

Envisage Increasing Oral Health of Indonesian Rural Peoples Through TeledentistryPilar Menara Falah^{1*}, Yudha Nurdian²1. Faculty of Dentistry, University of Jember, Jember, Indonesia
2. Faculty of Medicine, University of Jember, Jember, Indonesia**Abstract**

Indonesian rural peoples have a certain culture in the behavior of seeking dental and oral health. They have some problems to access oral health. They have problems with their territory and society itself. Most of them have less money, fewer teeth, more cavities, and worse health status than non-rural peoples. This literature review aims to refresh views on teledentistry as a solution to improve oral health and avoid its obstacles.

Search for the most recent articles published since 2020 in a database of research in November 2022 on Google Scholar, Science Direct, and PubMed. Qualifying articles were then extracted and summarized based on situational analysis.

Teledentistry is a solution to address the problems of rural peoples by reaching dental and oral health service facilities directly. Progressive medical equipment and instruments have made teledentistry a more appropriate way to reach patients on a large scale by providing teleconsulting support anytime and anywhere through internet-based media platforms. Campaigning for awareness of rural peoples on various health issues and promoting valuable information can be achieved.

Teledentistry reduces the burden on rural peoples and dental practitioners in disastrous situations. Therefore, it plays an important role in serving rural peoples with progressive management strategies and best fulfilling their treatment needs. More recently, teledentistry has not become an important part of normal oral health care. In the future, teledentistry will become another way to access oral health care.

Review (J Int Dent Med Res 2023; 16(2): 859-864)**Keywords:** Oral health, teledentistry.**Received date:** 02 January 2023**Accept date:** 05 February 2023**Introduction**

Indonesian people, especially the ones who live in rural environment, have a certain habit in seeking for oral care. This habit and dental caries severity are correlated. Poor oral health is a big problem for Indonesian public health.¹ Approximately 86.4% of Indonesian grown-ups had never been to a dentist. Elements that contribute to oral health facility usage in Indonesia are age, sex, marital status, residence, education, salary, health assurance, and individual health needs.² Indonesia has more than 17,000 islands in total. Inequality increased drastically while each island develops. Inequality in dental services access distribution is a result of

this condition. According to Indonesian Basic Health Research in 2013, dental service usage in Indonesia during the last 12 months is only 8.1%.³ Oral health is in line with individual's health status in general. Therefore, oral health care needs more attention since dental problems cause pain that will inflict impaired mastication and reduce individual's quality of life.

Various factors can lead to oral health problems including tooth-brushing habits, consumption of sweet foods, and dental visit.⁴ Extreme sweet foods consumption is related to one of several oral diseases which is caries. Caries can be found in individuals who rarely brush their teeth and visit the dentist. Increasing awareness of maintaining oral health and adding dentists numbers must be carried out to establish healthy rural peoples' behavior in Indonesia. Dental visit is one of the effort to take care of oral health because it allows the dentist to check oral health problems existence and provide treatment depend on the individual.

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However, rural peoples often faces dental care facility access barriers.⁵ Their barriers are in region and community aspects. Region aspects are including the distance to the oral health facility and complex residential area. Community aspects are including lack of conveyance, health assurance, and oral health suppliers. Rural areas have higher rates of impoverishment than non rural areas. There are also fewer dental practitioners in rural zone. People living in that zone go to the dentist less and Therefore, those people have higher rates of tooth loss and tooth decay than urban people.

Teledentistry is common approach in rural areas to connect rural peoples with dental health facility. It is a combination of dentistry, technology, and communication fields. It consists of a range of services including video consultations, sharing images and records among providers, provider education courses and patient monitoring to

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address a patient's oral health.⁶ Teledentistry is the use of information technology to implement dentistry without distance limitations. It has been widely applied in several dental health units because it can improve oral health service performance. Teledentistry can increase a dentist's capacity to detect oral disease and connect patients with appropriate treatment.⁷ Indonesian Dentists Association has released a leaflet that encourage immediate dental treatment to be done only in emergency situation and advised dentists to give dental health service through teledentistry. Despite how sophisticated teledentistry is, there are some obstacles in its application. This literature review will refresh the outlook of teledentistry as solution to increase oral health and avoid its obstacles.

