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Applications of Teledentistry during the COVID-19 Pandemic Outbreak

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Abstract

Health organizations and health care providers implemented public safety measures that reduced movements within the affected communities. This resulted in the postponement of elective treatments around the world. Oral health care facilities were among the affected facility that suspended elective procedures. As health care providers look for alternative methods that will assist in the reduction of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) transmission, telemedicine was applied in some affected countries. The potential safety measure of distant health care gave health care providers a secure way to provide health care for patients. The impact of the 2020 pandemic outbreak of coronavirus 2019 (COVID-19) in dental medicine is considered significant. Teledentistry, the equivalent method to telemedicine in dental medicine, was also applied in some affected countries. Implementation by various oral health organizations showed that teledentistry is one of the methods used during the outbreak. This review article shows a summary of the potential application of teledentistry during the 2020 pandemic outbreak of COVID-19 and future pandemic outbreaks.

Keywords: Telemedicine; Oral Medicine; Triage; Dental Health Services

Introduction

The Coronavirus Disease 2019 (COVID-19) is a disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) [1,2]. COVID-19 was first identified and isolated during an outbreak of pneumonia of unknown causes in the Hubei province of China, particularly Wuhan [3]. The transmission of COVID-19 was rapid and caused health concerns among affected countries [4]. The World Health Organization (WHO) characterized the outbreak as a pandemic [5]. Restrictive movement among the members of the community of affected countries was implemented to contain the outbreak and the unnecessary movements were also inhibited or avoided. Affected countries implemented health measures that drastically affected domestic and international travel. Enforcement of epidemiological surveillance was also implemented to control and isolate presumed carriers of the disease. Public health measures are key factors in containing the disease [6-8]. Epidemiologic health measures that were implemented include isolation of presumed carriers, health monitoring of affected individuals, and contact tracing of confirmed persons infected with SARS-CoV-2. Public gatherings were also canceled and avoided in order to prevent transmission in concentrated areas. Educational, religious, and business institutions temporarily suspended operations to contain the outbreak [9]. Health organizations, in various affected countries (e.g. United States of America, United Kingdom,

Singapore, China, and Middle East), postponed elective treatments to give room and space for COVID-19 patients [10-13]. Major dental organization of some affected countries (e.g. American Dental Association, Irish Dental Association, and National Health Commission of China) recommended the postponement of elective treatments. Management of emergencies is prioritized, while preventive appointments are also discouraged [14-16]. The risk of infection inside the dental clinic is high because of direct close contact human-to-human transmission, aerosol transmission, environmental material surface transmission, and nosocomial transmission for dentists who works inside the hospital [16,17]. With these events, some dental clinics temporarily closed due to safety risks. The impact of COVID-19 on dentistry is significant because it considerably changed how dentists accommodate every dental patient. The impact of COVID-19 encompasses the modifications of treatment modalities due to the infectious capabilities of the SARS-CoV-2. The modifications must include a safe way of providing dental care without compromising the overall health of the patient during the pandemic. Health care providers are looking into safe health measures that could assist patients in the time of a pandemic outbreak. The safe methods in approaching presumed infectious carriers involve distance between the patient and the health care provider. Health care providers will have to consider shifting methods on how to accommodate patients if they want the safest way possible. One of the measures that can assist patients through distance medicine is teledentistry. This narrative review shows the author's perspective regarding the applications of teledentistry during the COVID-19 pandemic outbreak.

Teledentistry

Teledentistry is the process of information-based distant communication between the oral health care provider and dental patient. Teledentistry, a system of communication involving video and audio feedback, gathers clinical information from the dental patients. Video conferences are available for the oral health care provider to elicit consultation for the dental patient. It also involves the exchange of clinical information that may contain laboratory results, pictures, or radiographs of the dental patient [18-22]. Teledentistry is derived from Telemedicine. In telemedicine, physicians use telecommunication systems to reach their respective patients in distant locations [23]. Treatment planning can also be accommodated in teledentistry. Through immediate feedback, teledentistry can be used to discuss methods of treatment that the dental patient may agree upon [24,25].

