

Review Article

A Scoping Review and Single-Center Insights on Dental Emergencies during Coronavirus Disease-2019

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Received: 29 August 2022; Revised: 21 November 2022; Accepted: 27 November 2022

ABSTRACT

This study aimed to evaluate the effects of the COVID-19 pandemic on dental emergencies. A systematic literature review (PubMed/Scopus) was conducted to identify studies on COVID-19 and dental abscesses, alongside a retrospective cohort study analyzing both quantitative and qualitative data from patients admitted to our hospital's emergency department for cervico-facial abscesses of dental origin. Thirteen studies were included in the review, examining the characteristics and management of dental emergency patients in hospitals and private practices, though overall evidence was limited. The retrospective cohort included 232 consecutive patients (100 study group vs. 132 control). Findings indicated an increase in both the prevalence of dental emergencies (abscesses) and associated complications (mediastinitis, death). Access to dental care was restricted, with significant variability across regions and countries. High-risk, aerosol-generating procedures were largely avoided, and hospital stays were shortened. Male patients and those with comorbidities appeared less likely to resume regular dental visits during the post-lockdown period. Although available evidence remains limited, the COVID-19 pandemic appears to have influenced dental emergencies by reducing routine dental care availability and affecting the behaviors of both healthcare providers and patients.

Keywords: Tooth extraction, Periapical abscess, COVID-19, Dental emergencies

How to Cite This Article: Mehta A, Singh A, Kumar R. A Scoping Review and Single-Center Insights on Dental Emergencies during Coronavirus Disease-2019. *Int J Dent Res Allied Sci.* 2022;2(2):45-53. <https://doi.org/10.51847/rmXFhWFNC1>

Introduction

The coronavirus disease 2019 (COVID-19) emerged in December 2019, caused by a novel member of the Coronaviridae family, the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2). Its clinical manifestations, primarily affecting the respiratory system, range widely from mild symptoms to severe viral pneumonia, potentially resulting in respiratory failure and death [1, 2].

Since the onset of the pandemic, daily life worldwide has been profoundly altered. Restrictions on routine activities, particularly during the European lockdown from March to May 2020, created significant barriers to accessing dental care.

From the beginning, the risk of COVID-19 transmission during dental procedures—especially aerosol-generating procedures (AGPs)—was a major concern for both patients and dental staff [3]. Dental practices inherently produce droplets and aerosols through procedures, speech, coughing, or sneezing, which can occur while the patient is unmasked. Transmission may also occur over longer distances via airborne viral particles, increasing contagion risk among patients and clinicians [4, 5]. To mitigate these risks, regional guidelines emphasized the use of personal protective equipment (PPE), including powered air-purifying respirators (PAPRs) when

treating SARS-CoV-2-positive patients with dental emergencies, and recommended minimizing AGPs [6]. During Italy's lockdown, the Ministry of Health advised postponing routine dental care, limiting treatment to urgent conditions—such as abscesses or pain unresponsive to medication—after telephone triage [7]. By the end of May 2020, updated guidelines for safe dental procedures were issued, restoring access to care, and similar measures were implemented in other countries. For instance, the U.K. recommended telephonic triage to provide advice, analgesics, and antibiotics when necessary, referring patients to urgent dental care centers if initial management was insufficient [8]. It was anticipated that restricted access to dental care would lead to an increase in emergency presentations of odontogenic cervicofacial abscesses. Although generally preventable with routine dental care in patients without severe comorbidities, odontogenic cervicofacial infections can be life-threatening, with potential complications including airway obstruction, sepsis, spread of infection, and death [9].

Given the novelty of COVID-19, data on its short- and long-term impact on healthcare, including dentistry, remain limited [3]. During lockdown, reduced access to preventive or routine dental services inevitably contributed to an increase in acute dental conditions. Even after implementation of strict safety guidelines to protect patients and clinicians, it was hypothesized that patient attendance patterns would change, potentially affecting the occurrence of severe dental complications [3].

