

**IMPACT OF COVID-19 ON THE UTILIZATION OF DENTAL SERVICES: A
SYSTEMATIC REVIEW**

Abstract

Emergency Department (ED) visits result from urgent conditions and instances caused by disease, disaster, accidents, or injury and require immediate medical attention. Today, emergency dental services are becoming an integral and crucial facet of properly functioning healthcare systems. Dental emergency visits are a risky undertaking when the COVID-19 epidemic is decimating global health systems. Emergencies in dental care are possibly life-threatening occurrences and demand instant attention to curb infection, severe pain, and tissue bleeding. Examples of these conditions include trauma affecting different facial bones, bacterial infection on soft tissues or cellulitis, and uncontrolled bleeding. Today, given the implications of the COVID-19 pandemic, all providers need to use their professional judgment to determine the need for emergency or urgent care for a patient. Consequently, this systematic review of literature reviews the implications of the COVID-19 epidemic on the use of dental services in different care facilities across the nation.

Keywords: COVID-19, emergency dental visits, dental hospitals, clinics, or institutions.

Introduction

Patients requiring emergency healthcare in dental visits can be classified as non-traumatic or traumatic. According to Wu et al [1], traumatic dental conditions are alveolar and jaw bone fractures, soft tissue laceration, fractured teeth, avulsed and displaced teeth. On the other hand, non-traumatic conditions include odontogenic infection, periodontal-related problems, and other pulp-related problems. Wu et al [1], depicted that having poor oral hygiene often results in patients having non-traumatic issues that require relief from infections and acute pain. According to similar sentiments shared by Kim et al [2], an ingrained inability to access regular dental care often results in patients seeking care at the hospital. In line with the impact of the pandemic, Guo et al [3] believed that an outbreak of a respiratory pandemic will affect patients seeking care at dental healthcare facility emergency departments.

During the treatment of dental infections, there is likelihood that other conditions could also be transmitted through aerosols, droplets, saliva, blood, or indirectly contacting contaminated surfaces. Generally, whenever health employees fail to adhere to appropriate procedures in infection control when offering care to patients, ailing dental patients become more susceptible to infections. Consequently, health care workers have an imperative role in ensuring that they comply with different treatment guidelines when serving diverse patient populations. More specifically, facilities need organized urgent dental care to be delivered using proper protective equipment and other approaches that will help reduce the production of aerosols, splatter droplets, etc. Protective equipment that dental specialists must wear includes surgical masks, gloves, face shields, and gowns. The methodology section will document the systematic mapping procedure used in the study to evaluate the literature on how COVID-19 has affected the delivery of dental services in different institutional establishments.

Research Question(s)

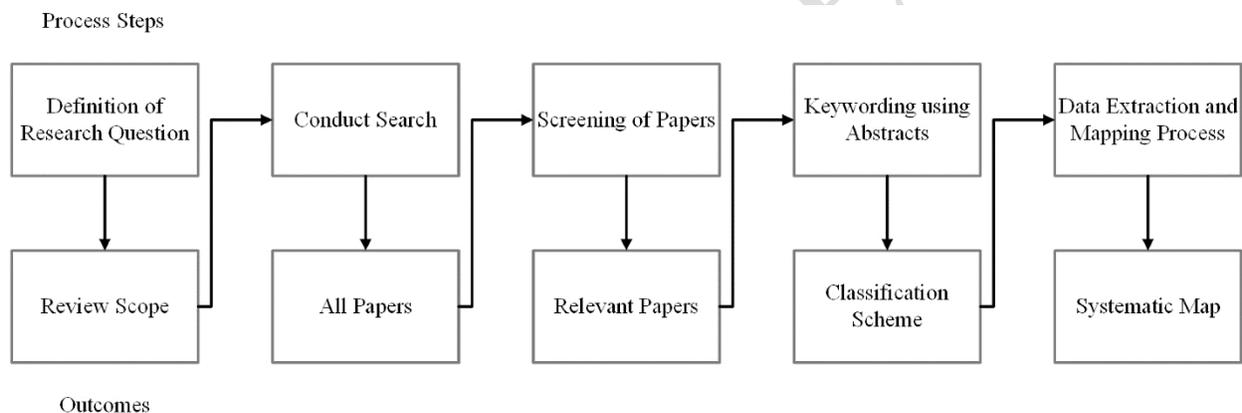
What effect has the COVID-19 epidemic had on the usage of dental care services?

