REVIEW ARTICLE

Telemedicine: new technology, new promises?

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Citation

Article Cycle

Abstract

Telemedicine has emerged to be key player in healthcare delivery in underserved areas. Successful telemedicine projects in India like the Aravind tele-ophthalmology network, the Kerala Onconet project and the Amrita mobile telemedicine unit are an inspiration for future endeavors. While improved access to healthcare, decreased healthcare costs and time saving were lauded as the strengths of telemedicine, the fact that very few reliable literature and statistics is available for the cost-effectiveness of telemedicine and the need for specialized equipment and training are weakening the potential telemedicine boom. As reluctance for acceptance by the public, lack of medicolegal protocols and an authoritative regulatory body are threatening the future of telemedicine, we hope that the establishment of virtual medical centers and international collaboration in the field of telemedicine and its inclusion in government programmes like PMJAY- Ayushman Bharath will prove to be a step towards a brighter future for telemedicine in India.

Keywords

Introduction

Telemedicine is gradually bridging the gap between specialist care and the under-served population and illustrates how ICTs can be used to strengthen healthcare services by overcoming many of the barriers to healthcare (ex. geographical, technological, access, and cost) and provide quality diagnostics and treatment that improve patient well-being among all demographics . (1) The objective of this review is to critically appraise the status of telemedicine utilization in India.

Success stories

The first Rural Telemedicine center was set up in 1999 in Aragonda (in Andhra Pradesh) by the Apollo Telemedicine Networking Foundation (ATNF), a not-for-profit organization established by the Apollo Hospitals Group. ATNF is now India's largest Telemedicine service provider with over 125 peripheral centers including 10 overseas centers and was chosen by the Ministry of External Affairs, Government of India, for the mega Pan African E-Network Project, to provide tele-consultation and

tele-education to 53 countries of the African Union.(2) Breaking all barriers, Apollo has also been running an E-Intensive Care Unit, creating a virtual ICU with a command center in a tertiary care, super-specialty hospital. It has partnered with the Himachal Pradesh government in Lahaul Spiti, at a district-level hospital close to the China border. (3)

Arguably the most exciting use of telemedicine is in tele-diagnostics and tele-radiology, where Max Hospitals is staking its claim with its 14 hospitals and over 100 radiologists in various locations with 25 sitting at its nerve center in Delhi. Their sophisticated software can serve even in areas with low bandwidth and provide a wide variety of features that help improve diagnosis. (3)

Breaking bridges in Tele-ophthalmology, Hyderabad-based LV Prasad Eye Institute (LVPEI) has a wide patient base with two hundred units connected to the main center in Hyderabad, it sees between 4,000-5,000 patients daily. (3) Aravind tele-ophthalmology network was launched in 2002 with support from ORBIS and Acumen Fund. The first joint globally acclaimed grand rounds presentation was held between Wilmer Eye Institute at John Hopkins and Aravind Eye Hospital-Madurai. (4)

Oncology Network (Onconet - Kerala) is another successful telemedicine project in India, made possible by the combined efforts of the Centre for Development of Advanced Computing and Regional Cancer Center in Trivandrum. It includes the creation of an internet-based Hospital Information System 'TEJHAS' (Telemedicine Enabled Java based Hospital Automation System) with online sharing of histopathology slides, electronic medical records and radiology images between the nodal centers and regional cancer center, which facilitated the remote follow up of patients by oncologists. (5,6)

Set up in September 2002, with the help of ISRO, Amrita telemedicine network connects more than 60 national centers and 9 international centers. The Amrita mobile telemedicine unit is equipped with a state-of-the-art video conferencing unit connected to an extended C band 1.8m antenna and control unit for uninterrupted telemedicine linkup in all weather conditions. (7) On 13th January 2003, Amrita's first remote tele-surgery procedure was performed at the Amrita Emergency Care Unit at Pampa, Kerala. (8) Amrita telemedicine services made its mark in the field of disaster management by the services provided during the 2004 Tsunami attack. They are also one of the five centers selected by the Ministry of External Affairs, Government of India for the Pan-African Project. (7)

Telemedicine Utilization

A study conducted in 2017 among U.S. healthcare providers showed 33 percent of respondents stating that half or more of the patients continued using telemedicine services after their initial visit.(9) Another study done on 8,000 patients who used telemedicine services reported no difference between virtual appointment and an in-person office visit (10) and 21% of patients who used telemedicine services experienced good quality healthcare. (11) There has been increase in the number of patients using telemedicine services in US, from less than 350,000 in 2013 to 7 million in 2018. (12)

Contrary to this, even ambiguous data on utilization of telemedicine are not available for India, although some states like Punjab and Odhisha do provide reliable information. Having 25 active telemedicine centers, including 3 ISRO assisted ones; Punjab Health State Network has seen a rise in telemedicine consultations from 450 in the year 2008 to 8641 in 2015. (13) Similarly, the Odhisha State Telemedicine Network has reported total number of 16,556 tele-consultations till end of May 2017. (14) A step towards bridging the gap between people and utilization of telemedicine services was the GOI in 2005 by the setting up of the National Task Force on Telemedicine. (15) However, the use of telemedicine in healthcare services delivery is outperforming other segments in the recent years with a CAGR of 20.4% in 2010–2015. (16)