Teledentistry provides a cost-efficient method when compared to a traditional referral method. Sufficient clinical information gathering is possible through teledentistry, making the method a reliable tool in the diagnostic process. The method provides a cost-efficient oral care to dental patients through an analysis of sufficient clinical information that leads to appropriate treatment [26,27]. Teledentistry also allows accessibility of specialists to certain areas. These areas may be rural that have no access to specialists. This provides the community with a better oral health system. The delivery of oral health care education to distant areas that have no access to oral health care is also a benefit. This enables the community to be knowledgeable in the field of oral care [28,29]. All specialty fields in dentistry will benefit from the use of teledentistry, but the specialty that will most benefit in times of a pandemic outbreak is community dentistry. Community dentistry is a field in dentistry that deals with the oral health and extent of oral diseases within a community. Benefits in community dentistry include; a wide coverage for oral health care, the interaction of general practitioners of dental medicine with specialists, and the cost-effective exchange of health information. Dental public health must not be neglected in times of pandemic outbreaks [27,30,31].

Potential Applications

Telemedicine is widely used during the 2020 pandemic outbreak of COVID-19. The method was widely received because of its safety potential. Similar to telemedicine, teledentistry offers a variety of application methods that can be used by dentists in times of pandemic outbreak [32-34].

Screening for Triage

Teledentistry can serve as a screening tool in the characterization of a dental patient's case. Dentists can characterize if the dental patient's case is elective or emergency. Elective cases are recommended to be postponed preventing unnecessary movement inside the community. Emergency cases are strictly prioritized during pandemic outbreaks. These cases are recommended to be appointed at the dental clinic or hospital as soon as possible. Screening allows dentists to create a safety measure that will reduce unnecessary movements. The nature of teledentistry reduces movement along the community preventing transmission of SARS-CoV-2 [32,35-39].

Diagnostic

The collection of clinical information will immediately lead to the analysis of the condition of the dental patient. Diagnostic procedure during the use of teledentistry is aided by software capabilities that enable dentists to know the condition of the dental patient. Some of the capabilities of software applications include the exchange of previously clinically-taken extraoral photographs, intraoral photographs, and dental cast photographs. The photographs that are originally taken inside a dental health facility can serve as a diagnostic material for an appropriate diagnosis. A sufficient set of diagnostic materials in oral health care is always an efficient way to provide health care. The availability of diagnostic materials lets dentists provide an immediate explanation regarding the condition of the patient. Excellent software support helps teledentistry become an efficient diagnostic tool [40-46].

Treatment Planning

A diagnosis will have a corresponding treatment that will be analyzed by the dentist. These treatments can be discussed together with the patient. A software that offers to present a visual list of treatment is an advantage. The list of treatments presented gives dental patients an overview of their case. Active participation of the patient in this method is possible through the video conference. Discussing the treatment plan with the patient will allow dentists to choose the appropriate treatment with regards to the circumstances of the dental patient. Consultation with a specialist is also possible if the software permits multiple participants in the video conference. This allows real-time discussion by the dental health team [28,47-51].

Screening Tool for Possible COVID-19 Patients

The collection of complete clinical information can give details if a patient has a presumed condition of COVID-19. If the initial phase of the interview or conference includes strict compliance with the guidelines of screening, then the detection of presumed patients may be done. The dentist can immediately send the dental patient to a proper health care facility that accommodates possible COVID-19 patients. Dentists, who are knowledgeable regarding the symptoms of COVID-19, will have an impact on the detection of COVID-19 patients in their community [16,17,52,53].

Specialist and Interprofessional Consultation

Communication with other health care workers is possible teledentistry. The dental health team, which is composed of various professionals, can collaborate to discuss concerns for the patient. Concerns include diagnosis, treatment, and other health measures for the patients. Consultation with other specialists for appropriate diagnosis or treatment will be an advantage to dentists who are comfortable working as a team. Conferences together with the dental patient are possible to establish active participation in all of the parties concerned. Immediate feedback will result in cost-efficient results, making teledentistry appropriate in times of crisis or outbreaks [52-56].

