



Telehealth and Technologies in Health-A Comprehensive Approach to Modern Trend of Health Care

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ABSTRACT

How many times have you heard it said that the internet has changed modern life? Indeed, it's likely changed how you stay in touch with family and friends and buy goods and services. And it's probably even changed how you search for information about health problems. What does telehealth mean? Telehealth sometimes called telemedicine lets your health care provider care for you without an in-person office visit. Telehealth is done primarily online with internet access on your computer, tablet, or smartphone. Several telehealth tools are offered to help you manage your health care and receive the services you need. During the coronavirus disease 2019 (COVID-19) pandemic, many people used telehealth. People often still use it¹

MATERIALS AND METHODS: Several electronic databases, including PubMed, Wiley, Springer, Google Scholar, Web of Science, WHO, Wikipedia, Research Gate, Forbes, Medline, Healthline were searched for this article.

Keywords: Telehealth, Technologies, Health, Comprehensive Approach, Modern trend, Healthcare

INTRODUCTION

“Telemedicine will become the core methodology of health care delivery in the future. That is where we are going to get the efficiencies, we need to provide affordable care” “Yulun Wang, President of American Telemedicine Association”

Telehealth, also referred to as telemedicine or e-medicine, is the remote delivery of healthcare services over the telecommunications infrastructure. Telehealth allows healthcare providers to evaluate, diagnose, inform and treat patients without an in-person visit. Patients can communicate with physicians from their homes using their own personal technology or by visiting a dedicated telehealth kiosk.²

METHODOLOGY

The following article is based on data searched/collected from a wide source of books, National & International journals, Internet sources (Including WHO, Wikipedia, Biomed Central, Healthline) and various databases including PubMed, Google Scholar, Wiley, Research Gate, Springer etc.

HISTORY OF TELEMEDICINE – TIMELINE THROUGH THE AGES:

Ancient Telemedicine

At the very beginning, Telemedicine could be seen in its infant stages in Greece and Rome around 500 BC. During this time communication between towns was conducted by human messengers, who would transfer any medical advice or medicines necessary. Mediums like smoke signals and light reflections were used to communicate medical information. These were used especially over long distances to indicate health events like births, deaths, and disease outbreaks³. In the early 1900s, radio revolutionized communication. Inspired by radio's sudden prominence in every field from entertainment to national defense, it wasn't long before innovators started imagining how doctors could attend to patients over the radio. A [Radio News Magazine from 1924](#) features an illustration of a doctor attending to a patient via video call, under the headline “The Radio Doctor–Maybe!” At that point, this was only an editor's vision of the future technology, but 90 years later these dreams would be realized⁴.

Early Telemedicine

The invention of telegraphs and telephones advanced Telemedicine towards what it is today. They made long-distance communication easier, increased the speed of delivery and were being used by the common public on a large scale. Due to this, it was used by the military during the Civil War for ordering medical supplies as well as communicating deaths or injuries on the battlefield.

Early Telemedicine usage cited is back in 1940s Pennsylvania, when radiology images were sent using telephone line between two towns 24 miles. This probably was the world's first example of an electronic medical record transfer. It was further enhanced by a Canadian doctor in the 1950s, into a teleradiology system. In 1959, the University of Nebraska set up a two-way television to transmit information to medical students and later linked the system with a state hospital for video consultations. The University of Miami School of Medicine in 1967 worked with the local fire department in 1967 to transmit ECG rhythms in rescue situations over the radio to Jackson Memorial Hospital.

The world became more connected with the widespread use of telephones. Physicians could give their patients' medical advice over the phone as well as confer with other physicians to exchange information. With the advanced communication methods used today telephones may not seem significant, but they played an essential part in the evolution of Telemedicine.

Telemedicine As We Know Today

The idea for modern Telemedicine that we use today appeared around the 1960s, during which time the transmission of video, images and other medical data occurred. In 1959, the clinicians at the University of Nebraska became the first people to use video communication for medical purposes. They used interactive telemedicine to transmit neurological examinations and other such programs soon followed³.

WHAT IS TELEHEALTH?

Telehealth is the use of digital information and communication technologies to access health care services remotely and manage your health care. Technologies can include computers and mobile devices, such as tablets and smartphones. This may be technology you use from home. Or a nurse or other health care professional may provide telehealth from a medical office or mobile van, such as in rural areas. Telehealth can also be technology that your health care provider uses to improve or support health care services.

The goals of telehealth, sometimes called e-health or m-health (mobile health), include the following:

- ❖ Make health care easier to get for people who live in communities that are remote or in the country.
- ❖ Keep you and others safe if you have an infectious disease such as COVID-19.
- ❖ Offer primary care for many conditions.
- ❖ Make services more easily offered or handy for people who have limited ability to move, time or transportation.
- ❖ Offer access to medical specialists.
- ❖ Improve communication and coordination of care among health care team members and a person getting care.
- ❖ Offer advice for self-management of health care.