Methodology

In this systematic literature review, the researcher developed a research protocol. The researcher looked at the existing evidence on the COVID-19 pandemic relating to the dental profession and established whether research existed on the phenomena of interest before quantifying it. The systematic mapping process is a five-step process documented in figure 1.

Figure 1

The five-step systematic mapping process



The first step involved defining or identifying the research question. This phase involved linking and clarifying the research question for the study. The next step involved carrying out the research on the identified research question for the study. After specifying the research question, the inclusion criteria for the study were defined. They focused on studies relating to and published on the nature of COVID-19, with a particular focus on its impact on the dental emergency department services. Consequently, the inclusion criteria led the researcher to seek studies published on disinfection measures and infection control related to treating ailing dental patients and managing staff working in dental health care institutions.

At this point, the researcher identified relevant studies using a search process for literature while attempting to balance feasibility with comprehensiveness and breath. The researcher created a search protocol for different scientific databases. The identified literature from the review related to the transmission of COVID-19, infection control measures, and its impact on dental settings. Other research also reported recommendations, guidelines, and standard operating procedures. After pilot searches, the terms employed in the search process were identified and tested utilizing a combination of different keywords, such as COVID-19 and dental services. More specifically, the terms to be used in the study were combined using Boolean operators, e.g., (COVID-19 OR SARS-CoV-2 OR Coronavirus) AND (dental facilities OR dental hospitals) AND (disinfection OR infection control) AND (systematic reviews OR randomized control trials OR clinical trials OR literature reviews) AND (2019 OR 2020 OR 2021). The researcher then carefully selected studies including all diverse levels of evidence given by the Joanna Briggs Institute (JBI).

The selected literature was restricted to research written in English, and all other materials produced in other dialects were excluded from the review. In addition, the literature to be included in the study had to have evidence from different health settings, such as clinical practice, hospitals, or dental clinics. However, not all the evidence must be obtained from primary research. Thus, recommendations, guidelines, reviews, and opinions from different oral health organizations and groups from 2019 to 2021 would be included. Additionally, all studies published before 2019 were also excluded from the review. The databases used include Wiley, Elsevier, Science Direct, PubMed, ACM digital library, Springer Link, PLOS One, and Ebscohost. The data was then charted out in narrative and tabular forms where applicable. Lastly, the researcher identified the implications of the findings on research, practice, and policy.

The different steps in the systematic literature review were completed in line with the exclusion and inclusion criteria. Excluded papers in the review include studies whose text was not fully available online; those published in other languages, duplicate content, and poster papers. All discrepancies were resolved before the final write-up on the findings was made. The literature search is documented in figure 2, which highlights the PRISMA flow chart. For included articles, the researcher analyzed all descriptive attributes and complied with the criteria required in data extraction depending on the report type. The final data was narratively reported in line with the study objectives.

