table 3](#), column 2). Severity scores were combined to give an overall total severity score out of a maximum of 21. Subsequently this variable was dichotomised into Mild (score 0–4) and Moderate-Severe (5–21).

Approval for the study was sought and approved by the clinical governance committee at University Hospitals Bristol and Weston NHS Foundation Trust.

Data was anonymised and statistical analysis performed using StataMP17. A paired 2-sided *t*-test was used to assess for evidence of a difference between the mean number of ED attendances prior to (phase 1), and after COVID-19 restrictions on routine primary dental care (phases 2 and 3 combined). A chi squared test with one degree of freedom was used to compare severity scores prior to and after implementation of COVID-19 dental restrictions ([Table 3](#)).

Results

Change in attendance

A total of 582 patients attended the ED during the study period 1 January 2020 to 1 January 2021 with odontogenic pain, with or without infection. In phase 1, prior to COVID-19 restrictions to primary care dental services, 101 patients attended the ED. A total of 117 patients attended in phase 2 and 364 in phase 3 ([Table 3](#)). The number of presentations to the ED per week are shown in [Table 2](#). Attendance increased by 27.8% in phase 2. This increased by a further 11.7% in phase 3. The difference in mean ED attendances per week between phase 1, and phases 2 and 3 combined was 3.1, with 95% confidence interval (CI): 0.3–5.7; $p = 0.005$. Overall, there was a 42.8% attendance increase to ED from phases 1–3 ([Table 2](#)).

Of the patients seen in phase 1, 57.4% ($n = 58$) did not see a GDP prior to attending the ED. This increased to 70.9%

Table 1
Data collection for each presentation to the emergency department.

Variable	Parameter
Anonymous identifier	
Age	
Sex	Male/Female
Referral source	Emergency department/Bristol Dental Hospital
Regular dental attender	Yes/No/Unknown
Previous general dental practitioner visit prior to emergency department attendance	Yes/No
Previous general medical practitioner visit prior to emergency department attendance	Yes/No
Previous antibiotic prescription	Yes/No
Comorbidities	Oral/IV
Medication	Diabetes, smoking, immunocompromised
Allergies	Steroids, anticoagulants, immunosuppressants, other, none
Systemic involvement	Yes/No
Infection site	None, lymphadenopathy, neck swelling, trismus, dysphonia/dysphagia, bilateral neck swelling/ Ludwig's angina
Ludwig's angina	Yes/No
Return to theatre	Yes/No
ITU admission	Yes/No
Previous analgesic use	Paracetamol, ibuprofen, paracetamol and ibuprofen, codeine, codeine and paracetamol, other, none
Previous dental treatment	None, extirpation, temporary restoration, incision and drainage, extraction under local anaesthesia
Sepsis six trigger	Yes/No
Route of antibiotic prescribed in secondary care	Oral and discharge from emergency department, IV in emergency department and discharge, IV and admit
Treatment	No treatment, analgesic advice, discharge and dentist to treat, extraction under local anaesthesia, incision and drainage under local anaesthesia, treatment under general anaesthesia

Table 2
Number of attendances to the emergency department for dental pain and or infection during the different phases of primary dental service restrictions due to COVID-19. Data are number.

Phase	Number of presentations seen at BRI	Number of days in phase	Number of weeks in phase	Average number of presentations/weeks	Mean difference pre and post COVID-19 restrictions
Phase 1 Pre COVID-19 restrictions 1 January to 24 March 2020	101	84	11.8	8.5	
Phase 2 25 March to 7 June 2020	117	75	10.7	10.9	
Phase 3 8 June 2020 to 1 January 2021	364	208	29.8	12.2	
After COVID-19 restrictions Phases 2 and 3 combined	481	283	40.5	11.8	3.07 (0.35, 5.78) p=0.005

(n = 83) in phase 2 and 70.0% (n = 255) in phase 3. General medical practitioner (GMP) advice regarding dental concerns, was sought by 7.9% (n = 8) in phase 1 which increased only minimally to 8.5% in phase 3.

A total of 104 patients (17.8%) received dental care prior to attending the ED - distribution and type of treatment are shown in Fig. 3. The majority (n = 74) of these patients, having already sought advice from a GDP, had no systemic features and received no further treatment from the ED.

Severity of infections across time

The majority of patients presented with low severity scores, increasing only slightly across the phases, 75.2% (phase 1), 84.6% (phase 2) and 81.0% (phase 3) (Table 3). Only 19.2% of presentations scored Moderate-Severe across the study. 82.0% (n = 480) of patient presentations had no clinical systemic involvement. Three patients (0.8%) presented with severe bilateral neck swelling. Fig. 1 shows the total severity

Table 3
Severity score/phase of COVID-19 restrictions to primary dental care. Data are No. (%).