Numerous studies have examined the impact of COVID-19 on other medical conditions, highlighting how the pandemic's disruptions—including reduced inpatient availability—may influence disease outcomes, often reflecting variations in management across countries, as summarized in systematic reviews [10–14]. To consolidate evidence regarding COVID-19 and dental emergencies, we conducted a systematic scoping review of the available literature. Additionally, we performed a retrospective analysis of dental abscess admissions during the pandemic at our hospital (“A.O.R.N. A. Cardarelli,” Naples, Campania, Italy), using previous years as controls. To our knowledge, there are no regional reviews from Southern Italy addressing the impact of COVID-19 on dental emergencies.

This study aims to provide a comprehensive overview of the existing evidence on how COVID-19 has influenced dental complications by integrating our local data with findings from the literature.

Materials and Methods

Systematic scoping review

The review adhered to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. In April 2022, a systematic scoping review was conducted using PubMed and SCOPUS to capture studies related to COVID-19 and dental emergencies. The search query employed was: (TITLE-ABS-KEY (“SARS-COV-2”) AND/OR TITLE-ABS-KEY (“COVID-19”)) AND (TITLE-ABS-KEY (“dentistry”) OR TITLE-ABS-KEY (“dental”) OR TITLE-ABS-KEY (“dental abscess”)), structured to maximize comprehensiveness. All authors independently screened titles and abstracts, excluding studies that were off-topic or not in English. Full-text evaluation followed for the remaining papers. Studies were excluded if:

- The full text was not available in English
- They were duplicate records
- They did not specifically address odontogenic abscesses or urgent dental care during the COVID-19 period

Eligible documents included case reports, case series, clinical studies, literature reviews, commentaries, and letters to the editor. Relevant findings were extracted and summarized narratively by all authors.

Single-center analysis of dental abscesses during the COVID-19 pandemic

The observational study followed STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines. Medical records from “A.O.R.N. A. Cardarelli” hospital (Naples, Campania, Italy) were reviewed to identify all consecutive Emergency Room admissions to the Dentistry and Maxillofacial Surgery Units for odontogenic abscesses between March 2020 and May 2021. Collected variables included patient age, sex, hospitalization duration, mediastinitis occurrence, and mortality.

Treatment included medical therapy (ampicillin + sulbactam 1 g + 2 g IV per day) with or without intraoral or percutaneous drainage and/or extraction of the affected tooth. Extraction was omitted for teeth deemed restorable by endodontic treatment or already removed prior to abscess persistence. Patients were divided into four temporal groups: lockdown (March–May 2020, when private dental services were closed), post-lockdown (June 2020–May 2021), total pandemic period (March 2020–May 2021, n=100), and a pre-pandemic control group (January 2018–February 2020).

Both qualitative and quantitative analyses were performed to assess changes in dental abscess presentations during the pandemic. Statistical

comparisons were conducted using unpaired Student's t-tests and Pearson Chi-square tests, with a 95 percent confidence interval ($p < 0.05$), using IBM SPSS version 21 and GraphPad. To account for different observation periods (3 months for lockdown, 12 months post-lockdown, 15 months total pandemic, 26 months control), data were normalized per day before statistical analysis to minimize bias.

Results and Discussion

Scoping review

The process of literature selection and screening is depicted in **Figure 1**.



Figure 1. Articles screening process.

The search yielded 2,584 records from PubMed and 1,423 from Scopus. Initial screening based on titles and abstracts narrowed the selection to 27 studies. Following full-text review, 13 articles were ultimately included:

- One case report [14]

- Ten clinical studies, including nine retrospective [3, 15–22] and one prospective [23]
- One letter to the editor [24]
- One review article [6]

Overall, the included studies provided low-quality evidence, largely due to their retrospective design and small sample sizes. Additionally, the studies were highly heterogeneous, reflecting varying regional responses to the pandemic (**Table 1**).