Infectious Disease Consultation

Dentists may consult experts who are more knowledgeable in handling cases of presumed and confirmed infectious cases. During the era of COVID-19, oral health care providers can consult

experts that will help them manage their approach towards oral health. While this method serves as an educational seminar, it is considered as part of the method if the concerned matter is for the welfare of the dental patient. Teledentistry lets dentists consult experts through conferences. This tool can also be a potential way to exchange laboratory results or diagnostic results of presumed infectious patients for discussion purposes. The nature of the consultation will reduce the total time health care workers need to allocate for providing effective health care because of the immediate communication by the health care team [52,53,56,57].

Evaluation of Presumed COVID-19 Patients

Health professionals who provide health care during the 2020 pandemic outbreak of COVID-19 should strictly evaluate all patients to identify possible SARS-CoV-2 carriers. Oral health care professionals are included because they can use teledentistry. The initial screening questions should include recent travel history, symptoms regarding COVID-19, and the nature of work. Questions regarding recent travel history should include travel to countries that have confirmed COVID-19 cases. Symptoms regarding COVID-19 should be specifically mentioned. Fever, cough, respiratory problems, and weakness are some symptoms that must be stated in the questions. Questions regarding the nature of work should also be included to give information that will determine if the patients have come in contact with confirmed COVID-19 patients. Health care workers are some profession that directly comes in contact with COVID-19 patients. Professions that need to be in a large number of people should also be considered. If the patient answers in favor of the questions that will result in the presumption of COVID-19 infection, then the dentist should immediately refer the patient to an appropriate health care facility that accommodates COVID-19 patients. The health care facilities report to the World Health Organization (WHO) that summarizes the number of infected individuals. Evaluation of every dental patient should be properly documented. Documentation in teledentistry can be done through software capabilities [16,17,58-62].

Limitations and Challenges of Teledentistry

There are general elements that limit the use of teledentistry during pandemic outbreaks. The general elements include politics, technology, and education. Political features are controlled by authorities from governments or health organizations. The features related to policies that address implementation guidelines. If primary health organizations like the World Health Organization (WHO) publish guidelines related to telemedicine, then national health organizations will follow the WHO guidelines. The national policies' impact on the use of teledentistry is considerable because it allows authorities to recommend the use of teledentistry to oral health care workers. Technological features describe the tools or means of connectivity by the health care practitioner and the patients. Connectivity means include internet connection and mobile network-based connection. The presence of a fast connection helps teledentistry achieve a continuous process. The hardware materials needed to be used as a tool in teledentistry include computers, cellphones, and tablets. The hardware's compatibility with software that supports teledentistry is considerable for its usage. Educational features are concerned with the acceptance of teledentistry in all aspects of society. Patient education and health care professional education regarding teledentistry is considerable for proper usage. A poor knowledge regarding the capabilities of teledentistry software may limit the functions that can be used by the oral health professional [63-65].

Specific elements within the specialties of dentistry are also evident in limiting teledentistry such as the limitations of encompassing treatment and diagnostic procedures. Many treatment methods require clinical visits from patients. Teledentistry distances the patient from the oral health care professional. The absence of clinical presentation is a considerable limitation for teledentistry. Almost every specialty (e.g., surgery, endodontic, orthodontic, prosthodontic) requires treatment procedures to be done inside the dental clinic [18,31,42]. Diagnostic procedures (e.g., percussion test, palpation, cold test) also requires clinical presence. The distant feature is the most substantial challenge of teledentistry [18,41].

Teledentistry Paradigm Shift for Future Pandemic Outbreaks

The use of distant oral health care was caused by public health measures that reduced movement inside affected communities. The public health measure is the sole substantial reason why some oral health care providers have applied teledentistry. Termination of this measure may result in the non-usage of teledentistry. The continuation of this method is highly recommended. The theoretical recommendation includes the enactment of appropriate policies, availability of communication technology, and acceptance of teledentistry through education.

General features that limit the function of teledentistry must be considered for future outbreaks. Enactment of appropriate policies must come from major health organizations like the WHO. The WHO publishes guidelines that are reflected through national health care organizations. Governments may also enact policies that favor teledentistry. The support of the government will help oral health care providers in acquiring resources that are needed to implement teledentistry. The availability of secure communication technology includes an internet connection that is provided by network-based companies. The availability of connection enables teledentistry to be applied throughout the affected rural and urban communities in future pandemic outbreaks. Acceptance of teledentistry through education involves acceptance in the dental academic community and the dental patient community. The support of the dental academic community will have an impact on dental students, dental researchers, and oral health care providers. The support of the dental patient community will also have an impact on members of the affected communities [63-65].