Variables	Phase 1	Phase 2	Phase 3	Post COVID-19 restrictions (phases 2 and 3)	Total
Systemic score:					
No sign of systemic involvement (score = 0)	82 (81.2)	100 (85.5)	298 (81.9)	398 (82.7)	480 (82.5)
Lymphadenopathy (score = 1)	0	3 (2.6)	4 (1.1)	7 (1.5)	7 (1.2)
Trismus (score = 2)	12 (11.9)	7 (5.9)	44 (12.1)	51 (10.6)	63 (10.8)
Major neck swelling (score = 3)	0	0	0	0	0
Dysphagia/dysphonia (score = 4)	7 (6.9)	7 (5.9)	15 (4.1)	22 (4.6)	29 (4.9)
Bilateral neck swelling/Ludwig's angina (score = 5)	0	0	3(0.8)	3 (0.6)	3 (0.5)
Total	101	117	364	481	582
Mean score	0.51	0.38	0.46	0.44	0.45
Treatment score:					
No treatment (score = 0)	18 (17.8)	8 (6.8)	41 (11.2)	49 (10.2)	67 (11.5)
Analgesic advice/GDP to treat/referral to BDH (score = 1)	53 (52.5)	79 (67.5)	237 (65.1)	316 (65.7)	369 (63.4)
Extraction with LA (score = 2)	0	1 (0.9)	0	1 (0.2)	1 (0.2)
Incision and drainage LA (score = 3)	15 (14.9)	19 (16.2)	52 (14.3)	71 (14.8)	86 (14.8)
Treatment under GA (score = 4)	15 (14.9)	10 (8.6)	34 (9.3)	44 (9.1)	59 (10.1)
Total	101	117	364	481	582
Mean score	1.56	1.52	1.45	1.47	1.49
Antibiotic score:					
No antibiotics (score = 0)	40 (39.6)	50 (42.7)	138 (37.9)	188 (39.1)	228 (39.2)
Oral antibiotics and discharged (score = 1)	33 (32.7)	51 (43.6)	149 (40.9)	200 (41.6)	233 (40.0)
IV antibiotics and discharged (score = 2)	7 (6.9)	4 (3.4)	34 (9.3)	38 (7.9)	45 (7.7)
Admitted for IV antibiotics (score = 3)	21 (20.8)	12 (10.3)	43 (11.8)	55 (11.4)	76 (13.1)
Total	101	117	364	481*	582
Mean score	1.09	0.81	0.95	0.92	0.95
Sepsis six pathway:					
No (score = 0)	98 (97.0)	115 (98.3)	354 (97.3)	469 (97.5)	567 (97.4)
Yes (score = 4)	3 (2.9)	2 (1.7)	10 (2.8)	12 (2.5)	15 (2.6)
Total	101	117	364	481	582
Mean score	0.12	0.07	0.11	0.10	0.1
ITU admittance:					
No admittance to ITU (score = 0)	100 (99.0)	116 (99.2)	359 (98.6)	475 (98.8)	575 (98.8)
Admitted to ITU (score = 5)	1 (0.9)	1 (0.9)	5 (1.4)	6 (1.2)	7 (1.2)
Total	101	117	364	481	582
Mean score	0.05	0.04	0.07	0.06	0.06
Total mean score	3.34	2.82	3.04	2.99	3.05
Low severity score total (0–4)	76 (75.2)	99 (84.6)	295 (81.0)	394 (81.9)	470 (80.8)*
Moderate-severe severity score total (5–21)	25 (24.8)	18 (15.4)	69 (19.0)	87 (18.1)	112 (19.2)*
Total	101	117	364	481	582

* Chi-squared test comparing pre and post COVID-19 restrictions $\chi^2 = 2.8$; $p = 0.1$; 1 degree of freedom.

scores across each phase: two patients scored 21, both in phase 3. Severity score total was dichotomised into Mild (Score 0–4) and Moderate-Severe (Score 5–21). A total of 80.8% ($n = 470$) of presentations were classified as Mild and 19.2% ($n = 112$) of presentations fell into the Moderate-Severe category (Fig. 2). There was a slightly lower proportion of Moderate-Severe presentations post COVID-19 restrictions however there was no statistical evidence for a difference ($\chi^2 = 2.8$, $d.f = 1$, $p = 0.1$) shown in Fig. 3.

Antibiotic prescription prior to attending ED occurred in 28.7% ($n = 29$) of presentations, with an additional 2.0% ($n = 2$) having multiple courses for the same dental concern.

Presentations to the ED were largely an inappropriate use of secondary care resources, as 63.0% ($n = 367$) of patients

were discharged from the ED to see a GDP for treatment or given advice regarding analgesia. A total of 40.0% of patients ($n = 233$) were given oral antibiotics and discharged, with a further 30.0% ($n = 175$) discharged without a prescription.

