

The Benefits of Teledentistry during the COVID-19 Pandemic: Scoping Review

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Abstract: *The COVID-19 pandemic has an effect on all health workers, including dentists. Dental treatment has been established to be a key source of transmission due to aerosols and droplets. Teledentistry was a combination of telecommunications and dentistry as a device for faraway treatment plans and consultation. Implementing teledentistry in dental practice can improve dental health services during the COVID-19 pandemic. The purpose of this study is to find out the benefits of teledentistry during the Covid-19 pandemic. In the scoping review, the articles search on Pubmed and Proquest, published in 2020-2021. Eighteen articles were selected and included in the final screening. Based on 18 articles show that teledentistry has many benefits in dental health services and may be very useful during the COVID-19 pandemic.*

Keywords: Benefits, Covid-19, Teledentistry.

1. Introduction

Background

The COVID-19 pandemic declared through WHO has affected all medical experts, including dentists.¹ Dentist is considered a high-risk profession because the virus spreads in the air during dental procedures.² Dental treatment has been established to be a key of transmission due to aerosols and droplets infected with microorganisms. During the COVID-19 pandemic, limiting visits to the dentist is one of the various transmission prevention. Telehealth is one of the uses of technology in today's communication field, especially in the health sector. Hospital has widely used and trusted telehealth as communication tools with patients. One type of telehealth that combination of telecommunications and dentistry is teledentistry.³ Telehealth and teledentistry have been known and appreciated as tools in minimizing the risk of increasing the spread of the COVID-19 virus.⁴

The situation of the COVID-19 pandemic is not ending soon in some countries and is having a significant impact on dental care. This is because, in dental practice, the treatment procedures provided by dentists are carried out using close examinations with patients. Many dental procedures produce aerosols, droplets, splashes that are contaminated with bacteria, viruses, and blood so that it can cause the spread of infection globally quickly go to the dentist or other people in the clinic room.^{5,6} There is a need for innovations from dental practice so that dental and oral care procedures can be continued by decreasing the risk of cross-infection between dentists and patients, one of which is implementing teledentistry in daily dental practice. Teledentistry can improve the quality and efficiency of dental and oral health services for the community during the COVID-19 pandemic. It provides convenience for patients who live in rural areas and still have difficulty or cannot reach health facilities.⁷ The purpose of this study is to find out the various benefits of teledentistry during the Covid-19 pandemic.

Teledentistry

Teledentistry is a combination of telecommunications and dentistry as a tool for remote consultation and treatment planning with the help of exchanging clinical information and images. "teledentistry" is defined as video conferencing technology to diagnose and provide remote care consultation. Teledentistry was first developed in 1994 as a service started by the US military to serve The United States troops worldwide. With the development of technology, new opportunities for teledentistry are increasing currently available continue to alternatethe dental care flow.⁸ Teledentistry can improve access to dental services to eliminate disparities between rural and urban people. This can help people get specialized health care even in remote parts of the world due to advances in telecommunications. The use of teledentistry for consultation provides the benefit of conducting a diagnosis, treatment plan, and discussion by sending patient clinical photos and Rontgen images.^{8,9}

Teledentistry can be applied in several methods, such as Real-Time consult, Store-and-Forward method, Remote Monitoring method, and Near-Real-Time method. Real-Time VideoConsultation, which is done in person, includes video conferencing consultations where dental health workers and their patients in different areas can communicate with others. The Store-and-Forward method involves exchanging clinical information, then static images are collected and stored by dentists and can be used for treatment plans.⁹ The third method, namely the Remote Monitoring Method, is where patients are monitored by using a remote than can be done in the hospital or at home. Dentists can send patient statues such as anamnesis, diagnosis, clinical and radiographs image, periodontal and hard tissues statue, lab results, comments, photos, and other information by multiple providers. Sharing data is necessary for patients who need specific consultation with specialists.⁹

Dental Practice during the COVID-19 Pandemic

The COVID-19 pandemic caused by SARS-CoV-2 is detrimental to all aspects of life. This pandemic has also impacted dental practice. The dentist is considered to have a

high risk of transmission due to various reasons as viral agents. That is easily spread during dental procedures, biological agents that stay in the practice room, dental procedures, face-to-face interaction between doctors and patients so that doctors are constantly exposed to fluids such as saliva and the patient's blood. Therefore, WHO has proposed recommendations and new dental care protocols by following the general guidelines for health workers and health services to improve the safety of dental and oral health services.^{2,10}

