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Telemedicine and telehealth

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Abstract

Regular hospital visits can be expensive due to travel costs, especially in rural areas. Fortunately, when telemedicine services are used through video conferencing or other virtual technologies, doctor visits can be reduced. Therefore, telemedicine saves the patient and the medical staff time and treatment costs. In addition, with its fast and efficient operations, it can simplify the workflow of hospitals and clinics. This innovative technology makes it easier to monitor discharged patients and manage their recovery. In conclusion, it is enough to say that telemedicine can create a win-win situation. The purpose of this article is to examine the main trends, treatment workflow characteristics, and barriers to the use of telemedicine in healthcare. As a new technology, telemedicine is preferred by large hospitals. With the development of Internet technology, digitization and information have been applied to telemedicine, but telemedicine still has many limitations due to many factors. This article summarizes the evolution of telemedicine. The development of telemedicine at home and abroad was discussed. The use of telemedicine was explored including the feasibility and limitations of commercialization and development. and provide a vision for the integration of these technologies into the medical field has resulted in the telephone, which is now available worldwide. This article presents telemedicine in three main areas, including current status, challenges and opportunities based on research and implementation. he integration of these technologies into the medical field has resulted in the telephone, which is now available worldwide. This article presents telemedicine in three main areas, including current status, challenges and opportunities based on research and implementation.

Keywords: Telemedicine; Telehealth; Check-ups; Technology

1. Introduction

Telehealth is the delivery of health services through electronic means and telecommunications technology. Through telemedicine, patients can contact health professionals over long distances and receive care, monitoring, intervention, medical advice and remote interventions. The Healthline will benefit rural cases, lack of mobility and transportation, budget cuts and emergency staff shortages. In addition, it helps to organize meetings, presentations, exchanges between doctors and helps with data processing and integration of health [1]. Population is the most important asset of a country. In addition to many aspects, including education, health-related issues are the responsibility of government agencies to provide adequate health services [2]. Telehealth can make the healthcare system more efficient, organized and accessible. Research in this area is still in its early stages, but is expanding. telecare and remote monitoring of vital signs in people with heart disease have reduced the risk of death and hospitalization and improved quality of life [3-7]. There is also debate about proper research methods. For example, the economic analysis of telemedicine has not met the accepted standard [8]. The socio-economic impact of telemedicine has been little explored [9]. There is no literature on the factors that increase the adoption of telemedicine [10]. The use of qualitative methods at that time was not yet developed [11]. Many studies are poorly designed. And given the apparent difficulties in creating a strong evidence base for new practices, researchers have argued that simulation modeling needs to be further developed [12].

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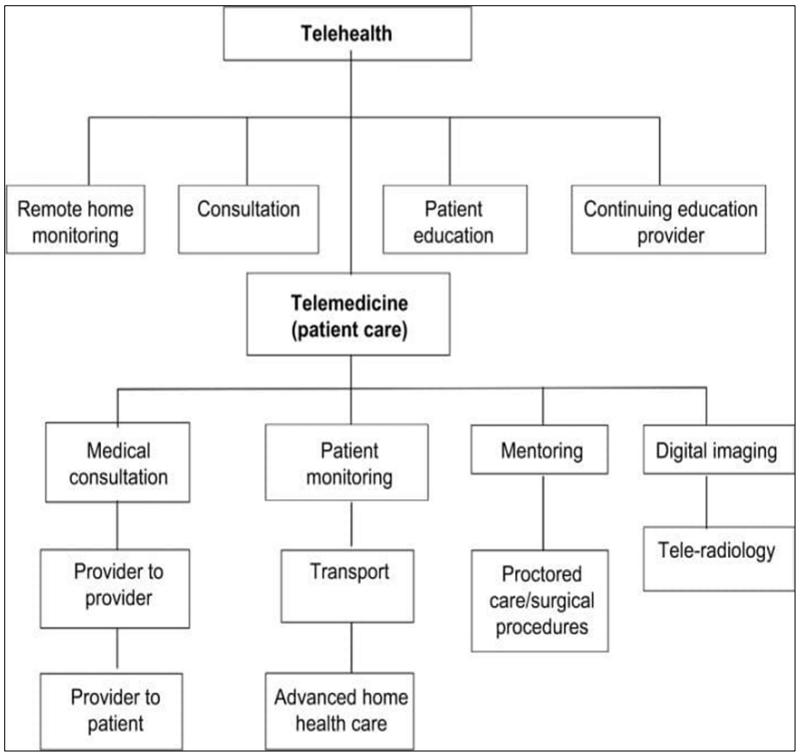