When dental infections are severe, however, this creates substantial burden on the NHS due to requirements for admission, surgical management, and the potential need for ITU support. The predominance of patients required no acute emergency treatment: 63.0% ($n = 367$) were discharged with advice and 40.0% were discharged with oral antibiotics. Of the patients who required admission (13.0%), 59 (78.0%) required surgical intervention in combination with IV antibiotics, with seven patients necessitating ITU admission. The mean (range) ITU stay was 4.12 (2–17) days.

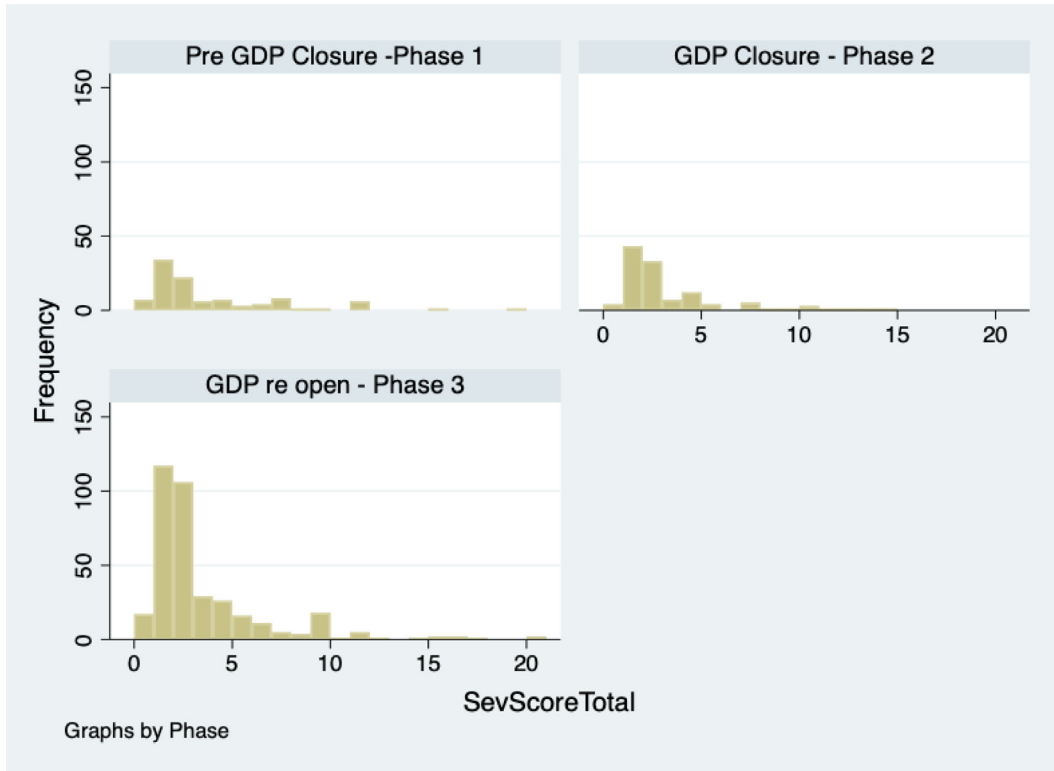


Fig. 1. Total Severity Score at each phase of primary dental care closure due to COVID-19 restrictions.

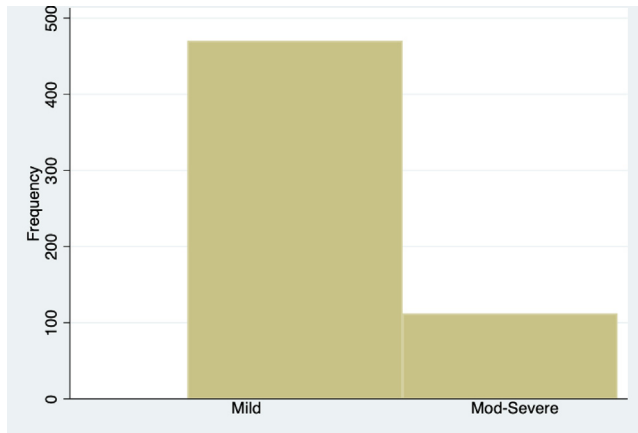


Fig. 2. Total severity score across the Phase 1, 2 and 3 separated into Mild and Moderate-Severe Severity.