Conclusions

Teledentistry is a potential approach in providing oral health care to the community of COVID-19 affected countries. Consultation, diagnosis, and treatment planning in teledentistry provide oral health care providers a safe approach in accommodating patients that will result in less movement inside the affected community. Reduced movement helps the community by preventing transmission of SARS-CoV-2. Teledentistry and telemedicine are the same in the context of technological factors. Both methods can provide continuous support to the community as long as distant connectivity is possible. Teledentistry also has an impact on the detection of presumed COVID-19 patients by strict screening evaluation. Dentists, with the use of teledentistry, can help experts of COVID-19 by detecting signs of COVID-19 in a presumed patient. In the context of contribution, oral health care providers can use teledentistry as a tool to identify signs and symptoms related to any future pandemic outbreaks. Teledentistry is a useful means that can make an impact during pandemic outbreaks. The continuation of teledentistry after the era of COVID-19 is possible through policy, technological availability, and education. Teledentistry should be applied during non-pandemic outbreaks for immediate availability to future pandemic outbreaks.

Conflict of Interest

The author declares that he has no conflict of interest.

References

1. Wang Y, Wang Y, Chen Y, Qin Q. Unique epidemiological and clinical features of the emerging 2019 novel coronavirus pneumonia (COVID-19) implicate special control measures. J Med Virol. 2020;92:568-576. Doi:10.1002/jmv.25748
2. Gorbalenya AE, Baker SC, Baric RS, de Groot RJ, Drosten C, Gulyaeva AA, et al. Severe acute respiratory syndrome-related coronavirus: The species and its viruses – a statement of the Coronavirus Study Group. bioRxiv [Internet]. 2020 [cited 2020 May 4]. Available from: https://www.biorxiv.org/content/10.1101/2020.02.07.937862v1