Table 1. Included articles (in alphabetical order)

Article	Study Type	Primary Focus
Alzahrani <i>et al.</i> [22]	Retrospective clinical study	Patient profiles in dental emergencies
Eggman <i>et al.</i> [21]	Retrospective clinical study	Patient profiles in dental emergencies
Howley <i>et al.</i> [14]	Case report	Patient profiles in dental emergencies
Kun-Darbois <i>et al.</i> [20]	Retrospective clinical study	Patient profiles in dental emergencies
Levites <i>et al.</i> [6]	Review	Guidelines and protocols
Long <i>et al.</i> [18]	Retrospective clinical study	Patient profiles in dental emergencies
Petrescu <i>et al.</i> [16]	Retrospective clinical study	Patient profiles in dental emergencies
Politi <i>et al.</i> [15]	Retrospective clinical study	Patient profiles in dental emergencies
Ramirez <i>et al.</i> [19]	Retrospective clinical study	Patient profiles in dental emergencies
Salgarello <i>et al.</i> [23]	Prospective study	Effects of COVID-19 on private dental practices
Ustun <i>et al.</i> [3]	Retrospective clinical study	Patient profiles in dental emergencies
Yadav <i>et al.</i> [24]	Letter to the editor	Guidelines and protocols
Yu <i>et al.</i> [17]	Retrospective clinical study	Patient profiles in dental emergencies

The included studies primarily focused on three aspects: the quantitative and qualitative characteristics of patients presenting with dental emergencies, the effects of COVID-19 on urgent cases in private dental practice, and recommendations for managing dental procedures during the pandemic.

Patient characteristics in dental emergencies

Most studies reported that acute apical periodontitis, with or without associated abscesses, was the leading reason for visits to dental emergency departments during lockdown periods [15–17, 19, 21]. Politi *et al.* [15] observed that during the six-week closure of dental practices in the U.K. (March–May), overall

emergency visits decreased; however, a higher proportion of patients (41% versus 38–39%) required hospitalization. Despite this, the average hospital stay was shorter, likely reflecting clinicians’ efforts to discharge patients quickly to minimize SARS-CoV-2 exposure. The authors concluded that the establishment of Urgent Dental Centers (UCCs), which provided remote support for acute cases, helped reduce hospital crowding. Similar findings were reported by Long *et al.* [18] in the same region. In France, Kun-Darbois *et al.* [20] observed a 44% reduction in admissions for dental cellulitis due to remote support services, suggesting patients may have avoided hospitals amid the pandemic.

In contrast, other regions [16, 17, 21] reported an increase in dental emergency visits for acute pain, with or without abscess. Eggman *et al.* [21] noted changes in clinician behavior, including reduced use of aerosol-generating procedures and increased teleconsultations, along with a decrease in presentations from patients with comorbidities immediately following lockdown. Pediatric hospital dental care also saw a sharp decline, though abscesses and acute pain remained the most common reasons for pediatric visits [3, 22]. Additionally, a case report [14] described a 24-year-old patient who developed Lemierre Syndrome with brain, lung, and liver involvement secondary to a dental abscess, attributed to difficulties in accessing dental care during lockdown.

Effects on private dental practice

A survey of private dentists in Northern Italy [23] indicated that 79.7% of practitioners continued to

manage urgent cases during lockdown, although patient numbers dropped significantly. Many dentists (81.2%) relied on telephone consultations to triage symptoms. Pulpitis and abscesses were the most frequent urgent conditions (44.7 percent and 40.2 percent, respectively). Protective measures, including FFP2 masks, gloves, and goggles, were commonly used to reduce the risk of SARS-CoV-2 transmission to staff and patients.