Many people found telehealth helpful during the COVID-19 pandemic and still use it. Telehealth is being used more often.⁵

How can telehealth technologies improve medical care?

1. **Teleconsultations** allow a physician in a remote area to receive advice from a specialist at a distant location about special or complex patient conditions. Such consultations can be as simple as a phone call. Increasingly, they involve sophisticated sharing of medical information such as CT, MRI or [ultrasound](#) scans. These images can be taken by the local physician, incorporated into an electronic medical record and sent to the specialist for diagnosis and treatment recommendations.
2. **Remote patient monitoring (RPM)** enables patient monitoring outside of clinical settings, such as in the home. Patients use or wear [sensors](#) that wirelessly collect and transmit physiological data to health professionals. RPM can significantly improve an individual's quality of life. For example, in diabetes management, the real-time transmission of blood glucose readings enables healthcare providers to intervene when needed and avoid acute events and hospitalizations.
3. **Tele homecare** provides the remote care needed to allow people with chronic conditions, dementia, or those at high risk of falling to remain living in their own homes. The approach focuses on reacting to emergency events and raising a help response quickly. Sensors monitor changes in chronic conditions as well as other risks including floods, fires, and gas leaks. Sensors can also alert caregivers if a person with dementia leaves the house. When a sensor is activated, a monitoring center is alerted to take appropriate action such as contacting a caregiver or sending emergency services.
4. **Point-of-care (POC)** medicine relies on diagnostic devices that can perform at the time and place of patient care, which includes at home, in doctor's offices and clinics, and in remote areas without electricity or laboratory equipment. POC devices can detect micronutrient deficiencies, anemia, infectious agents, and even some cancers. Combined with [telehealth](#), POC technologies allow health care workers to test patients and rapidly obtain results without the need for a complex laboratory setting which can result in significant cost-reduction.⁶

Types of Telehealth Technology

The choice of technology will determine if telehealth is asynchronous or in real-time.

1. Asynchronous Telehealth or Store and Forward (S&F)

- ❖ Information is recorded and transferred - can be stored locally or in a server, depending on the availability of connectivity
 - ❖ There is a time delay between when a message is sent from one party and when it is received by the second party
 - ❖ Common Store and Forward technologies used include secure messaging, email and web-based self-management programs
 - ❖ Newer technology such as virtual reality or "wearables" use "store and forward" technology to transmit data back to the therapist
 - ❖ Viewing and comments of the data can be done at the participants' (client/patient or healthcare provider) convenience
 - ❖ Less dependent on connectivity
 - ❖ More difficult to administer
 - ❖ Software choice and interconnectivity standards play a role
2. Real-time or Synchronous Telehealth
- ❖ Information provided by one part is received almost instantaneously by the second party (through audio/visual means)
 - ❖ Information or data is transferred live
 - ❖ It is a convenient and easy form of telehealth
 - ❖ requires high bandwidth
 - ❖ constant connectivity
 - ❖ investment in related hardware
 - ❖ Video conferencing between patient and healthcare provider is the prime example - physiotherapist and client can see and interact with each other in a live fashion
 - ❖ This is more prevalent in physiotherapy for heart and lung disease, diabetes management and musculoskeletal conditions for example osteoarthritis and for the rehabilitation of patients after orthopedic surgery⁷

EIGHT REASONS WHY WE SHOULD CONSIDER TELEHEALTH

TO BE PART OF THE HOLISTIC HEALTH PRACTICE OF THE HOSPITAL.