This pandemic creates a challenge for dental ethics. “To treat or not to treat” is a big question that many dentists face. The Centers for Disease Control and Prevention (CDC) US stipulates emergency cases only are treated. The handling of these cases must also apply health protocols so that patients and dentists avoid transmission of COVID-19.¹⁰

The protocol must be applied before coming to the dentist. Patients who have to go to the dental practice must first be screened by telephone. Then, the patient will be taken anamnesis related to his medical history and complaints that the patient feels, especially the symptoms that eliminate the possibility of the patient suffering from COVID-19 disease. Patients with severe symptoms can be given analgesics to relieve the discomfort. In addition, if there will be patients who come, everything non-essential as dental models and pamphlets should be removed because they are considered a risk factor for transmission.¹¹

2. Methods

A search was performed on Pubmed and Proquest. Studies published from 2020-2021. Terms and keywords used for the search: “Teledentistry and “COVID-19”, or each of the searching, the titles and abstracts were screened, the full-text versions of articles that met criteria were downloaded.

The flowchart in Figure 1 identifies the included and excluded articles at each stage. 100 were assessed in Pubmed and 55 in Proquest. 149 records screened after

duplicates removed, 76 references excluded, 73 full-text articles assessed for eligibility, and 18 full-text articles included.

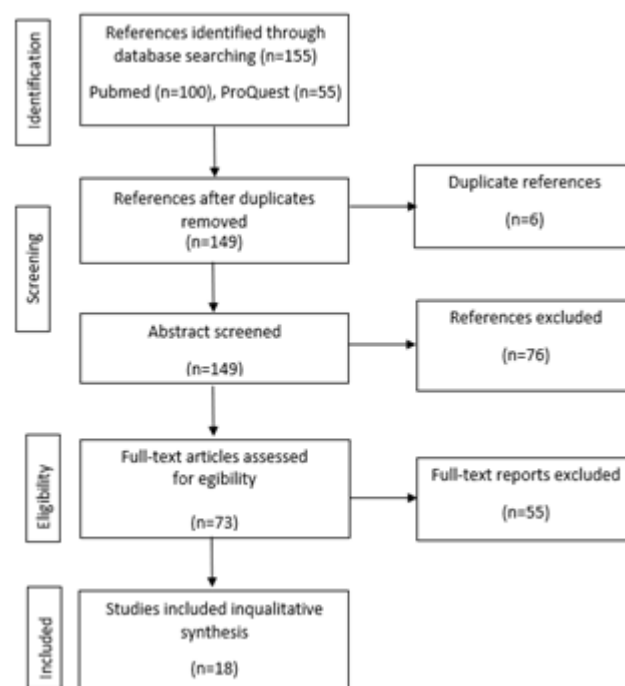


Figure 1: PRISMA chart: a flow chart describing the search methodology and numbers of articles included/excluded at each stage.

3. Results

An online search based on the specified keywords returned 155 records. After filtering the data, 149 articles were obtained discussed the benefits of teledentistry during the COVID-19 pandemic. Then, the articles were assessed for eligibility, 18 articles were found that met the criteria.

Table 1: Teledentistry’s article during the COVID-19

No	Author	Year	Title	Conclusion
1	Al-Khalifa K, AlSheikh R, Al-Swuailem A, Alkhalifa M, Al-Johani M, Al-Moumen S et al ¹²	2020	<i>Pandemic preparedness of dentists against coronavirus disease: A Saudi Arabian Experience</i>	Teledentistry allows telescreening, during the COVID-19 pandemic before the patient visits the dentist to reduce direct contact.
2	Yang Y, Zhou Y, Liu X, Tan J. ⁶	2020	<i>Health services provision of 48 public tertiary dental hospitals during the COVID-19 epidemic in China</i>	There is a significant increase in the use of teledentistry in Chinese hospitals, making it a means of consultation, screening for COVID-19, and providing education for patients.
3	Al-Khalifa K, AlSheikh R ⁷	2020	<i>Teledentistry awareness among dental professionals in Saudi Arabia</i>	Teledentistry improves practice performance by efficient time management, reduces costs, benefits patients, especially those in remote locations. Teledentistry avoids relatively long trips to the dental clinic. Teledentistry is also done in monitoring and educating patients.