Protocols for dental procedures

Yadav *et al.* [24], despite being a letter to the editor, was included for its focus on COVID-19’s impact on vulnerable patients. Both Yadav *et al.* and Levites *et al.* [6] emphasized the necessity of PPE in general practice and the potential use of powered air-purifying respirators (PAPRs) when managing SARS-CoV-2-positive patients in emergencies. Telemedicine was highlighted as an effective approach to provide care while limiting hospital crowding, particularly for patients with life-threatening comorbidities such as cancer, chronic heart failure, chronic obstructive pulmonary disease, or cognitive impairment.

Single-center experience: dental abscesses during the COVID-19 pandemic

Between January 2018 and May 2021, a total of 232 patients (mean age ± SD: 44.2 ± 17.5 years) were admitted to our Emergency Room with odontogenic abscesses. Patient demographic details are summarized in **Table 2**.

Table 2. Demographic characteristics of the study population. SD: standard deviation; M: medical therapy—see text; A: tooth extraction; D: intraoral/percutaneous drainage; E: exitus; MED: mediastinitis.

	Number of Patients	Age (Mean ± SD)	Sex (Female/Male)	Therapy (M/M + A/M + D/M + A + D)	Complications (MED/E)
Lockdown (March–May 2020)	28	46.9 ± 15.8	14/14	1/5/2/20	4/1
Post lockdown pandemic (May 2020–May 2021)	72	44.2 ± 16.2	28/44	9/9/15/39	4/0
Total pandemic (March 2020–May 2021)	100	45.5 ± 16.1	36/64	10/14/17/59	8/1
Control (January 2018–February 2020)	132	43.8 ± 17.6	67/65	46/8/37/41	7/4
Total	232	44.2 ± 17.5	145/87	56/22/54/100	15/5

For the purposes of analysis, patients were divided into four time-based groups: the lockdown period (twenty eight patients from March to May 2020, when routine dental services in Italy were suspended); the post-lockdown pandemic period (seventy two patients from June 2020 to May 2021); the overall pandemic period (100 patients from March 2020 to May 2021); and a

pre-pandemic control period (132 patients from January 2018 to February 2020). Age distributions did not differ significantly between groups according to Pearson Chi-square tests. In contrast, male patients were admitted at a significantly higher rate than females (p = 0.02) during the pandemic compared with the control group, while no other statistically

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 significant gender differences were observed in the other periods relative to controls. Overall, the analysis indicated an average of 13.5 admissions per month (Figure 2).

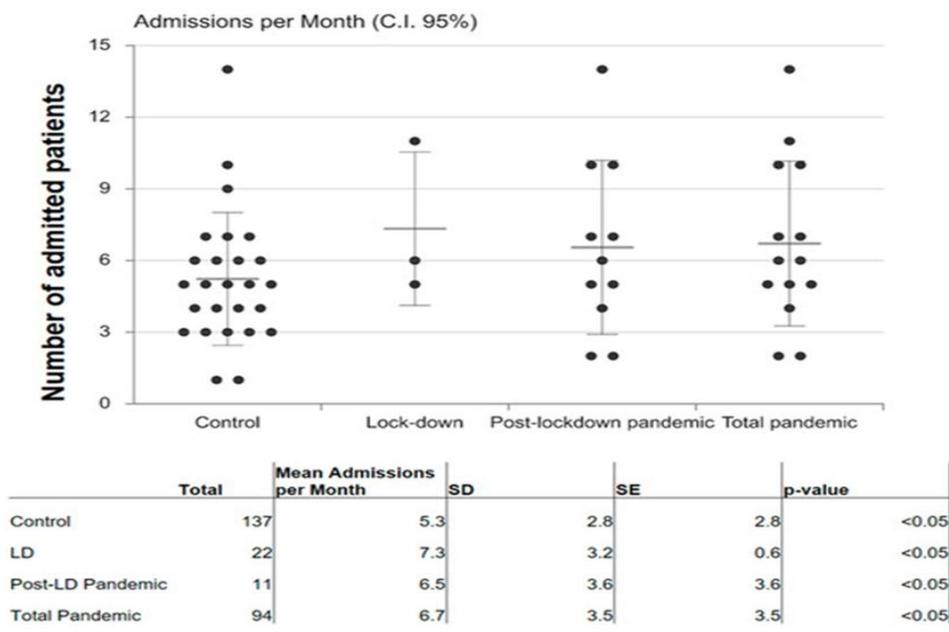


Figure 2. Dot plot depicting monthly admissions with 95% confidence intervals (CI); $p < 0.05$. CI: confidence interval; SD: standard deviation; SE: standard error.