3. Wu F, Zhao S, Yu B, Chen YM, Wang W, Song ZG, et al. A new coronavirus associated with human respiratory disease in China. Nature 2020;579(7798):265-269. Doi:10.1038/s41586-020-2008-3
4. del Rio C, Malani PN. COVID-19—New Insights on a Rapidly Changing Epidemic. JAMA 2020;323(14):1339-1340. doi:10.1001/jama.2020.3072
5. World Health Organization. WHO Director-General's opening remarks at the media briefing on COVID-19 – 11 March 2020 [Internet]. 2020 [cited 2020 May 4]. Available from: https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020
6. World Health Organization. Updated WHO recommendations for international traffic in relation to COVID-19 outbreak [Internet]. 2020 [cited 2020 May 4]. Available from: https://www.who.int/news-room/articles-detail/updated-who-recommendations-for-international-traffic-in-relation-to-covid-19-outbreak
7. Kucharski AJ, Russell TW, Diamond C, Liu Y, Edmunds J, Funk S et al. Early dynamics of transmission and control of COVID-19: a mathematical modelling study. Lancet Infect Dis. 2020;20(5):553-558. Doi: 10.1016/S1473-3099(20)30144-4
8. Centers for Disease Control and Prevention. COVID-19 Travel Recommendations by Country [Internet]. 2020 [cited 2020 May 4]. Available from: https://www.cdc.gov/coronavirus/2019-ncov/travelers/map-and-travel-notices.html#travel-1
9. Heymann DL, Shindo N. COVID-19: what is next for public health?. Lancet 2020;395(10224):542-545. Doi:10.1016/S0140-6736(20)30374-3
10. Centers for Disease Control and Prevention. Dental Setting [Internet]. 2020 [cited 2020 May 4]. Available from: https://www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings.html
11. Iacobucci G. Covid-19: all non-urgent elective surgery is suspended for at least three months in England. BMJ 2020;368:m1106. Doi:10.1136/bmj.m1106
12. Wong J, Goh QY, Tan Z, Lie SA, Tay YC, Ng SY,et al. Preparing for a COVID-19 pandemic: a review of operating room outbreak response measures in a large tertiary hospital in Singapore. Can J Anaesth. 2020;67:732-745. Doi: 10.1007/s12630-020-01620-9
13. Ng JJ, Ho P, Dharmaraj RB, Wong JCL, Choong AMTL. The Global Impact of COVID-19 on Vascular Surgical Services. J Vasc Surg. 2020;71(6):P2182-2183.E1 Doi:10.1016/j.jvs.2020.03.024
14. American Dental Association. ADA Calls Upon Dentists to Postpone Elective Procedures [Internet]. 2020 [cited 2020 May 4]. Available from: https://www.ada.org/en/press-room/news-releases/2020-archives/march/ada-calls-upon-dentists-to-postpone-elective-procedures
15. Irish Dental Association. COVID-19 and Dental Practice in Ireland [Internet]. 2020 [cited 2020 May 4]. Available from: https://www.dentist.ie/_fileupload/Covid%2019/IDA%20Paper%20re%20Covid-19%20to%20send%20to%20HPSC%2018_03_2020.pdf
16. Meng L, Hua F, Bian Z. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. J Dent Res. 2020;99(5):481-487. Doi:10.1177/0022034520914246
17. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. Int J Oral Sci. 2020;12:9. Doi:10.1038/s41368-020-0075-9
18. Jampani ND, Nutalapati R, Dontula BS, Boyapati R. Applications of teledentistry: A literature review and update. J Int Soc Prev Community Dent 2011;1(2):37-44. Doi:10.4103/2231-0762.97695.
19. Zimlichman E. Telemedicine: Why the Delay?. Isr Med Assoc J. 2005;7:525-526.
20. Roine R, Ohinmaa A, Hailey D. Assessing Telemedicine: A Systematic Review of the Literature. CMAJ. 2001;165:765-771.
21. Bhambal A, Saxena S, Balsaraf SV. Teledentistry: Potentials Unexplored. J Int Oral Health 2010;2:1-6.
22. Chang SU, Plotkin DR, Mulligan R, Polido JC, Mah JK, Meara JG. Teledentistry in Rural California- A USC Initiative. CDA J. 2003;31:601-608.