Figure 1 System of telemedicine

- **Birth Of Telemedicine**-Examples of the uses of telemedicine technology can be traced back to the era before television. For example, in the early 1900s, medical providers communicated by radio in Antarctica. In 1910, the first telephone stethoscope was introduced in England. As early as 1924, researchers began to demonstrate what a "remote radio doctor" could see and be seen by his patients. Radiographs are believed to have first been transmitted between Philadelphia and West Chester, Pennsylvania in the 1950s [13].

- **Rebirth Of Telemedicine**-In the early 1990s, telemedicine was reborn. Advances in image digitization and data compression technology made it possible to assemble video over low bandwidth lines. The revival of telemedicine in the United States came from the realization that access to health care in rural areas was not the same. We saw an increase in federal funding for those programs. A federal telemedicine program developed by Dr. Jay Sanders of Georgia Coast College was the first program of its kind and was widely acclaimed. In 1993, ten projects were launched and since then it has doubled every year [13].

- **System Of Telemedicine**-The telemedicine system mainly uses computer multimedia, the in-ternet, network information technology, and other technologies to effectively integrate medical resources and realize cross-regional and cross-institutional medical diagnosis and treatment and routine medical exchanges [14]. The system architecture essentially consists of three parts: telemedicine service, data center, and interface service. The telemedicine service includes remote con-siltation, remote imaging diagnosis, remote electrocardiogram (ECG)diagnosis, remote scheduling, two-way referral, distance instruction in surgery, distance learning, conferences, etc. [15-17]. Data Center contains basic data (user data, physician data, office data, medical data, etc. and application data (electronic records, follow-up files, patient information databases, telemedicine reports, distance n educational resource libraries, etc.); Interface services include hospital collection systems, electronic medical record systems, imaging systems, ECG signal systems, pathological systems and other systems [18].

1.1. Interface Service

- Hospital information system
- Electronic medical record system
- Imaging diagnosis system
- ECG diagnosis system
- Pathological diagnosis system