During the lockdown, when most private dental practices were closed, the average monthly admissions for dental abscesses reached 13.5. This decreased to 6.1 admissions per month in the post-lockdown period and averaged 6.6 per month across the entire pandemic period. In contrast, the pre-pandemic control period (January 2018–February 2020) recorded a mean of 5.3 admissions per month. Statistically significant increases were observed when comparing the lockdown to the control period ($p < 0.0001$) and the lockdown to the rest of the pandemic ($p = 0.0008$).

However, comparisons of post-lockdown or total pandemic periods with the control did not show significant differences ($p > 0.05$).

Figure 3. Analysis of hospital stay duration revealed notable variations across periods. During the control timeframe, the average hospitalization was 11.5 days. This extended to 17.8 days during the lockdown and then declined to 8.1 days in the post-lockdown period (June 2020–May 2021). All comparisons among these three periods were statistically significant ($p < 0.05$).

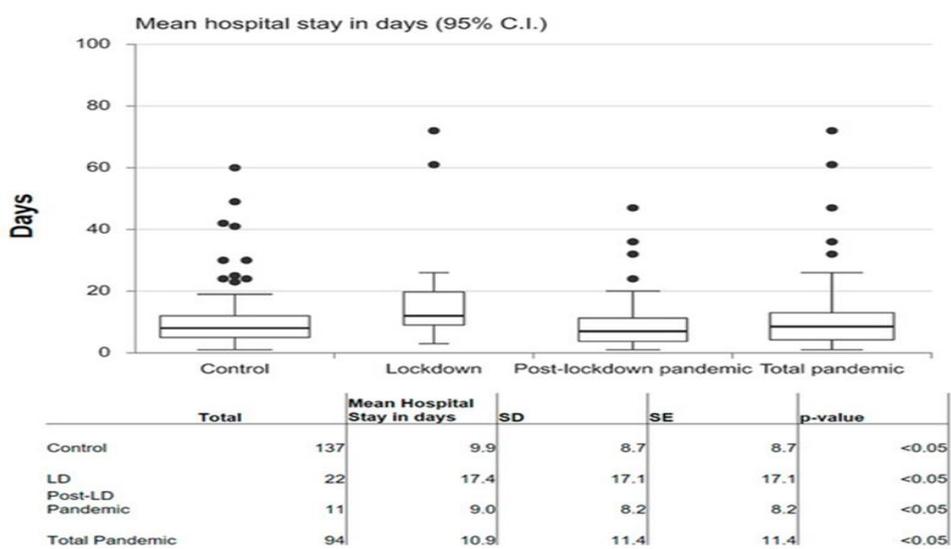


Figure 3. Box plot illustrating hospital stay duration in days with 95% confidence intervals; $p < 0.05$. CI: confidence interval; SD: standard deviation; SE: standard error.

During the control period, the proportions of patients receiving medical therapy alone (M), medical therapy with avulsion (M + A), medical therapy with drainage (M + D), and medical therapy with both avulsion and drainage (M + A + D) were 35 percent, 4.5 percent, 29 percent, and 44 percent, respectively. During the lockdown, these values shifted to 3.5 percent, 0 percent, 10 percent, and 86.5 percent, while in the post-lockdown pandemic period, they were 12.5 percent, 12.5 percent, 21 percent, and 54 percent. Chi-square analysis confirmed that these differences were statistically significant ($p < 0.05$), reflecting a notable increase in surgical interventions (avulsion and/or drainage) during the lockdown and pandemic periods. Regarding complications, seven cases of mediastinitis and four deaths (5% and 3%, respectively) were recorded during the control period; during the lockdown, there were four mediastinitis cases and one death (14% and 3.5%), and in the post-lockdown period, four mediastinitis cases occurred with no deaths (5.5% and 0%). These variations were statistically significant according to Chi-square testing ($p < 0.05$). To ensure robustness, additional statistical checks comparing the three individual control years (2018, 2019, and January–February 2020) showed no significant differences in admissions, hospital stay, treatments, or complications.

