



Clinical Usefulness of Telehealth: A Literature Review from the Perspective of Medical Specializations

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ABSTRACT

Telehealth uses interactive technology and telecommunication to provide health care and share medical knowledge between the users. Information is transferred from one site to another electronically. Telehealth enables physicians to access the integrated electronic medical records in treating patients. Telehealth can be used for diagnostic, therapeutic, preventive measures, self-education, and self-monitoring of patients' health. Telehealth enables users to interact collaboratively with each other. Telehealth enables multiple medical specialties in providing health care services to a more significant population of patients. Telehealth is also a cost-effective method in providing health care services in both urban and rural areas. Telehealth may be an answer to problems associated with poverty, rural areas, and lack of medical personnel. The purpose of this article is to give insights into the use of telehealth in multiple medical specialties and its positive outcomes.

Keywords: Telehealth, telemedicine, specializations

ABSTRAK

Telehealth memanfaatkan teknologi dan telekomunikasi yang interaktif untuk memberikan akses pelayanan kesehatan dan berbagi pengetahuan seputar dunia medis bagi penggunanya. Informasi ditransfer dari satu situs ke situs lain secara elektronik. *Telehealth* memungkinkan dokter untuk mengakses catatan medis elektronik terintegrasi saat merawat pasien. *Telehealth* dapat digunakan untuk tindakan diagnostik, terapeutik, pencegahan, serta pendidikan dan pemantauan mandiri bagi para pasien. *Telehealth* memungkinkan pengguna untuk berinteraksi secara kolaboratif satu sama lain. *Telehealth* juga memungkinkan beberapa spesialisasi medis dalam memberikan layanan perawatan kesehatan kepada populasi pasien yang lebih banyak. *Telehealth* juga merupakan metode yang hemat biaya dalam menyediakan layanan perawatan kesehatan di daerah perkotaan dan pedesaan. *Telehealth* dapat menjadi jawaban atas masalah yang terkait dengan kemiskinan, daerah pedesaan, dan kurangnya tenaga medis. Tujuan artikel ini adalah untuk memberikan wawasan tentang penggunaan *telehealth* dalam berbagai spesialisasi medis dan hasil positifnya. **Gilbert Sterling Octavius, Lie Rebecca Yen Hwei. Manfaat Klinis *Telehealth*: Studi Literatur Perspektif Spesialisasi Medis.**

Kata kunci: *Telehealth*, telemedicine, spesialisasi

INTRODUCTION

Indonesia is the 4th most populated country in the world, with 250 million inhabitants in 34 provinces spread across 17,508 islands.¹ Indonesia's population growth is predicted to increase by 1.2% per year. By 2045, Indonesia's population will increase significantly by 61.6-69 million people or around 24.6-27.6%.^{1,2}

However, according to the National Statistics Agency, in March 2019, 9.41% of Indonesia's population is in poverty, and poverty-stricken families have an average of 4.68 people in each household. The monthly expenditure per capita for each family in poverty is 425,250 rupiah.³

Poverty is a serious issue because the cost of medical treatment is expensive. The estimated costs of hospital beds in 2005 in Indonesia were \$30.36 for primary hospitals, \$39.61 for secondary hospitals, and \$54.10 for tertiary hospitals. Estimated outpatient costs in 2005 were \$9.25 for primary hospitals, \$13.12 for secondary hospitals, and \$19.41 for tertiary hospitals. This estimated costs do not include drugs and other diagnostic procedures.⁴ Furthermore, in 2008, 41% of life-span (measured in years) were lost due to communicable diseases, 45% due to non-communicable diseases, and 13% due to accidents.⁵

Indonesia also lacks of professional medical

personnel. According to 2018 data, Indonesia only has 4,269 medical doctors, 24,149 nurses and midwives, 0.548 dentists (in 2017), and 0.852 pharmacists per 10,000 population.⁶ According to World Health Organization (WHO), the ideal doctor-patient ratio is 1:600, which places Indonesia's health system as one of the worst in Southeast Asia. In 2006, WHO identified Indonesia as one of the countries with a critical deficit in the supply of qualified medical personnel.⁵⁻⁷

Studies have shown that telehealth is a cost-effective method with a high satisfaction index among patients and medical practitioners. It can be used to disseminate medical information, monitor disease progression, as

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ANALYSIS



well as facilitate treatment. These benefits have been experienced in both urban and rural areas.⁸⁻¹¹ Since its introduction, studies and implementation of telehealth have spread across multiple specializations fields, and this literature review will delineate clinical uses of telehealth in every medical sector.