Figure 2

PRISMA flowchart diagram for the systematic review

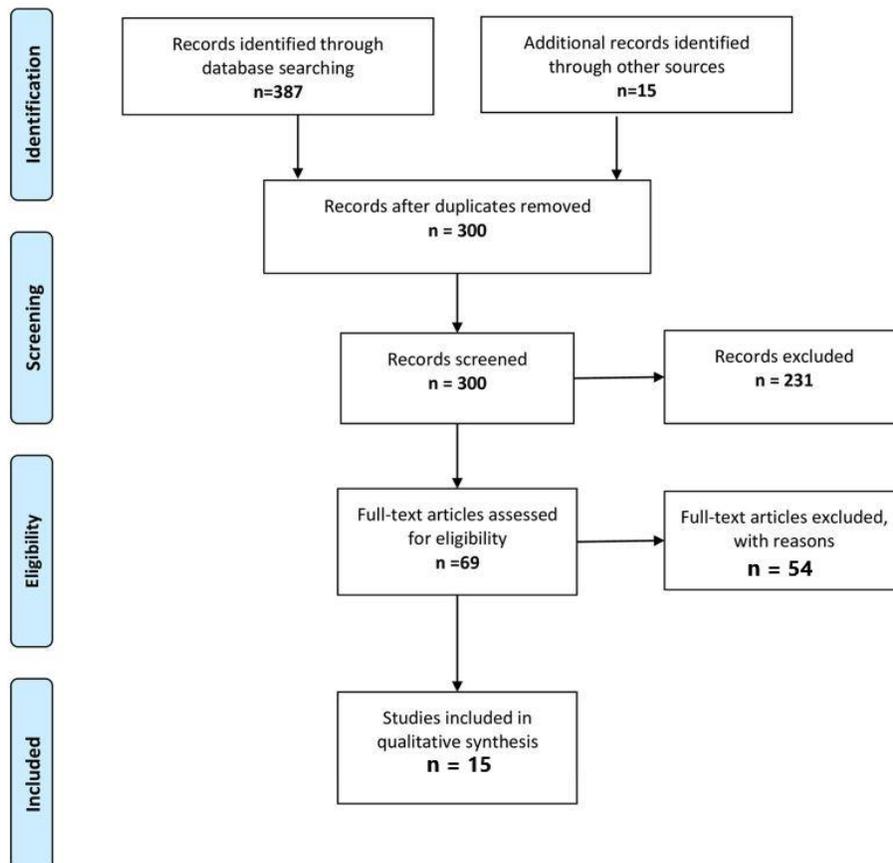


Table 1*Cochrane risk of bias assessment*

Author(s) and year of publication	Sequence generation or Selection bias	Allocation concealment or selection bias	Blinding or performance bias	Incomplete results or attrition bias	Selective reporting	Other bias
Ahmadi et al. (2020)	+	+	?	?	-	?
Ali et al. (2020)	+	+	+	+	+	?
Arellano-Cotrino et al. (2020).	+	+	+	+	+	?
Barabari and Moharamzadeh (2020)	?	?	+	+	+	+
Bhanushali et al. (2020)	+	+	+	+	+	?
Coulthard (2020)	+	+	+	+	+	-
Guo et al. (2020)	+	+	+	+	+	+
Jamal et al. (2021)	+	?	+	+	+	+
Kim et al. (2019)	?	?	+	+	+	-
Meng et al. (2020)	+	+	+	+	+	+
Peng et al. (2020)	+	+	+	+	+	+
Sarkarat et al. (2020)	+	?	-	-	+	+
Schwendicke et al. (2020)	?	+	+	-	+	+
Uhlen et al. (2021)	?	+	+	+	+	?
Wu et al. (2021)	?	?	-	+	+	+

In the Cochrane risk assessment table above, the symbols +, -, and ? are used.

- The symbol + is used to denote a low bias risk.
- The symbol – is used to show a high bias risk.
- The symbol ? is used in showing an unclear level of risk.

Findings or Results

Ahmadi et al [4] note that dentists are increasingly threatened in contracting COVID-19. Such risks make the nosocomial transmission of the pandemic a considerable issue for dentists as it risks them and their clients. In their research, Meng et al [5] opine that because of the attributes of dental facilities, the risks of cross-infection are considerably higher between clients and dental care specialists, raising the need for strict infection control. Most dental operations often generate saliva droplets and blood that could result in contagion [4]. Barabari and Moharamzadeh [6] and Jamal et al [7] also share these sentiments, noting that dentists and other allied workers are considered the riskiest group in contacting the pandemic during typical patient management undertakings.

Due to the pandemic, there is an increased demand for remote dental consultations, which remain ineffective for delivering dental services. Notably, such ineffectiveness results from lacking appropriate infrastructure in the remote dental service offerings and the innate attributes of dental procedures at different facilities. Consequently, Ali et al [8] postulate that funding is required to help provide adequate monetary resources that will ensure dental workers provide their services seamlessly.