The scoping review first highlights the overall limited quality of evidence available, largely due to the unique and evolving nature of the pandemic. Variations in pandemic management between countries and even among regions within the same country contributed to heterogeneity in the available data [25]. In Italy, for example, the spread of COVID-19 was highly uneven [26]: by July 2020, the five northern regions with the highest case counts—Lombardia (39.1 percent), Piemonte (13 percent), Emilia Romagna (11.9 percent), Veneto (8 percent), and Liguria (4.2%)—accounted for 76.2% of national cases. In contrast, Campania, located in southern Italy, represented only 2% of cases (4,762 total), with the majority concentrated in Naples (2,693 cases). Despite relatively lower numbers, over 50% of Campania's cases prompted the conversion of 56 hospitals—nearly the entire regional network—into dedicated COVID-19 treatment centers [27].

These geographic disparities, combined with the prolonged duration of the pandemic (approximately two years), likely influenced both the quality of the reviewed studies and the results of our single-center experience. Most included studies were retrospective [3, 15–22], supplemented by one case report [14], one letter to the editor [24], and a single prospective survey

[23] of 1,205 dentists. Although limited by the absence of a control group, this survey offered valuable insights into private dental practice during lockdown. It indicated that nearly 80% of dentists continued to manage emergencies with appropriate precautions, usually following telephonic triage. This aligns with literature reports [21] showing that dental professionals adhered closely to guidelines, avoided aerosol-generating procedures, and consistently used PPE. In many instances, initial medical therapy was attempted as a first-line approach. Nevertheless, the same survey [23] also noted that the weekly number of urgent cases managed during lockdown was lower than in any pre-pandemic week, consistent with studies reporting increased hospital presentations for dental emergencies.

Retrospective studies, including our own, share several common features. Typically, they performed quantitative and qualitative analyses of dental emergencies during the lockdown and compared these with control periods occurring before or after the lockdown. The results across studies were heterogeneous, likely reflecting differences in how countries organized emergency dental care. In regions where dedicated dental emergency centers—often offering telephonic support—were established, overall hospital visits declined [15, 18, 20], but a higher proportion of patients required hospitalization to complete treatment. This pattern suggests that primarily the most severe cases—such as swelling or abscesses unresponsive to medical therapy—presented to hospitals, increasing the likelihood of inpatient care. Conversely, in countries lacking such structured emergency services, hospital visits for dental emergencies rose, a trend also observed in our data. As noted by one study [17], even outside the COVID-19 context, hospitals providing comprehensive dental and emergency care may see a reduced total number of patients but a higher proportion of urgent cases. Across multiple studies, the incidence and proportion of dental abscesses—the leading reason for dental emergency visits—showed a general increase, likely due to restricted access to routine dental care and preventive services.

At our center, patients presenting with dental abscesses initially receive medical therapy and are discharged if subsequent dental treatment (including extraction if needed) is scheduled. When medical therapy fails—possibly due to antibiotic resistance—patients proceed directly to surgical intervention (avulsion ± drainage). Our findings reveal that both emergency room visits and hospitalization duration for dental abscesses increased during the lockdown, a predictable outcome

given the unavailability of routine dental care and the resulting rise in severe cases. Additionally, patients may have delayed seeking care to avoid potential exposure to SARS-CoV-2, further contributing to the higher number of severe presentations. Similarly, our data indicate a notable rise in surgical interventions (avulsions and/or abscess drainage) during both the lockdown and the broader pandemic period compared with the pre-pandemic control, likely reflecting patients arriving at the hospital only after medical therapy had already failed and avoiding high-risk public spaces unless absolutely necessary, even without an official telephonic triage system in place.