4	Meisha D, Alsolami A, Alharbi G ¹³	2021	<i>Social determinants of seeking emergency and routine dental care in Saudi Arabia during the COVID-19 pandemic</i>	The use of teledentistry during the COVID-19 pandemic to ensure continuity of dental care and efforts to avoid direct physical contact between dentists and patients.
5	Rahman N, Nathwani S, Kandiah T ³	2020	<i>Teledentistry from a patient perspective during the coronavirus pandemic</i>	Teledentistry is beneficial for patients in saving time to facilitate early access to care for patients. Meanwhile, health workers will reduce emergency unit visits.
6	Plaza-Ruiz S, Barbosa-Liz D, Agudelo-Suárez A ²	2021	<i>Impact of COVID-19 on the Knowledge and Attitudes of Dentists toward Teledentistry</i>	Teledentistry is done in establishing diagnosis and treatment, planning appointments with patients, providing dental and oral health education, advising on emergencies, providing easier access to preventive dental and oral care, and being able to consult specialists for patients in the rural areas and areas with limited access to health.
7	Ostrc T, Pavlović K, Fidler A ⁵	2020	<i>Urgent dental care on a national level during the COVID-19 epidemic</i>	Teledentistry is used in first-level triage to reduce contact between medical personnel and patients. Consultations made via telephone calls and pictures taken by the patient can be used to determine the severity and determine immediate treatment.
8	Byrne E, Watkinson S ¹⁴	2020	<i>Patient and clinician satisfaction with video consultations during the COVID-19 pandemic: an opportunity for a new way of working</i>	Teledentistry helps doctors determine whether the patient needs further treatment through remote consultation. During the COVID-19, virtual clinics allow remote work. Consultation as communication between doctors and patients can be applied every day.
9	Abdulwahab M, Kamal M, AlAli A, Husain Y, Safar M ¹⁵	2021	<i>Knowledge and Perceptions of COVID-19 Among Health Care Professionals, Medical Students, and Dental Students in the GCC Region: A Cross-Sectional Correlational Study</i>	The role of teledentistry during the COVID-19 pandemic is to help facilitate the assessment and triage of patients to minimize direct contact.
10	Muniz I, Campos D, Shinkai R, Trindade T, Cosme-Trindade D ¹⁶	2021	<i>Case report of oral mucosa garlic burn during COVID-19 pandemic outbreak and role of teledentistry to manage oral health in an older adult woman</i>	Teledentistry during the COVID-19 pandemic is in the form of patient support and monitoring, including initial consultation and follow-up to complete case resolution.
11	O'Donovan M, Buckley C, Benson J, Roche S, McGowan M, Parkinson L et al ¹⁷	2020	<i>Telehealth for delivery of haemophilia comprehensive care during the COVID-19 pandemic</i>	Teledentistry allows identification of urgent dental problems with intraoral photographs using mobile phones and improves access to care after the pandemic is over.

12	Wallace C, Schofield C, 2021 Burbridge L, O'Donnell K ¹⁸	<i>Role of teledentistry in paediatric dentistry</i>	Teledentistry helps improvise patient care, reduce patient waiting lists, and reduce face-to-face attendance during the COVID-19 pandemic. Applications in pediatric dentistry include advice on prevention, assessment dental development, oral medication, TMJ disorders, patients with additional social needs, implications for patients and parents/guardians, and medicolegal implications.
13	Vanka S, Jan A, Alhazmi S, 2020 Alsubhi B, Allehyani R, Wali O et al ¹⁹	<i>Barriers of Dental Services Utilization During COVID-19 Pandemic</i>	The role of technology such as teledentistry can be used to connect dental practitioners with patients.
14	Abbas B, Wajahat M, 2020 Saleem Z, Imran E, Sajjad M, Khurshid Z ²⁰	<i>Role of Teledentistry in COVID - 19 Pandemic: A Nationwide Comparative Analysis among Dental Professionals</i>	Teledentistry provides teleconsultation, telediagnosis, telemonitoring, and teletriage to prevent the spread of COVID-19.
15	Giudice A, Barone S, 2020 Muraca D, Averta F, Diodati F, Antonelli A et al ⁴	<i>Can Teledentistry Improve the Monitoring of Patients during the Covid-19 Dissemination? A Descriptive Pilot Study</i>	Remote consultation can be done between medical personnel or between doctors and patients. Patients can avoid going to the dental clinic without an effective indication, limiting doctor-patient contact, and between patients in the waiting room. Teledentistry is used to surgical and nonsurgical monitor patients remotely, reducing costs and patient waiting time.
16	Pharande S, Bhor K, Potnis S, Jamenis S, Vinay V, Karnik S ²¹	<i>Dentistry Beyond Lockdown: Oral Healthcare Practitioner's Perceptions towards Novel Coronavirus (COVID-19)</i>	Based on the patient's signs and symptoms, a decision can be made to see whether the patient should come to the dentist's clinic or not. Therefore, teledentistry can be a tool during the pandemic and a sign of delay for elective procedures.
17	Arqub S, Voldman R, 2021 Ahmida A, Kuo C, Godoy L, Nasrawi Y et al ²²	<i>Patients' perceptions of orthodontic treatment experiences during COVID-19: a cross-sectional study</i>	Tele-orthodontics is one of the tools to continue orthodontic treatment during the pandemic and can be a tool in the future for an orthodontic practice.
18	Inquimbert C, Balacianu I, 2020 Huyghe N, Padeloup J, Tramini P, Meroueh F et al. ²³	<i>Applications of teledentistry in a French inmate population: A one-year observational study</i>	Teledentistry is used in detention centers for initial examination and diagnosis.