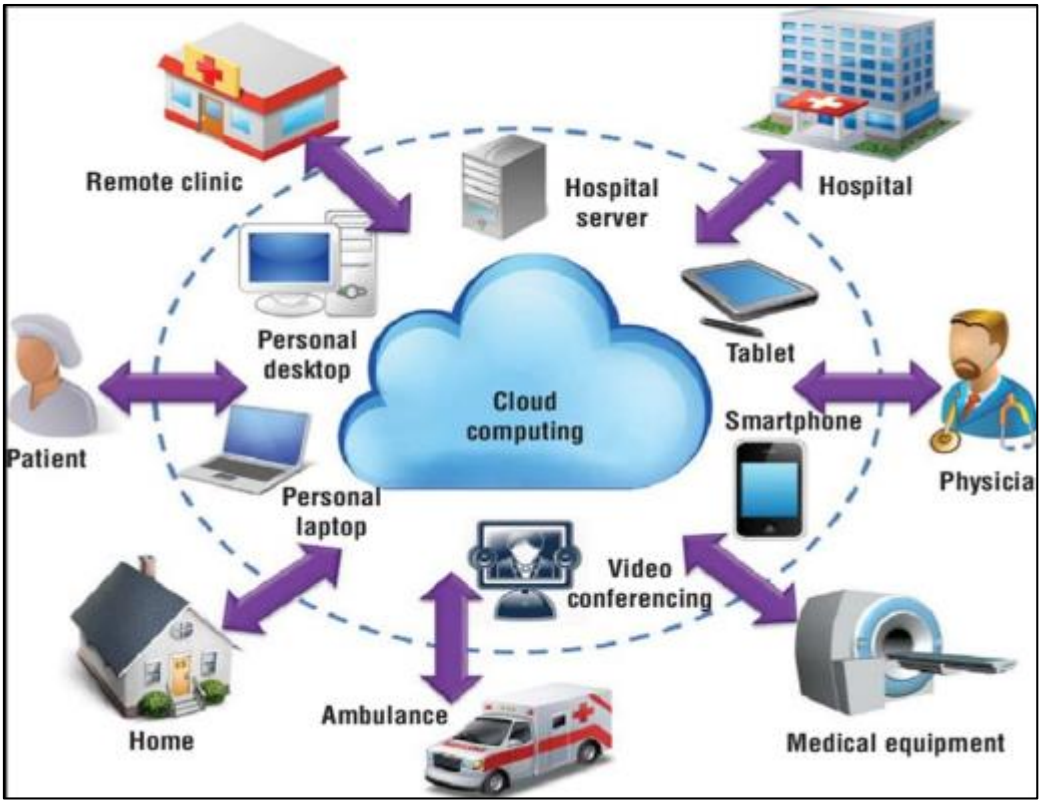

Figure 2 Components of telemedicine

2. Benefits of telehealth and telemedicine

2.1. Patient

Telemedicine can be used as a means of communicating information to patients and the general public. Through telemedicine, patients will know the nature of the disease, the prognosis associated with the disease, the impact of the treatment, and the reasons for the health professionals to ask questions [19]. They can provide a basis for shared decision-making between patients and health professionals, encourage patients and promote self-help when patients gain such knowledge. So, it is important to be accurate and objective. Telemedicine can also be used to provide information in the form of health promotion or health education to the general public, schools and hospitals [20]. Saudi Arabia improves treatment standards, improves access to health care and saves time and money [21]. Another study by Akiyama and Yoo found that the number of visits to the doctor decreased to one a week compared to two a week. Health care costs also decreased, saving $5,000 per person per year compared to conventional health care [22]. Dick et al. found in pediatric consultations, patients experienced a higher level of comfort using telephone communication and saved $1000 per person at the same time [23]. Shore et al. reported that the use of telehealth could increase efficiency and reduce research costs among rural, remote and underserved populations [24]. Telemedicine systems are available, but their use depends on understanding the health of patients with heart disease. As they take more responsibility for their circumstances, they become more active in supporting their lives. Educating patients about health problems encourages them to track their progress and engage with their doctors, thereby improving heart health [25]. It has been shown that telemonitoring at home can provide patients with heart failure (CHF) with better clinical results compared to conventional treatment. Home telemonitoring also reduces hospitalizations, the number of emergency department visits, reductions in all CHF-related events, and lower mortality [26]. As technology improves and becomes more accessible, so do patient and safety outcomes [27]. In less developed and more remote areas where there are fewer specialists, teleophthalmology often improves the accuracy of medical services. Available. This means that more patients can be screened and monitored. Integrating face tests into a smartphone app is also available. It can measure visual acuity and help diagnose and treat various eye diseases such as glaucoma and amblyopia. This approach helps patients receive appropriate treatment and referrals to specialists when needed [28].