SWOT analysis

STRENGTH (17-23)

1. Improve access to health care by overcoming the barriers of distance.
2. Significant decrease in patient travel for health services thereby saving both time and money.
3. More rapid diagnosis and fewer missed diagnoses due to improvements in treatment quality with the use of telemedicine.
4. From an educational point of view telemedicine helps in the mutual exchange of knowledge among medical practitioners which in turn keeps them updated and well informed.
5. Remote analysis and monitoring services and electronic data storage significantly reduce healthcare service costs, saving money for you, your patients, and insurance companies.

6. Telemedicine also reduces unnecessary ER visits that is not so urgent.
7. Patients in rural or remote areas benefit from quicker and more convenient access to specialist.
8. Engaging patients through telemedicine can help them maintain appointments and care schedules. Also, when patients are committed to their own healthcare goals, it leads improved health.

WEAKNESS (24-27)

1. Unaffordability by the poor in rural areas owing to the high cost of telemedicine systems and solutions.
2. Thought of receiving healthcare services via telemedicine networks and applications is not appealing to the patients due to lack of awareness and reduced acceptability.
3. Problems arising due to the perspective of medical practitioners showing resistance to change and slow clinical acceptance of telemedicine. Doctors are still not fully convinced and familiar with the cumbersome tele-medicine equipment.
4. An uncertainty regarding the risks and responsibilities involved in the functioning.
5. Excessive reliance upon technology leading to the breakdown of the traditional clinician-patient relationships.
6. Limited reimbursement for telemedicine services. In most cases, medical insurance providers do not cover telemedicine.
7. Limited availability of required ICT infrastructure for telemedicine (e.g., internet connection, bandwidth for high speed telecommunications, etc.) particularly in rural areas.
8. Lack of professional calibers as well as capacity.
9. Other contributing factors include patients' fear and unfamiliarity, financial unavailability, lack of basic amenities like transportation, electricity, telecommunication, literacy rate and diversity in languages, technical constraints, quality doubts and lack of Government Support.

OPPORTUNITIES (26-28)

1. Acceptance of telemedicine, by the public as well as by the professionals, as a standard method of healthcare.
2. Changing telemedicine services reimbursement models: The inclusion of telemedicine services in Pradhan Mantri Jan Arogya Yojna (PMJAY)-

Ayushman Bharat, hopes for a great future for telemedicine in India.
3. International collaboration: Involvement in telemedicine projects with countries who have better knowledge and resources will prove to be effective for improvement of quality of telemedicine services offered.
4. mHealth or mobile health is one of the recent trends which looks to be promising.
5. Virtual medical centers ("hospitals without beds"): A number of pilot programmes are being undertaken to distribute the services of centralized specialists across a wider geographic area. Mercy Hospitals is pioneering in this field with a new virtual care center in Missouri intended to serve a four-state area.
6. Opportunity for patients to reach out with questions, report early warning signs, and make a follow-up appointment to make sure they are on track.
7. Telemedicine by offering offers patient-centered approaches, such as improved timeliness of care it is offering it is promoting patient care quality

THREATS (22,29,30)

1. Reluctance of population to use telemedicine services and general lack of infrastructure and resources to sustain them can be considered as serious threats to the general establishment of the telemedicine system.
2. The world's under-served populations lack access and ability to use technologies as technologies tend to change rapidly, requiring populations to keep updated, which automatically excludes the communities with low levels of literacy from text-based communication technologies such as email.
3. There is a lack of patient follow-up in poor countries, making the assessment of the clinical effectiveness of telemedicine services ineffective.
4. Lack of proper medicolegal protocols are also said to be keeping the physicians from embracing the telemedicine practice.
5. No regulatory bodies that could issue the required laws to manage telemedicine services across the country and beyond the country's borders.
6. Inability to sustain the functionality of the project due to shortage of both financial and legalization frameworks.

7. Need of licensed healthcare professionals to avoid malpractice in telemedicine.

8. Restructuring IT staff responsibilities and purchasing equipment takes time and costs money hence lack of training of physicians, practice managers, and other medical staff will decrease the effectiveness of telemedicine program.

9. Poor broadband connections could possibly lead to patient mismanagement. Also the concept of personal touch not being addressed to raises doubt in the minds of a few physicians.

Conclusion

Despite the challenges and risks involved in telemedicine, the demands of the healthcare industry in the near future can be met by implementing effective and innovative telemedicine solutions. Hand in hand with updating the technology, the reasons for hesitancy in acceptance of telemedicine practices by both physicians and the public should be addressed. With further research and intensification in government initiatives, telemedicine practices are sure to pave way for a better future in healthcare.

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