Theoretical Literature Review

Teledentistry is one of telehealth manifestation beside telemedicine combining telecommunications and dentistry. It is an innovative field that has a potential for increasing dental service and education. Jacques Marescaus was the first person to perform remote medical surgery on humans in 2001. He was in New York and successfully performed a cholecystectomy operation on a 68 year-old patient who lives in Strasbourg, France, 6,230 km from New York City. Operations that were carried out by robots which were controlled remotely are known as Lindbergh operations. Connections between New York and Strasbourg are connected with Asynchronous Transfer Mode (ATM) technology. This operation was carried out successfully without complications for 54 minutes. This proves that telehealth in general is an old concept but researches discuss about it only after COVID 19 Pandemic.⁸ The first teledentistry implementation was in US project that was launched in 1994 to check the US soldier's dental health. Teledentistry word was formally used for the first time in the literature by Cook in 1997. This technology develop rapidly in the 21st century. Teledentistry has the potential to provide benefits in dental health services by increasing early diagnosis, facilitating right treatment for oral diseases, simplifying communication between patients and health workers, and adding access to care for people living in rural areas.⁹ Many people in rural areas don't get adequate health

services because besides the limited number of dentists, the costs and time required to go to the dental clinician are extremely high. This innovation can overcome these barriers by providing access to dental and oral Journal of International Dental and Medical Research ISSN 1309-100X <http://www.jidmr.com> Teledentistry Pilar Menara Falah and Yudha Nurdian health service providers in rural areas to consult with dental practitioners in urban areas. Patients don't need to present in clinic with teledentistry existence.¹⁰

Teledentistry is divided into two main types including synchronous and asynchronous. Synchronous teledentistry involves real-time interaction between patient and practitioner. Real-time videotelephony allows people at two or more locations to communicate with each other by using a digital screen to display a video image of the person or people at either one person or both locations.¹¹ This system uses a video camera and speaker phones so that both users at different locations can see and hear each other. Both patient and practitioner make an agreement to meet and both parties are agreeing upon a meeting time and information that is exchanged in real time is transmitted simultaneously between sites in this technique. It allows deeper discussion and personal contact between patient and practitioner than asynchronous teledentistry.¹² This method requires high intensive for the device and network connection.

Asynchronous teledentistry involves patients clinical information and its conferment to another practitioner at a different location.¹³ It requires lower cost than synchronous teledentistry. It operates through the internet. The dental professional collects all important informations from the patient and keeps them in a file which is encoded later. The file is encoded to guarantee the information is safe and only can be accessed by the authorized parties. It is forwarded to e-mail. The consultant gets the file and checks its contents. In return, the consultants give the recommendations to the dental professional. This technique is not only cost effective but it also provides adequate benefit for a wide range of applications.¹⁴ It is just as effective as presenting cases in synchronous teledentistry.

The use of teledentistry in its implementation is divided into four subunits including teleconsultation, telediagnosis, teletriage and telemonitoring.¹⁵ Teleconsultation is basically telecommunications or electromagnetic systems usage for the purpose of sharing information or communication channel between patients and dentists.¹⁶ Teleconsultation has positive impacts on patients who have physical or intellectual limitations, elderly patients, and patients who are convicts to consult with dentists.¹⁷

Telediagnosis is very effective to be applied during the pandemic because the determination of the prognosis diagnosis can also be done by taking advantage of technological sophistication in the form of images or digital information.¹⁸ A simple example is the diagnosis of dental caries which can be done via a smartphone using several applications such as WhatsApp and telegram. Teletriage is the usage of advanced technology by directing patients to the appropriate place, treatment type, and time.¹⁹ One of the basic principles of teletriage is the implementation of a priority system by choosing patients with urgent needs. The application of the principle of teletriage also has an impact in reducing patient waiting time. One of the applications of teletriage in dentistry is to use teleradiology as a useful tool in triage of patients with maxillofacial trauma from basic health care centers to advanced levels.²⁰

Based on standard operating procedures for dentistry, patients with particular cases are advised to have control after dental and oral treatment in order to observe and determine the next steps for treatment. Control procedures can still be carried out through telemonitoring. Telemonitoring is the remote monitoring or control of patients based on technology.²¹

Periodic control visits with physical contact can be minimized by telemonitoring so that control procedures can be more effective and efficient in terms of time and cost. In addition, through telemonitoring the development of a disease or the progress of a treatment in the oral cavity can be continuously monitored. Therefore, it has been proven to be useful in control procedures, especially monitoring patients with both surgical and non-surgical cases.¹⁶

Materials and methods

This study is conducted based on narrative approach to describe potential opportunities of teledentistry to increase oral health status of Indonesian rural peoples. In order to achieve a narrative review article, the information are summarized based on situational analysis. This literature review used a search methodology for the most recent papers published since 2020 through a database of research papers. The research was conducted in November 2022 on Google Scholar, ScienceDirect, and PubMed.