4. Discussion

Teledentistry can be done via mobile phones, sending emails or messages, video chatting, and give many benefits in dentistry.^{17,24} Teledentistry can assist dentists in screening patients for COVID-19 to avoid contact with patients who can infect staff and other patients in the clinic or hospital. This can be done using a questionnaire administered online before the patient visits the dental clinic.^{6,22}

The use of teledentistry during the COVID-19 pandemic can make it easier for patients to consult with dentists so that patients can be immediately evaluated and a further treatment plan determined.^{4,16,18,19,22} Teledentistry can also

be used as an educational tool that can be given by dentists in the form of diseases that may exist in the oral cavity to maintain healthy teeth and mouth during the COVID-19 pandemic, such as brushing the teeth and gargles to reduce the COVID-19 virus.^{5,15,18,20,21}

Teledentistry also makes it easier for everyone in rural or urban areas to need dental and oral care. Patients living in remote areas face problems, such as limited treatment, lack of equipment, and lack of medical personnel. Through teledentistry, people living in remote areas can get consultations and advice regarding the patient's complaints.^{3,7,18,24}

Teledentistry allows triage of care based on the patient's condition. Patients who need emergency treatment will be prioritized to come to the dentist. Dental care places dentists at high risk for infection during the COVID-19 pandemic. Therefore, it is better to postpone non-emergency dental treatment to reduce face-to-face contact between dentist and patient. In addition, teledentistry can reduce crowds in the practice area to reduce unnecessary exposure.⁵

Teledentistry is useful in diagnosing and treating oral lesions, providing easier access to preventive dental and oral care, and consulting specialists. During the COVID-19 pandemic era, teledentistry was important to complement the limited dental care system during the pandemic. Patients can take a complete history without visiting the dentist. Take photos of the condition of the patient's oral cavity.^{18,20,25}

Teledentistry can improve education in dentistry. It is impossible for dental students or dental practitioners can't do something during a pandemic. This situation supports dental students in developing their cognitive abilities and exposing themselves to developments in dentistry. In addition, the lecture system, which should be face-to-face in person, now we can do it online with live sessions so that students can still interact with their lecturers while being recorded or with materials that have been recorded. This helps students learn more because materials can be played repeatedly.^{2,6}

Dental students can also do exercises to analyze patient cases with problem-solving. In addition, during the COVID-19 pandemic, dental students and dentists must have knowledge of COVID-19 screening for patients, more stringent infection prevention, and control measures in practice.^{15,25}

Dentists can provide patients undergoing radio and/or chemotherapy through teledentistry. Dentists can also motivate and re-emphasize oral hygiene measures. Dentists can monitor the progress of the patient's condition virtually after treatment in periodical control form to see the progress of treatment results. Teledentistry can monitor the child's dental development and other developmental such as neonatal/natal teeth and malocclusion that can be done via video calls.^{6,14,18}

5. Conclusion

The benefit of teledentistry during this pandemic aims to facilitate consultation and provide opportunities for a diagnosis and treatment planning, as well as sharing clinical and radiographic images of patients among dentists, minimizing the risk of cross-infection between dentists and patients, as well as providing dental health services and mouth for people living in rural areas who still have difficulty or even cannot reach health facilities.

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