Table 2. Literature review and Primary Study outcomes or Findings

Authors and year of publication	Study aim(s) or objective(s)	Inclusion criteria	Study design	Primary Study outcomes or Findings
Ahmadi et al. (2020)	Evaluating the impact of the pandemic on dental practice in Iran.	Participants were dentists in Iran facilities.	Questionnaires were used to evaluate participant's perceptions and attitudes.	Dental health workers are at a high risk of contracting COVID-19 and must use standard protocols.
Ali et al. (2020)	Evaluating the financial repercussions of the epidemic on dental institutions.	Relevant papers and news articles on the economic effects of the epidemic.	A systematic review of literature.	Visible policies are needed by public organizations, health regulatory bodies, and governments in alleviating the financial implications of COVID-19.
Arellano-Cotrino et al. (2020).	Identifying, synthesizing, and comparing the efficacy of personal protective equipment (PPE) in dental setups.	Articles on PPEs in dental setups published between 2020 and 2021.	A bibliographic search was conducted on literature from different scientific databases.	The use of FFP2 and N95 respirators are recommended for dentists to reduce the contagion levels of COVID-19.

Barabari and Moharamzadeh (2020)	Review relevant aspects of dentistry and discuss the implications of the epidemic on dental healthcare.	Literature on the repercussions of the epidemic on clinical dentist services.	A systematic review of literature.	COVID-19 has resulted in numerous immediate complications in clinical dentistry, and some have long-term implications.
Bhanushali et al. (2020)	Evaluating the implications of the pandemic on future dentistry practice.	Literature on infection control and protocols used in managing patients.	A systematic review of literature on the virus, mode of transmission, and control.	Tele dentistry is a new approach being employed to reduce the threats of cross-infection in clinical services.
Coulthard (2020)	Evaluating the moral decision-making capacity and duty of dentists in reducing the spreading of the epidemic.	Literature on evidence-based and moral decision-making regarding urgent dental care.	Systematic review of literature.	Dental professionals have a moral duty in reducing routine care options that helps curb the spread of COVID-19 among patients.

Guo et al. (2020)	Assessing how the epidemic has influenced the use of dental services in Beijing, China.	All the patients involved had to need emergency dental care services.	A retrospective analysis was employed on patients seeking care at emergency dental units.	The pandemic has reduced the provision of dental services and emergency dental visits from most patients. It affected people's dental services-seeking behaviors.
Jamal et al. (2021)	Performing an overview of the recommendations for dentists to avoid contracting COVID-19.	Literature on recommendations for limiting COVID-19 transmission from to dentists from carriers.	A systematic review of literature.	There is a need to postpone dental treatment, use telecommunication, and apply precautionary measures in treating patients with dental emergencies.

Kim et al. (2019)	Examining social health determinants and national trends affiliated with providing emergency services.	The authors looked at ED visits involving dental nontraumatic dental conditions (NTDCs).	The authors constructed a pooled cross-sectional database of ED visits and created dichotomous outcomes.	An ingrained inability to access regular dental care often results in patients seeking care at the hospital. Older patients were more likely to seek emergency care, risking COVID-19 mortality and transmission rates.
Meng et al. (2020)	To evaluate the current and future predicaments of the COVID-19 epidemic on dental and oral health care.	Literature on infection control measures in alleviating the situation of the pandemic.	Systematic literature review on nosocomial infection in dental setups.	There is an increasing threat of cross-infection caused by the nature of dental settings. Thus, strict infection control measures are needed.