23. Bauer JC, Brown WT. The digital transformation of oral health care. Teledentistry and electronic commerce. J Am Dent Assoc. 2001;132(2):204-209. Doi: 10.14219/jada.archive.2001.0156
24. Berndt J, Leone P, King G. Using teledentistry to provide interceptive orthodontic services to disadvantaged children. Am J Orthod Dentofacial Orthop. 2008;134:700-706.
25. Pradhan D, Verma P, Sharma L, Khaitan T. Knowledge, awareness, and attitude regarding teledentistry among postgraduate dental students of Kanpur city, India: A questionnaire study. J Educ Health Promot. 2019;8:104. Doi:10.4103/jehp.jehp_363_18
26. Rocca MA, Kudryk VL, Pajak JC, Morris T. The evolution of a teledentistry system within the Department of Defense. Proc AMIA Symp. 1999;921-924
27. Mariño R, Ghanim A. Teledentistry: a systematic review of the literature. J Telemed Telecare 2013;19(4):179-183. Doi: 10.1177/1357633X13479704
28. Aziz SR, Ziccardi VB. Telemedicine using smartphones for oral and maxillofacial surgery consultation, communication, and treatment planning. J Oral Maxillofac Surg. 2009;67(11):2505-2509. Doi:10.1016/j.joms.2009.03.015
29. Smith AC, Bensink M, Armfield N, Stillman J, Caffery L. Telemedicine and rural health care applications. J Postgrad Med. 2005;51(4):286-293.
30. Böhm da Costa C, Peralta FDS, Ferreira de Mello ALS. How Has Teledentistry Been Applied in Public Dental Health Services? An Integrative Review. Telemed J E Health. 2019;26(7):945-954. Doi:10.1089/tmj.2019.0122
31. Bradley M, Black P, Noble S, Thompson R, Lamey PJ. Application of teledentistry in oral medicine in a community dental service, N. Ireland. Br Dent J. 2010;209(8):399-404. Doi:10.1038/sj.bdj.2010.928
32. Smith AC, Thomas E, Snoswell CL, Haydon H, Mehrotra A, Clemensen J, et al. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). J Telemed Telecare 2020;26(5):309-313. Doi:10.1177/1357633X20916567
33. Portnoy J, Waller M, Elliott T. Telemedicine in the Era of COVID-19. J Allergy Clin Immunol Pract. 2020;8(5):1489-1491. Doi:10.1016/j.jaip.2020.03.008
34. American Dental Association. Summary of ADA Guidance During the COVID-19 Crisis [Internet]. 2020 [cited 2020 May 5]. Available from: https://success.ada.org/~/media/CPS/Files/COVID/COVID-19_Int_Guidance_Summary.pdf?utm_source=adaorg&utm_medium=covid-resources-lp&utm_content=cv-pm-summary-guidance&utm_campaign=covid-19&_ga=2.17326009.125174176.1586179216-56373000.1585793961
35. Mandall NA, O'Brien KD, Brady J, Worthington HV, Harvey L. Teledentistry for screening new patient orthodontic referrals. Part 1: A randomised controlled trial. Br Dent J. 2005;199(10):659-62. Doi:10.1038/sj.bdj.4812930
36. Estai M, Kanagasingam Y, Huang B, Checker H, Steele L, Kruger E, et al. The efficacy of remote screening for dental caries by mid-level dental providers using a mobile teledentistry model. Community Dent Oral Epidemiol. 2016;44(5):435-441. Doi:10.1111/cdoe.12232
37. Hollander JE, Carr BG. Virtually Perfect? Telemedicine for Covid-19. N Engl J Med. 2020;382:1679-1681. Doi: 10.1056/NEJMp2003539
38. Patterson S, Botchway C. Dental screenings using telehealth technology: a pilot study. J Can Dent Assoc. 1998;64(11):806-810.
39. Elliott G, Smith AC, Bensink ME, Brown C, Stewart C, Perry C, et al. The feasibility of a community-based mobile telehealth screening service for Aboriginal and Torres Strait Islander children in Australia. Telemed J E Health 2010;16(9):950-956. Doi: 10.1089/tmj.2010.0045
40. Torres-Pereira C, Possebon RS, Simões A, Bortoluzzi MC, Leão JC, Giovanini AF, et al. Email for distance diagnosis of oral diseases: a preliminary study of teledentistry. J Telemed Telecare 2008;14(8):435-438. Doi:10.1258/jtt.2008.080510
41. Morosini Ide A, de Oliveira DC, Ferreira F, Fraiz FC, Torres-Pereira CC. Performance of distant diagnosis of dental caries by teledentistry in juvenile offenders. Telemed J E Health. 2014;20(6):584-589. Doi:10.1089/tmj.2013.0202