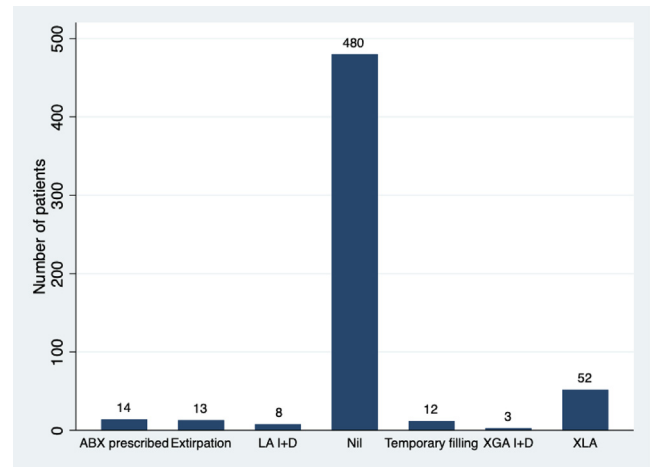


Fig. 3. Bar chart to show pre admittance dental treatment across the study period.

Discussion

This study provides evidence that COVID-19 pandemic-related restrictions to dental care caused an increase in patients presenting with dental pain and infection to ED. This has been corroborated by other single-centre studies in the UK.^{8,9}

For the duration of the study, most patients who attended the ED with dental problems presented with low severity conditions and required little input from secondary care. The results show a 14.0% increase in patients attending the ED without prior consultation with a dentist fol-

lowing lockdown measures. It is postulated that many of these patients could have accessed a primary care dentist had there been no restrictions. However, a conflicting observation from the data is that over half of the patients had not sought help from a dentist before the COVID-19 dental restriction implementation. This rose to over 70.0% during phases 2 and 3. This highlights a pre-existing lack of access to NHS dental care, which was exacerbated by pandemic restrictions, when the delivery of courses of dental treatment decreased by 68.7%, during the 12-month period prior to March 2021.¹⁰

A number of patients, ranging from 8 to 31 during phases 1 to 3, respectively, sought help for their dental problems from a GMP prior to attending the ED, which is not appropriate or the responsibility for GMPs to manage. This predates the COVID-19 crisis, equating to approximately 380,000 GMP consultations for dental concerns annually in the UK.¹¹

Phase 2, when routine dentistry was suspended but a ‘AAA’ telephone triage service was adopted, saw an increase in ED attendances from phase 1 by 27.8%. Although the ‘AAA’ strategy can easily and quickly be implemented at a national scale, it has several limitations especially for conditions that do not respond to antibiotics, such as pulpitis. Antibiotic prescribing from April to July 2020 was 25.0% higher than the previous year.⁴ However, in our study, the number of patients receiving antibiotics prior to their ED attendance did not increase but remained at similar levels prior to and during COVID-19 dental restrictions, with 30.0% in phase 1, 31.0% in phase 2, and 26.0% in phase 3.

The number of patients with dental infections requiring ITU input and triggering a sepsis six pathway, an indication of severe spreading infection, increased after implementation of the pandemic restrictions. The results demonstrated that the most severe infections were observed in phase 3; five patients were admitted to ITU out of a total of seven across the study period. The data suggest that the restrictions in routine primary dental care services contributed to an increase in the emergence of number of patients requiring ITU treatment because of odontogenic infections.

During the study period, six patients reattended the ED for the same dental complaint. Four of these required subsequent admittance for GA and two were referred to the dental hospital for treatment as they were unable to access their own GDP after initial advice and treatment in the ED. Of the six patients who re-attended, one patient required three subsequent incision and drainage procedures under GA due to the severity of the dental infection and one patient, on their second re-attendance required ITU admission. This highlights the impact on patients of not being able to attend a GDP despite not requiring treatment at the initial ED attendance.

Conclusion

This study investigated the impact of COVID-19 related restrictions to dental care on the number of patients presenting to ED with dental pain and infection. It has demonstrated an increase in presentations to ED regarding dental pain and infection following the CDO restrictions on primary dental care since 25 March 2020. It was suggested that due to a lack of availability in primary care dentistry, the severity of infections would increase following lockdown. The results show the most severe cases requiring ITU admission occurred following lockdown measures and restricted access to dental care. It can be inferred from the data that this was a direct result of patients being unable to access primary dental care.

However, the majority of presentations were deemed to be of low severity, and did not require secondary care input, which placed an unnecessary burden on an already stretched ED resource.

It was demonstrated that many patients coming to the ED with dental problems had not seen a dentist first, even if their presenting complaint did not require secondary care input. This inappropriate use of ED services highlights a pre-existing limitation of primary dental care provision in the UK, which has been exacerbated by COVID-19 public health measures.

The COVID-19 pandemic brought many restrictions to primary care health services, which were deemed necessary to prevent the spread of the virus. However, the collateral damage to dental care services in the UK has far reaching implications for both patients and dental practices.

Conflict of interest

We have no conflicts of interest.

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