Definition of Telehealth

Telehealth is often referred to as telemedicine, and these terms are used interchangeably.⁽¹²⁾ However, both terms are not quite the same. World Health Organization defines telehealth as the “delivery of health care services, where patients and providers are separated by distance. Telehealth uses information and communication technology (ICT) for the exchange of information for the diagnosis and treatment of diseases, and for the continuing education of health professionals.”¹³ Telemedicine has a similar definition. However, it only encompasses the interaction between a medical practitioner and a patient or its user.¹⁴ It is often regarded that telehealth is the broader umbrella term, while telemedicine is one part of telehealth.^{13,14}

Clinical Uses of Telehealth in Different Medical Sectors

Teledermatology

Teledermatology is a telemedicine application that deals with the practice of dermatology through ICT. As with other telemedicine applications, teledermatology aims to provide the highest quality care more efficiently by providing valuable information to patients. Many researches has been done to compare teledermatology and face-to-face meetings.¹⁵ Although the diagnostic correlation from study to study varies, most experts agree that synchronous or real-time telemedicine is as useful as face-to-face consultation.^{16,17}

While there is no consensus on the use of teledermatology, the British Association of Dermatologists (BAD) recommends that teledermatology should only be used in a hospital with an integrated primary or secondary care team. Suspected skin malignancies should be seen in face-to-face settings, and measures should be taken to ensure that data is transmitted and secured in encrypted pathways.¹⁸

Tele-Endocrinology

Diabetes mellitus is one of the most

significant causes of morbidity and mortality in the world.¹⁹ The costs of managing diabetes mellitus and its complications are exorbitant. Collaborative activities are conducted by a multidisciplinary team, including physicians, nurses, clinical dietitians, and pharmacists, to optimize management and offer more integrated services. In 2010, through face-to-face meetings, the Veterans Health Administration (VHA) initiated a patient-focused medical home program to expand access to multidisciplinary teams. With this initiative, VHA advocates the use of the care management home telehealth (CCHT) software to enhance glycemic regulation of veterans and achieve the optimal target of hemoglobin A1C.¹⁹

For veterans living in remote areas with restricted access to face-to-face meetings, tele-endocrine can increase the consistency of glucose measurements. Several studies have shown that the degree of patient satisfaction rises with the presence of tele-endocrine since this telemedicine is cost-effective and less time-consuming. In a specific group of less educated patients, HbA1C is still managed as efficiently as in-person visits with telehealth.^{20,21}

The American Diabetes Association has reported that presence of groups that consist of diabetic patients through telehealth may be a valuable addition to managing the disease. These groups, which are rising in number, may provide online communities that can provide peer support for other new diabetic patients. This serves as an alternative for peer support for ongoing diabetes.²²

Telehealth in Emergency, Intensive Care Unit (ICU), or Anesthesia

The introduction of telehealth in an intensive care unit (ICU) is motivated by three key factors: the emphasis on patient's safety and early intervention, the demand for working hours at night and weekends has risen beyond available capacity, and quicker updates on patient conditions that are part of the ICU's interdisciplinary telemedicine program.²³ Guidance on teleICU operations based on experts' advice was published by the American Telemedicine Association (ATA).²⁴ Standardization on teleICU operations was rendered in this guideline and signaled the acceptance of teleICU in medical practice.²⁴

Decreased 90-day mortality, decreased ICU length of stay and hospital stay, decreased ICU mortality, hospital mortality, decreased complications, and decreased costs are some of the advantages of implementing teleICU.²⁵

Tele-orthopaedics

Telemedicine is not commonly used in orthopedic surgeries. A study showed no difference between the level of satisfaction, the level of complications, or the need for more transportation between face-to-face assessment and telemedicine evaluation in post-operative patients.²⁶ Telemedicine has also been used for evaluating patients with active military service in remote areas. Blank, et al, (2011) published the results of 9 years of research on telemedicine assessment of wounded military combatants showing that many acute musculoskeletal symptoms can be diagnosed and transmitted by consultation through a web-based platform.²⁷