2.2. Professionals Health

Whited et al conducted a study by presenting study that included a randomized trial of the use of tele dermatology [29]. Using this technology improves communication between healthcare workers and patients, thereby increasing patient compliance [30]. Through experiments in the AcibademHealth Group, it was found that various forms of cytology can be examined at no unnecessary expenses, creating national and international levels of consultation between specialists with results that can be compared with routine cytology in other centers [31]. This approach increased patients' adherence to the instructions, improving the clinical outcomes. Telemedicine also helps the healthcare providers be better informed about the patient's current condition and monitor the patient's symptoms, if any are present. Monitoring symptoms through meaningful activities can reduce the need for hospital visits, lead to more successful alerts and treatments, and make the work of healthcare professionals easier [32]. Health workers were satisfied with the use of telemedicine in private therapy because they could interact with each other and keep open communication between patients and themselves. Health professionals were able to easily evaluate the patient's physical or psychological changes over time through video chat [33].

Hospitals- Milder symptoms in low-risk patients were resolved without a visit to the clinic. Therefore, costs and resources are saved. On the other hand, the monitoring of high-risk patients will also save costs since it can enable a method of early detection of possible complications [34]. A study conducted by Maarop, Singh and Win found that implementation of teleconsultation in Malaysia brought many benefits to healthcare providers, organizations, and patients. The benefits were then categorized into supportive and critical benefits. Supportive benefits are the use of technology to support consultation and referral efficiently while critical benefits are the use of technology to support hospital organizations and health care facilities to provide health care services for underserved and critical patients. Using the teleconsultation approach, the hospital and other health care facilities were able to give advice for critical patients without waiting for one specific specialist to respond to the call. They had better utilization of their resources, reduced mortality and morbidity, and reduced patient movement. Overall, organizations can save costs and resources more than ever before [35].

3. Limitations

- **Patient**- Although the use of telemedicine has been shown to have advantages, it also has disadvantages. Older adults who watch screens like television don't think that the doctor has actually seen and heard them. There are also privacy issues regarding the accumulated data [37]. Using SMS or applications as a reminder can also cause usage fatigue, where the patients may stop responding to the interface or worse, stop using it at all [38]. Compared to face-to-face consultations, telemedicine has increased risks related to privacy and security. A report investigating the validity of physical activity measures showed that the validity and reliability of fine motor activity measures were related to Internet bandwidth [39].
- **Health professionals**-Telemedicine might be interpreted as a threat to them current job or autonomy in the remote places when the healthcare professionals in remote areas consulta case to the specialist in bigger cities, or worse they will be perceived as mere technicians. As the use of telehealth grows, it is also prone to fraud and abuse so that strict laws will be needed to keep the practices legitimate and correct. Prescribing various controlled substances for certain conditions also needs to be addressed [39].
- **Hospitals**- Implementation of telemedicine can bring issues to the hospitals and other health care facilities related to infrastructure planning and development, certain telecommunication regulations, reimbursement systems with the government, licensure and credentialing, medical malpractice liability, and confidentiality. Lack of knowledge on telemedicine and its benefits, and lack of time to learn how to adopt the technology contribute to more training and workshops to be done for the adopters, resulting in increasing costs for the health care facilities [40].
- **Need of telemedicine**- Rising healthcare costs and the need for better care are prompting hospitals to explore the benefits of telemedicine. They want to improve relationships between doctors and remote patients and better use of health services. Telemedicine is a method of providing medical treatment over the Internet, usually via video chat. This technology has many benefits for both patients and healthcare professionals [41].

4. Types of telemedicine

- **Teleradiology**- Teleradiology can transmit X-ray images like X-ray, CT scan, MRI etc. from one place to another[42]. The three main components are the image sending station, the transmission network and the image receiving station. In simple words, two computers are connected through an internet connection. Teleradiology begins at the end of image transfer, where the image is created, scanned, and sent over the network to the imaging station. The computer at the receiving end of the image has a high-resolution screen to view the images.

A printer is usually attached to print images. This allows the patient's X-rays to be reviewed by a radiologist from another location.