As reported in studies from other regions [16, 18–23], closures of private dental practices during lockdown likely contributed to the increased number of dental abscess cases. Elevated patient numbers in the post-lockdown period may be attributed to continued fear of visiting dentists, which similarly increased the risk of complications from untreated dental infections. In line with the Lemierre syndrome case report [14], our study also observed higher rates of mediastinitis and death during the lockdown and pandemic periods relative to the control period, underscoring the potential severity of delayed or limited access to dental care.

Despite the generally limited quality of evidence in both the included studies and our own data, an additional noteworthy finding of this study is the impact of the pandemic on the behavior of patients and healthcare providers.

The influence of COVID-19 on patient behavior is evident in both the literature and our findings. Pediatric attendance at dental emergency rooms declined during the pandemic [3, 22], likely because most pediatric dental abscesses rarely require hospitalization. Nevertheless, when visits did occur, the proportion of dental abscesses and other emergencies appeared to rise even in this age group [22]. Another study [21] reported that patients with comorbidities were generally hesitant to visit dental hospitals unless facing severe conditions, while our analysis revealed a significantly higher prevalence of male patients seeking care during the pandemic compared to the pre-pandemic period. Given that dental services are fully accessible in our region, this may suggest that male patients were slower to resume routine dental visits. Such patterns imply that certain patient groups may feel less confident attending dental practices regularly during the post-lockdown phase. Broader behavioral shifts across genders and age groups during the pandemic have also been documented [27].

Similarly, the pandemic appears to have influenced clinicians' practices [16, 18, 20–22]. A consistent trend

was observed toward earlier discharge of hospitalized patients, likely aimed at minimizing exposure to SARS-CoV-2. This adaptation may have affected the mental health of dental teams, which has been highlighted in the literature [28]. Given comparisons of the pandemic's psychological burden on healthcare workers to the stress experienced during World War II, ongoing stress management strategies are recommended for dental staff both inside and outside the workplace.

Conclusion

It is important to emphasize that the conclusions drawn from our scoping review, including our own data, are based on studies with limited scientific rigor and should therefore be interpreted cautiously. To fully understand the impact of COVID-19 on dental emergencies, prospective multicenter research is needed. Current evidence suggests that the pandemic's effects on dental emergencies vary by region, reflecting differences in public dental care organization. The implementation of telephonic dental emergency centers appears effective in preventing overcrowding in hospital emergency rooms when routine or private dental services are unavailable, and such models may be valuable for future planning.

However, when routine dental care is restricted, an increase in dental abscess cases is likely, with corresponding rises in mediastinitis and mortality rates. The pandemic has also influenced both healthcare provider behavior—through reduced use of aerosol-generating procedures and shortened hospital stays—and patient behavior. Clinicians have generally demonstrated adaptability, implementing evolving guidelines to continue providing care while minimizing SARS-CoV-2 exposure in both primary (private practices) and secondary (hospital) settings. Certain patient populations, particularly those with comorbidities and males, appear less likely to resume regular dental care, paradoxically increasing their risk for complications and hospitalization, a situation reminiscent of the lockdown period when limited primary dental services led to heightened demand for emergency care [29].

Additionally, hospitals are increasingly encountering patients who test positive for SARS-CoV-2 upon pre-admission screening, even when they were referred for non-COVID-related issues and remain asymptomatic. This highlights the importance of developing home-based health care and monitoring systems to ensure that non-COVID patients continue to receive timely treatment without overburdening hospital resources.

Acknowledgments: None

Conflict of Interest: None

Financial Support: None

Ethics Statement: None

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