1. **Expand Your Patient Base:** A frustrating element of in-person care has always been late or no-show patients. It results in time lost for the Health Care Practitioner (HCP) as well as the lost opportunity to reach out to a new patient. Now, imagine HCP's days full of virtual medical visits. There is a reduction of no-shows and increased treatment persistence, mainly because of treatment success. Additionally, HCPs' patient base can be dramatically expanded since telehealth provides easy access and scheduling. In a cross-sectional survey, 52.5% of clinicians were convinced that virtual visits allow for higher efficiency, while quality was equal to that of in-person visits.
2. **Increased Patient Flexibility:** When scheduling a doctor's appointment, patients must consider a variety of personal barriers, such as: travel time, time off work, childcare, and more. Telehealth visits dramatically reduce these accompanying problems, leading to stress reduction and increased flexibility – even in emergency situations. In a survey among telehealth patients in the UK conducted by Dhahri et al., family closeness was one of the most appreciated advantages of telehealth.
3. **Increase Collaboration Opportunities between Medical Disciplines:** A full-service hospital combines an extensive variety of medical disciplines. Optimized communication between patient-directed disciplines and diagnostic facilities, such as radiology or laboratory medicine, is important to achieve fast and straight-forward healthcare measures. As a result, a higher pace regarding treatment times and therapies potentially benefits the patients' well-being. Combining expertise increases diagnostic value. Consulting physicians can be invited easily and attend virtual visits on-demand, which offers a quick second opinion or additional experience. Scientific exchange and productivity also benefit from digital opportunities by providing easier access to people and/or data.
4. **Increased Patient Adherence:** Easy access to generalists and specialists is key for patient adherence, treatment success, and hospital promotion. Proven factors include close monitoring, satisfaction, and short waiting periods. A study performed in rural areas of Colombia showed that 65% of the patients see telehealth appointments as an overall improvement in healthcare.⁶ Another study further showed that 65% of patients were likely to get a call with a specialist, particularly in cases which are relevant for pre-op visits or follow-ups.
5. **Allows for Easy Patient Follow-Up:** Advances in treatment adherence and persistence mainly rely on regular and systematic touchpoints by HCPs. Telehealth opportunities and remote care options can create a variety of these touchpoints in a personalized and case-specific way, ranging from an overview of patient consultations to implantable cardiac monitors. Remote monitoring especially holds tremendous potential to profit from telehealth applications.

6. **Improved Patient Outcomes:** Telehealth options can reduce the risk of infection and allow care teams to assess their patients potentially better. By using telehealth options, already health compromised patients have a lower risk of infection when it comes to classical healthcare-associated pathogens, such as multi-resistant Staphylococcus aureus (MRSA). Telehealth can therefore reduce complications or potential disease progression for patients. Moreover, you have more possibilities to educate patients regarding their treatment plan, whether it be medication or hands-on therapy. By using digital tools, zooming in scans for a close-up or watching self-injection videos, you allow for flexible and direct communication which can improve patient satisfaction.
7. **Physicians and Care Teams Benefit Regarding Their Mental and Physical Health:** Especially during the COVID-19 pandemic, doctors were able to hold the necessary distance from potentially infectious patients while staying in touch digitally. Virtual consultations became applicable and led to the rising numbers of features and platforms. Considering that physical and mental health of care teams are key, telehealth and virtual care opportunities are important to maintain your hospitals' care-force, even during unpredictable times.
8. **Cost Reduction:** Telehealth solutions can reduce costs in various medical disciplines, such as dermatology, podiatric medicine, and cardiology.²⁸ Moreover, general expenses like front desk support, space for medical examination rooms, and material can be reduced. Telehealth opportunities may reflect a favorable add-on for your hospital considering easy-to-use implementation, financial benefits, and cost reduction. Telehealth cost reduction also applies for patients. For example, in Germany, digital health application access is regulated by the digital healthcare act (DVG: Digitale-Versorgung-Gesetz) from 2019, making it easier also for patients to cover benefits from digital health, since insurances are required to pay for applications with certain specifications⁸.

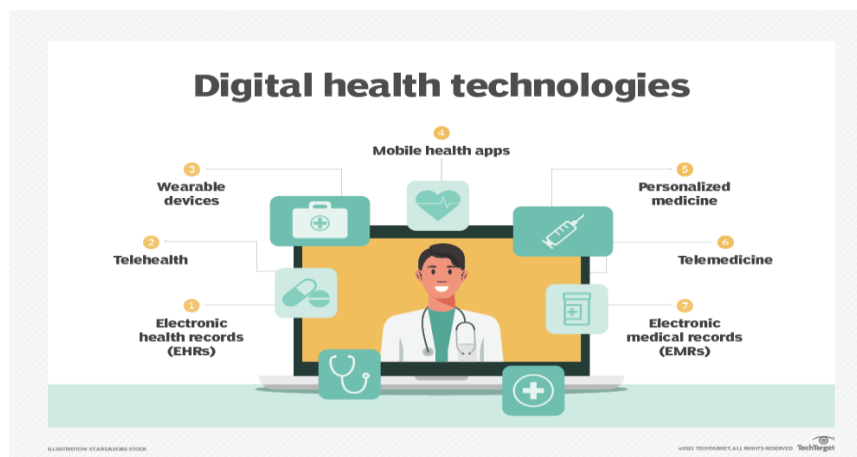
ADVANTAGES AND DISADVANTAGES OF TELEMEDICINE:

Advantages of Telemedicine:

1. **Increased access to care:** Telemedicine can help to improve access to care, especially for patients in rural and underserved areas.
2. **Improved continuity of care:** Telemedicine can help to improve continuity of care by providing more frequent and regular contact between patients and their care providers.
3. **Cost savings:** Telemedicine can help to save on costs by reducing the need for travel and accommodation for patients and care providers.
4. **Flexibility:** Telemedicine can offer more flexible appointment times and locations.
5. **Increased convenience:** Telemedicine can be more convenient for patients as they can receive care from the comfort of their own homes.
6. **Improved patient satisfaction:** Telemedicine can help to improve patient satisfaction by providing a more convenient and personalized care experience.
7. **Increased access to specialists:** Telemedicine can help to increase access to specialists, who may not be available in a patient's local area.
8. **Improved communication:** Telemedicine can help to improve communication between patients and care providers.
9. **Enhanced care coordination:** Telemedicine can help to enhance care coordination by providing access to a patient's medical records and care plan.
10. **Increased efficiency:** Telemedicine can help to increase efficiency in the delivery of care by reducing waiting times and appointments.

Disadvantages of Telemedicine

1. **Limited evidence:** There is limited evidence to support the efficacy of telemedicine.
2. **Lack of regulation:** There is a lack of regulation surrounding the practice of telemedicine.
3. **Security and privacy concerns:** There are concerns about the security and privacy of medical information.
4. **Technical problems:** There can be technical problems with the equipment used for telemedicine.
5. **Limited access:** Telemedicine may not be available to all patients due to limited access to technology.
6. **Inequitable access:** There may be inequitable access to telemedicine if it is only available to patients who can afford it.
7. **Geographic barriers:** There may be geographic barriers to the use of telemedicine.
8. **Time zone differences:** There may be time zone differences between the patient and care provider which can make it difficult to coordinate care.
9. **Language barriers:** There may be language barriers between the patient and care provider which can make it difficult to communicate.
10. **Social isolation:** There is a concern that telemedicine may lead to social isolation⁹.



DISCUSSION:

Since the internet and mobile devices now pervade our lives, it is natural that people want to leverage telehealth technologies to improve care, offer convenience, promote access, and support sustainability. Telehealth services range from consultations and video conference mental health sessions to public health broadcast text messaging and on-demand provider education¹⁰. Telehealth requires good Internet access by participants, usually in the form of a strong, reliable [broadband](#) connection, and broadband mobile communication technology of at least the fourth generation (4G) or long-term evolution (LTE) standard to overcome issues with video stability and bandwidth restrictions. As broadband infrastructure has improved, telehealth usage has become more widely feasible. [Healthcare providers](#) often begin telehealth with a [needs assessment](#) which assesses hardships which can be improved by telehealth such as travel time, costs or time off work. Collaborators, such as [technology companies](#) can ease the transition. Delivery can come within four distinct domains: [live video \(synchronous\)](#), [store-and-forward \(asynchronous\)](#), [remote patient monitoring](#), and [mobile health](#)¹¹. Telehealth is different from telemedicine because it refers to a broader scope of remote healthcare services than telemedicine. While telemedicine refers specifically to remote clinical services, telehealth can refer to remote non-clinical services, such as provider training, administrative meetings, and continuing medical education, in addition to clinical services¹².

CONCLUSION:

The benefits of telehealth opportunities are striking – for patients, doctors, and hospitals. Constantly increasing numbers of services, tools, devices, and apps enter the market and significantly improve healthcare procedures across all medical disciplines. COVID-19 has served as door-opener for telehealth and digital medicine. You should consider keeping the door open⁸. A wide range of services is available through telehealth, including identification and diagnosis of common illnesses, consultations about new symptoms and chronic disease management, triage for injuries or acute illness symptoms, and mental health therapy. Telehealth has grown in popularity over the past few years because it offers fast, easy access to clinical and non-clinical healthcare services. The COVID-19 pandemic has given a big boost to telehealth's popularity, and insurance companies are treating these visits like they would an in-person visit at the provider's office. Telehealth is convenient to patients and providers. Most services allow patients to schedule appointments online. All it requires is a device with an internet connection, camera and audio. Physical location isn't a constraint. A person could be at home, in their workplace or traveling and have a telehealth visit. People without easy access to transportation and those who live in rural areas with few healthcare providers will have better access to care through telehealth services. When care is convenient to receive, people are more likely to seek it. This means problems can be identified earlier and before more serious complications arise. Anyone who needs healthcare services and prefers to stay home or can't leave home should consider telehealth services to get essential care¹³. While "telemedicine" was commonly used in the past, it is being phased out in favour of "telehealth," which is a more universal term for the current broad array of applications in the field. Its use crosses most health service disciplines, including dentistry, counselling, physical and occupational therapy, home health, chronic disease monitoring and management, and disaster management; it's also expanded beyond traditional diagnostic and monitoring activities to include consumer and professional education¹⁴.

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CONFLICTS OF INTEREST:

None

ETHICAL CLEARANCE:

Not required

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