Telemedicine is deemed acceptable in pediatric sports medicine, parents may have direct access to sports medicine services providers without having to leave their job or encourage their children to leave school. Parents seek information, guidance, and advice on injuries in different situations, which can often be transmitted via telemedicine platforms without the need for special equipment.²⁸ American Academy of Orthopaedic Surgeons (AAOS) has provided a startup checklist on telemedicine consult.²⁹ Furthermore, during the COVID-19 pandemic, more orthopedics are embracing telehealth into their practices.³⁰

Telenephrology

The use of telemedicine nephrology is intended to offer, beyond conventional healthcare, an alternative treatment modality. Telenephrology programs can eliminate health care inequalities associated with kidney disease through an expanded portfolio of technologies to meet veterans' different telecommunication preferences.³¹ A recent review mentioned that due to the lack of access and care in chronic kidney disease patients, telehealth might be a solution to improve patients' quality of life.³² One case study also calculated the cost-effectiveness of telemedicine in renal transplantation patients and found that patients saved 203,202 km on travel distance, A\$ 31,048 saved on gas, and



ANALYSIS



2,771 hours saved on travel.³³

Teleneurology

One study analyzed patients diagnosed with CADASIL who needed follow-up. The patients studied had the choice of being followed up via face-to-face meetings or telemedicine. The research found that the patient and doctor satisfaction level was more or less the same in both face-to-face and telemedicine follow-ups. The average length of a telemedicine consultation was 3 minutes shorter than that of a face-to-face consultation, implying that telemedicine could lead to health care cost savings. In addition to that, telemedicine may also minimize patient travel time and the associated potential costs.³⁴ Ahmed, et al, also found that telemedicine can reduce patient costs and improve patient satisfaction in epilepsy patients.³⁵

American Academy of Neurology released a position statement that reimbursement, streamlined state medical licensing process, and malpractice coverage should be improved to support teleneurology in clinical practices.³⁶

Teleophthalmology

Regular eye-screening can help with early diagnosis, timely care interventions, and preventing vision issues. However, as patients get older, they appear to monitor their eye health less often, although they are at the most significant risk of developing visual impairment in this age group.³⁷ Moreover, many elderly patients living in rural areas are less likely than those living in urban areas to obtain rigorous exams.³⁸ The Veteran Affairs (VA) eye clinic in Atlanta has initiated a new Technology-based Eye Care Services initiative to address veterans' needs in rural areas (TECS). This technology is a store-and-forward telemedicine primary ophthalmology service that is Technology-based Eye Care Services (TECS).^(ref7)

In primary care clinics, eye health screening is conducted and is carried out by technicians according to predetermined guidelines. The patient's questions asked were the history of the patient's eye health, family, and social history. An analysis of the visual field, pupil reactivity, intraocular pressure, and corneal thickness was then conducted. Pictures of the fundus are often taken if the patient has diabetes. This information is entered into an

electronic medical record where the clinician interprets the information at the leading clinic, plans and procedures are decided, and glasses are prescribed if appropriate. Hospital personnel can contact patients who need follow-up to arrange face-to-face appointments with physicians.³⁹

Tele-ophthalmology has the opportunity to enhance patient access to eye health, help quickly diagnose patients, and increase patient satisfaction because of cost savings and travel time.⁴⁰ American Academy of Ophthalmology (AAO) mentioned that teleophthalmology has two mature domains: diabetic retinopathy and retinopathy of prematurity (ROP). AAO also mentioned that quality service should not be compromised for the sake of convenience.⁴¹

Teleoncology

Cancer patients in rural and remote areas have a lower survival rate than patients living in urban areas.⁴² Several service models have been built to enhance the quality of life and fair access, management, and clinical support. Some of the service's variations are face-to-face outreach (FTF) visits equipped with technology for consulting and overseeing the administration of chemotherapy, teleoncology for consulting and overseeing the administration of oral drugs, teleoncology to replace the FTF model for consulting and overseeing the administration of chemotherapy, and teleoncology for case discussions.⁴² Oncologists in tertiary health care can perform patient evaluations and initiate care in a timely and safe manner using telemedicine, provided adequate infrastructure and human resources are available in rural or remote areas. The ability to care for patients in local health systems and prevent patient transfers between hospitals will have many benefits for patients, families of patients, and the health system itself.⁴³

The American Cancer Society included a list of cancer telehealth applications, such as controlling medications and nutritional status, helping physicians consult with a specialist in palliative care, checking between treatments or as another form of follow-up, and making lifestyle changes.⁴⁴