42. Estai M, Bunt S, Kanagasingam Y, Kruger E, Tennant M. Diagnostic accuracy of teledentistry in the detection of dental caries: a systematic review. J Evid Based Dent Pract. 2016;16(3):161-172. Doi:10.1016/j.jebdp.2016.08.003
43. Hersh WR, Hickam DH, Severance SM, Dana TL, Pyle Krages K, Helfand M. Diagnosis, access and outcomes: Update of a systematic review of telemedicine services. J Telemed Telecare 2006;12(2):3-31. https://doi.org/10.1258/135763306778393117
44. Marcin JP, Nesbitt TS, Cole SL, Knuttel RM, Hilty DM, Prescott PT, et al. Changes in diagnosis, treatment, and clinical improvement among patients receiving telemedicine consultations. Telemed J E Health 2005;11(1):36-43. Doi: 10.1089/tmj.2005.11.36
45. Birnbach JM. The future of teledentistry. J Calif Dent Assoc. 2000;28(2):141-143.
46. Alabdullah JH, Daniel SJ. A Systematic Review on the Validity of Teledentistry. Telemed J E Health 2018;24(8):639-648. Doi:10.1089/tmj.2017.0132
47. Mariño R, Tonmukayakul U, Marwaha P, Collman R, Hopcraft M, Manton DJ, et al. Teleconsultation/telediagnosis using teledentistry technology: a pilot feasibility study. Int J Adv Life Sci. 2014;6:291-299.
48. Berndt J, Leone P, King G. Using teledentistry to provide interceptive orthodontic services to disadvantaged children. Am J Orthod Dentofacial Orthop. 2008;134(5):700-706. Doi:10.1016/j.ajodo.2007.12.023
49. Oral Health Workforce Research Center. Case Studies of 6 Teledentistry Programs: Strategies to Increase Access to General and Specialty Dental Services [Internet]. 2020 [cited 2020 May 5]. Available from: http://www.oralhealthworkforce.org/wp-content/uploads/2017/02/OHWRC_Case_Studies_of_6_Teledentistry_Programs_2016.pdf
50. Mladenović D, Tosić G, Zivković D, Djindjić N, Mladenović L, Mladenović S, et al. Telemedicine consulting in the patient preparation and planning of prosthetic tooth replacement. Vojnosanit Pregl. 2013;70(9):866-870. Doi:10.2298/vsp110407010m
51. Al Dossary S, Martin-Khan MG, Bradford NK, Armfield NR, Smith AC. The Development of a Telemedicine Planning Framework Based on Needs Assessment. J Med Syst. 2017;41(5):74. Doi:10.1007/s10916-017-0709-4
52. Greenhalgh T, Wherton J, Shaw S, Morrison C. Video consultations for covid-19. BMJ 2020;368:m998. Doi:10.1136/bmj.m998
53. Greenhalgh T. Covid-19: a remote assessment in primary care. BMJ 2020;368:m1182. Doi:10.1136/bmj.m1182
54. Ueda M, Martins R, Hendrie PC. Managing Cancer Care During the COVID-19 Pandemic: Agility and Collaboration Toward a Common Goal. J Natl Compr Canc Netw. 2020;18(4):366-369. Doi:10.6004/jnccn.2020.7560
55. Ebrahim SH, Ahmed QA, Gozzer E, Schlagenhauf P, Memish ZA. Covid-19 and community mitigation strategies in a pandemic. BMJ 2020;368:m1066. Doi:10.1136/bmj.m1066
56. Tanne JH, Hayasaki E, Zastrow M, Pulla P, Smith P, Rada AG. Covid-19: how doctors and healthcare systems are tackling coronavirus worldwide. BMJ 2020;368:m1090. Doi:10.1136/bmj.m1090
57. Xiao C. A Novel Approach of Consultation on 2019 Novel Coronavirus (COVID-19)-Related Psychological and Mental Problems: Structured Letter Therapy. Psychiatry Investig. 2020;17(2):175-176. Doi:10.30773/pi.2020.0047
58. Centers for Disease Control and Prevention. Coronavirus (COVID-19) [Internet]. 2020 [cited 2020 May 5]. Available from: https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html
59. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395(10223):497-506. Doi: 10.1016/S0140-6736(20)30183-5
60. World Health Organization. Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected [Internet]. 2020 [cited 2020 May 5]. Available from: https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125

61. Centers for Disease Control and Prevention. Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID 19) in Healthcare Settings [Internet]. 2020 [cited 2020 May 5]. Available from: https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html
62. World Health Organization. Infection prevention and control of epidemic- and pandemic-prone acute respiratory diseases in health care [Internet]. 2020 [cited 2020 May 5]. Available from: https://apps.who.int/iris/bitstream/handle/10665/112656/9789241507134_eng.pdf?sequence=1
63. Combi C, Pozzani G, Pozzi G. Telemedicine for Developing Countries. A Survey and Some Design Issues. App Clin Inform. 2016;7(4):1025-1050. https://doi.org/10.4338/ACI-2016-06-R-0089
64. Güler NF, Übeyli, ED. Theory and Applications of Telemedicine. J Med Syst. 2002;26:199-220. Doi:10.1023/A:1015010316958
65. Patel RN, Antonarakis GS. Factors influencing the adoption and implementation of teledentistry in the UK, with a focus on orthodontics. Community Dent Oral Epidemiol. 2013;41(5):424-431. Doi:10.1111/cdoe.12029