Results

Although teledentistry is often practiced, some patients will be dissatisfied with this service.²² Many patients are still disappointed because they don't have physical contact with the dentists. Dentists must listen to all patient protests even from virtual reality.

Discussion

The types and actions of treatment, risks, and other related matters are essential to be conveyed to the patient. Although the service is virtual, they are obligated to ask for informed consent from the patient. Moreover, dentist should inform the patients about the teledentistry services restrictions to avoid misunderstandings.²³

In its application, there are several challenges for teledentistry services, including the incapability of patients and practitioners in using advanced technology, weak security and privacy system for patient data, software authorization problems, network utilization tuition, physical examination limitations, and equipment required.²⁴ Wrongly diagnose also has the potential to occur during the usage of this service. This may occur because of technical hitches when transferring patient's multimedia data or weak telecommunication network. However, any types of sophisticated technology cannot alternate humans role. In this case, teledentistry's role and performance will increase in line with operator's dedication and precision and the support of sophisticated and stable telecommunications equipment.²⁵

Dentists must make sure that the telecommunication solution meets their clinical requirements and complies with privacy laws.²⁶ They should provide adequate information to the patients about the limitations, advantages, and disadvantages that may occur during online session. Dentists must follow guidelines and procedures regarding informed consent, patient details, personal communications, and consultancies' privacy and confidentiality.²⁷ The patient should also be aware of the limitations of teledentistry, and dentists will provide the best advice possible in the absence of a face-to-face consultation.²² Besides teledentistry should be taught to important groups in rural zone such as community health workers.²⁸

Future advances in technology will enable teledentistry to be used in many more ways, such as clinical decision support, quality and safety assessment, consumer home use, medication e-prescribing and simulation training. Teledentistry provides new opportunities for dental education by providing the primary care professionals with an easy access to efficient consultation and by helping in conducting postgraduate education and continuing dental education programs.²⁹ In spite of some issues which need to be resolved, the potential of teledentistry is tremendous, which needs to be explored.³⁰

According to Rachmawati et al, most people's attitude towards the use of teledentistry was positive and had no barrier.³¹ Infrastructure and regulations need to be prepared by the government to be able to implement teledentistry. Jha et al stated that teledentistry can be a beneficial tool for peer education, consultations, and ensuring proper referral channelizing.³² Kui et al claimed that while dental practitioners should be encouraged to keep themselves updated about new technologies, patients should also be constantly informed about their options for receiving special oral health care.³³ Antarsih et al stated that Indonesia has a demographic bonus, community support, BPJS insurance regulations related to teledentistry, national e-health strategies, there is a collaboration between several ministries with a Digital Health Service Platform company.³⁴ However, there are obstacles, namely the low ratio of doctors and health workers to the population. According to Handayani, Indonesia does have a promising start and trajectory of

teledentistry technologies.³⁵ While it might be challenging, there is a substantial need for the government to develop accessible teledentistry platforms for the possible improvement they might bring to the future of oral healthcare provision in general. Teledentistry is a promising application for increasing knowledge of oral health and also initial examination, diagnosis, and treatment planning.^{36,37}

Building technological framework for teledentistry is an important gap that must be overcome for improving oral health care access to reach its full potential especially for rural society. Though use of Zoom, Whatsapp messenger, and other secure apps exists, several investors acknowledged that including audio file as an option in teledentistry policies is important to reduce the differences to patients who don't have access to video services, either because of poor technology or poor internet service, or who are simply not comfortable using video. Furthermore, teaching dental practitioners to use this technology and enjoy it is important for improving long-term use of teledentistry. It needs homogenization of teledentistry with electronic dental records. Increasing access to better internet services, improving software for dentistry, and training dentists on how to use it are viewed as crucial for teledentistry's long-term success.

Conclusions

Teledentistry is useful for Indonesian rural society to access oral health facility. Furthermore, educating patients about their treatment and diagnosis is a vital part of their appointments with doctors. Teledentistry can be applied in some platforms such as mobile phones, video conferencing, and social media.

Declaration of Interest

All authors have no conflict of interest.

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