Telepediatrics

Telepediatrics is among the growing telehealth groups. However, outcome-based

research in this field is still limited. One randomized controlled trial was performed in a school located in a remote area to determine telemedicine's efficacy in managing asthma in children. This study showed that children who received the school-based enhanced asthma management telemedicine (SB-TEAM) intervention had more days without symptoms, fewer days with activity restriction, reduced airway inflammation, and fewer visits to the emergency room or hospital to asthma recurrence.⁴⁵ Despite limited studies, there have been encouraging signals that telepediatrics are going to grow even further. Studies in Australia and Canada show that telepediatrics can be implemented smoothly, albeit with some barriers.^{46,47}

According to the American Academy of Pediatrics, telehealth will expand access to treatment, provide more patient- and family-centered care, increase practice efficiencies, improve quality of care, and fix pediatrician shortages in rural areas.⁴⁸

Telepsychiatry

People with schizophrenia or bipolar disorder frequently encounter social isolation, stigmatization, and social regression. The primary cause of individuals undergoes relapse and hospitalization is non-adherence to care. It is estimated that patient adherence to treatment at 12 months is only 50%.⁴⁹ To improve their medication adherence level, telemedicine can be used in people with schizophrenia and bipolar disorder. With telemedicine, patients can also get social support and comprehensive monitoring by physicians without the need for costly face-to-face sessions. Web-based support programs, individual phone or video calls, and smartphone applications are included in the telemedicine methods used. However, only a few telemedicine applications for individuals with severe mental disorders have been developed.⁴⁹

To enhance performance and patient satisfaction, the American Psychiatric Association has recently developed a toolkit for telepsychiatry. As more tools and information are available, this toolkit contains various telepsychiatry subjects such as clinical, training, and policy considerations, and updates will be included.⁵⁰



ANALYSIS



Teleradiology

Teleradiology is one of the most extensively studied fields of telehealth. Its roots in technology had been dated back to 1947. One study reported that point of care ultrasound (PCUS) could be used well to evaluate critically ill patients by tele-ICU intensivists. Thus, intensive workers do not need to be in the ICU 24 hours a day.⁵¹ Reviews have also found that consultations with teleradiology are better in diagnostic accuracy compared to mobile consultations. With teleradiology, transfer of patients, rehospitalization, and duration of stay decreased.^{52,53}

Like other task forces, the American College of Radiology suggested that patient care quality should not be adversely affected due to teleradiology. Extensive instruction on how to run them should be provided with state-of-the-art equipment. In cases where radiologists should be available for consultation, teleradiology is also essential.⁵⁴

Teleurology

In urology, telemedicine itself has been commonly used in patient management, procedures, patient visits, and consultations.⁵⁵ In 2016, a study performed by Safir et al.

analyzed patient satisfaction and performance in the evaluation of bloody urine. Of the 150 patients surveyed, 98% preferred telephone consultation over face-to-face visits, and 97% patients showed a high degree of satisfaction.⁵⁶ Another research by Chu et al. showed that with teleurology, patients saved 277 miles in travel, 290 minutes in travel, \$67 in travel, and \$126 in opportunity cost.⁵⁷

American Urological Association mentioned that urologists had been the pioneers in telehealth and telemedicine, and urologists should embrace telehealth in the future. It is the solution to anticipate a shortage of urologists and improve patients' care and health.⁵⁸

Telehealth in Ear, Nose, and Throat (ENT)

In infants, the high incidence of otitis media results in high burden to the health system and the community.⁵⁹ Also, otitis media at a young age can impede the growth of the child's speech and language abilities, which can significantly impair the child's well-being.⁶⁰ Telehealth facilities are provided to eliminate patient's or physician's need to fly due to the difficulty of accessing specialist doctors in remote areas. Consultations with

experts by video conferencing are carried out by telehealth. Specialized instruments, such as digital otoscopy, enable physicians to share their images with specialists through telehealth.⁵⁹

During this COVID-19 pandemic, there is a massive disparity in the uptake of telemedicine. American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS) even urged to prioritize telehealth to all practitioners to reduce face-to-face visits and consultations in order to decrease mortality among practitioners.^{60,61}

Conclusion

The use of telehealth in multiple medical specialties benefits both healthcare providers and patients. It saves travel time and costs associated with face-to-face consultations. With the development of technology, more people can use the smartphone for daily consultations and medical information. We believe that the use of telehealth in Indonesia will continue to increase. Moreover, telehealth advancements are likely to be the standard of care in specific areas of health care in the future.

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ANALYSIS



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