Peng et al. (2020)	To evaluate the reasonable controls laid in place to curb the spreading of COVID-19 in dental facilities.	Literature on the transmission of COVID-19 through contact transmission with eye, nasal, and oral mucus, direct inhalation transmission, sneezing and coughing.	A review of different articles on the transmission routes of the novel β -coronavirus (2019-nCoV).	Dental specialists have an imperative role in curbing the spread of the pandemic. Thus, infection between person-to-person routes ought to be alleviated in different dental clinics and hospitals.
Sarkarat et al. (2020)	Evaluating how dentists are involved in curbing the spread of the epidemic in Iran.	One thousand one hundred members of the Dentists Association participated in the study.	An online questionnaire was used.	There is a low definitive rate of dental treatment among patients that fear the environment is not properly disinfected. ³
Schwendicke et al. (2020)	An economic assessment of the implications of the epidemic on dentistry.	300 German dentists were involved in the study.	A telephone-based survey was used to determine changes in the utilization of dental services.	COVID-19 led to revenue reductions for dental institutions, and net profits reduced immensely due to low patient volumes.

Uhlen et al. (2021)	Assessing the psychological effects of the epidemic on personnel involved in offering care in dental facilities.	Dental assistants and dental hygienists in Norway were included in the study.	Structured questionnaires were electronically sent to the dentists, and obtained data was analyzed for plausible findings.	The pandemic has led to increased insecurity on infection statuses and has caused feelings of instability. Eventually, it has affected the treatment of dental conditions.
Wu et al. (2021)	Investigating the use of emergency dental services.	Electronic health records for 515 patients. Besides, 26 resident dental care providers were involved.	A retrospective chart data approach was employed.	Fewer patients had dental emergencies after COVID-19. Thus, the pandemic affected the usage of dental services.

Discussion

Due to the repercussions of the COVID-19 epidemic on different healthcare institutions, diverse bodies, such as the National Health Service, British Dental Association, and the Centers for Disease Control and Prevention (CDC), have been forced to design and develop diverse responses, recommendations, and guidance for dynamic dental setups. From the systematic literature review, it is clear that most of these instructions emphasized the need to closely examine patients' epidemiological history and clinical symptoms as they came into different dental facilities. In their research, Peng et al [9] postulated that the pandemic forced most organizations to recommend procedures applied in emergency and urgent diagnosis in providing proper care supplies for patients and dental procedures. Evidently, the pandemic has decreased

treatment sessions, emphasizing preventive care options, testing referred patients, and triaging clients for diverse related signs.

Patients believe that re-opening dental facilities for non-emergency cases might trigger increased contagion of this condition. They have minimized their visits to most of the institutions until the implications of the pandemic are eradicated or subside. In addition, a lot of pressure has been mounted on patients to augment oral hygiene and ensure that preventive care is applied to curb the need for emergency care during the epidemic. Since most current dental facilities offer low-risk undertakings, e.g., extracting teeth, the need for removable prosthetic treatment might increase. Sarkarat et al [10] and Arellano-Cotrina et al [11] noted that face masks, goggles, face shields, gloves, gowns, etc. have now been instituted as essential in curbing the virus from spreading between dental patients and providers. Besides, there is increased use of PPEs, and some of these supplies are in shortage, resulting in increased dental treatment costs. Consequently, Schwendicke et al [12] noted that the pandemic has imposed financial distresses on dental services, and funding is needed to help cushion dental workers and facilities. Uhlen [13] believed that the pandemic has also increased anxiety and stress amongst dentists. Consequently, it is necessary that public organizations intervene psychologically and financially to provide support to dental workers during such unprecedented times (Coulthard [14]). Currently, Bhanushali et al [15] noted that tele-dentistry is being adopted to help in reducing cases of cross-infection.

Conclusion and Recommendations

The main concerns raised by the pandemic include repeatedly changing protocols, increased workload, PPEs, social distancing, and self-isolation, which have substantially affected how people utilize dental services. Most dentists have been forced to adhere to the current

COVID-19 protocols and guidelines. Most have preferred reducing dental procedures to only focus on emergency and urgent treatments until the pandemic is eradicated.

In that case, most dentists believe that offering fully-fledged services will only result in more transmission of the ailment. Furthermore, more dental facilities have also undergone financial difficulties due to their closure. In addition, researchers must find plausible solutions that can aid in alleviating the situation in the current and future pandemics.

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