- **Telepathology**- Telepathology is widely used in diagnosis, research and education. It is a type of mobile health that can transfer high resolution pathology data from one place to another [43]. Data in the form of images or videos used for diagnostic purposes used in histopathology. Win-and Forward methods are used in telepathology.
- **Teledermatology**- External Skin Provides information about the skin's outer surface. Patients can send photos or videos of skin lesions, rashes or moles to a healthcare professional for remote diagnosis. Teledermatology has been shown to improve efficiency, save time and increase patient satisfaction
- **Telecardiology**- Its main application is to transmit EKG (electrocardiography) over the phone or wirelessly. Another use is monitoring patients with a pacemaker to detect arrhythmia if it occurs.
- **Telesurgery**- Telesurgery allows patients to be operated on in the same location without the physical presence of surgeons. Robotic surgery is an important part of telesurgery where robotic surgeons operate during surgery.
- **Telerehabilitation**- Telerehabilitation provides rehabilitation services that may include clinical assessment and clinical treatment. It can be done in many ways such as video conferencing, audio recording, web cam, etc.
- **Telenutrition**- Remote Diet allows customers to speak with a nutritionist/nutritionist from anywhere in the world. It includes vendors that provide great statistics, meal plans, and pictures of food. This helps nutritionists set goals for patients, and can be tracked periodically to check progress. This is especially good for those in the hospital or the elderly because they can consult a nutritionist at home.
- **Telenursing**- communication between a patient and a nurse without the physical presence of a nurse. This will help with the problem of lack of nurses. It helps to increase health coverage in rural, poor and underprivileged reas. It is mainly used to monitor the critically ill or the elderly who have difficulty walking [44].
- **Telepharmacy**- If it is not possible to contact the pharmacist directly, telemedicine is offered to patients. Telemedicine services include medication administration monitoring, patient counseling, authorization and reauthorization of prescription medications, and regulatory compliance monitoring using the telephone, I or video conference [45].

5. According to health resources and service administration-

Figure 3 Types of telehealth

- **Synchronous videoconferencing**-Since ancient times, the effect on tooth decay has been known, the traditional method of using Moria leaves to treat tooth diseases. In experimental studies conducted on golden hamsters, it was found that feeding the hamsters leaves with a marigold extract was beneficial.

- **Asynchronous Videoconferencing**- A simultaneous video conference, also known as a shop and submit, is the transmission of a written medical history to a physician, usually a specialist. A doctor can send diagnostic images electronically to another doctor for further diagnosis. Synchronous telehealth services can include email, secure text messaging, or any other form of communication that allows two parties to interact at different times.
- **Report patient monitoring (RPM)**- RPM refers to the use of electronic devices to remotely record medical data, such as vital signs or blood sugar levels. The data is usually sent to an outside testing center or home health department for interpretation. RPM can be used as an adjunct to visiting nursing services.
- **Mobile health-**MHealth allows patients to monitor and share their health information through mobile devices. An example of mHealth includes a health monitoring app or wearable device. MHealth is also used to inform and educate patients about health topics. This may include disease outbreak notifications or general information [46].

6. Difference between telemedicine and telehealth

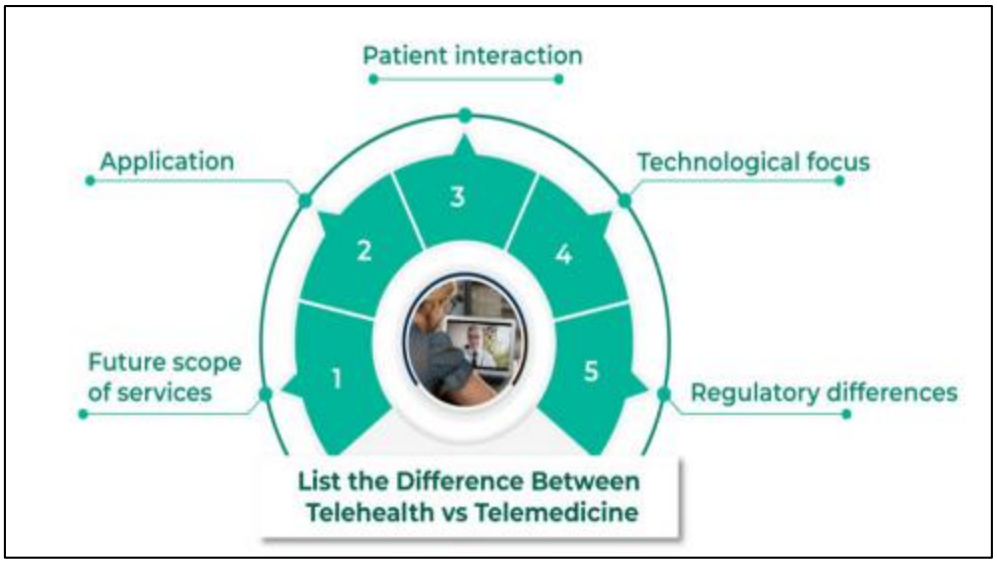

Figure 4 Difference between telemedicine and telehealth

6.1. Future scope of services

- **Telemedicine**-This includes managing clinical services provided by healthcare professionals to remote patients. Therefore, some of the most important services include diagnosis, diagnosis, and development of patient care plans using mobile technology.
- **Telehealth**-Compared to telemedicine, a telehealth platform has a broader scope that includes a variety of medicine-related services that go beyond providing clinical care. It also includes non-clinical services such as provider training, administrative services and health education, but these are not part of telemedicine [47].

6.2. Applications

- **Telemedicine**- It is mostly used for remote consultations between healthcare experts and patients. Additionally, it promotes detailed patient's diagnosis and treatment without in-person visits.
- **Telehealth-**Telehealth is a broad term that includes telemedicine because it covers services such as office meetings, mobile health services, live video conferencing and patient monitoring. It also includes health-related education where doctors and patients can attend lectures [47].

6.3. Patient interaction

- **Telemedicine**-Telemedicine focuses on medical diagnosis and treatment, with an emphasis on the clinical aspect of healthcare delivery. Doctors use these programs to improve patient interaction, which increases communication and reduces stress. In addition, you can follow the instructions for better patient interaction.

- **Telehealth**-There is a strong focus on patient engagement and participation and a focus on the patient's entire healthcare journey. Thus, patient interaction and engagement are improved by providing comprehensive care to patients [47].

6.4. Technological focus

Telemedicine-Telemedicine uses technology to address medical needs and achieve clinical goals. Most will cover virtual doctor visits and remote monitoring devices. It also includes sharing medical records for diagnosis and treatment.

- **Telehealth-**It supports various technologies that support the delivery of health services 24/7. These include mobile health devices, wearable devices and communication devices for operational and health purposes**.**

6.5. Regulatory differences

- **Telemedicine-**Telemedicine is subject to specific guidelines and regulations designed for clinical practice. This includes licensing requirements for physicians and other professionals who practice across various state lines.
- **Telehealth-**The Telehealth Act covers a variety of services in both clinical practice and clinical practice. Telehealth is subject to different laws and regulatory considerations compared to telemedicine [47].

6.6. Other points

All telemedicine is telemedicine, but not all telemedicine is telemedicine. Telemedicine vs. Telehealth is part of a broader initiative to increase access to care, simplify healthcare for patients and increase the efficiency of the healthcare delivery network. Telehealth encompasses many other functions than the doctor-patient conversation, but telehealth communication is limited to the doctor-patient conversation [48].

7. Conclusion

Although telemedicine has many advantages, it is not without disadvantages. Telemedicine currently lacks the technology to directly replace the physical examination as a mainstay in the healthcare system. Therefore, telehealth will continue to complement in-person meetings until technology advances. Undoubtedly, telemedicine is a promising technology that will help in the transformation of the healthcare industry. In the future, telemedicine can ease access to healthcare, and enhance the quality and efficiency of healthcare. The well-developed architecture and the different modalities of telemedicine is the solution for the majority of the problems in the healthcare sector. Telemedicine has been successfully implemented in various departments of healthcare such as teleradiology, telesurgery, teleneurology and so on.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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