

# Telemedicine Platforms for Remote Patient Consultations

**Satwik Mamidi**

Salesforce Developer.

[m.satwik16@gmail.com](mailto:m.satwik16@gmail.com)

## ABSTRACT

The following study aims to shed light on the problem of limited healthcare access in remote areas and its possible solutions which is the development of secure telemedicine platforms. Despite implementation challenges, telemedicine offers significant benefits such as remote consultations, diagnostics, and follow-ups, making it a promising solution. Telemedicine technology uses advanced communication and secure digital platforms to offer healthcare services in real-time.

This research indicates that secure telemedicine platforms have the potential to reduce the healthcare disparity and improve patient outcomes, particularly in areas with limited access to services.

**Keywords:** Telemedicine, Remote Areas, Patient Consultations, Limited Access

## 1. INTRODUCTION

Patients located in remote areas or with a lack of access to the healthcare systems witness several challenges, including long travel times, poor medical infrastructure, the technological gaps, such as lack of diagnostic tools and inadequate internet infrastructure, and a shortage of medical personnel exacerbate healthcare access issue [1]. These are some of the major barriers that the patients of remote locations need to overcome in order to receive essential healthcare services. The World Bank reported that over 3.4 billion people worldwide are residing in rural areas, especially in developing countries with low access to healthcare services [2].

Higher death rates, undetected illnesses, and treatment delays are some of the outcomes that await these people. The growing telemedicine provides a practical alternative or solution to ensure access to healthcare services for people residing in such rural areas [3]. The telemedicine services are diverse ranging from tests, remote appointments, and check-ins to medicinal support [3]. The COVID-19 crisis strengthened the benefits of telemedicine as a solution to enhance patient results and alleviate pressure on healthcare systems [3].



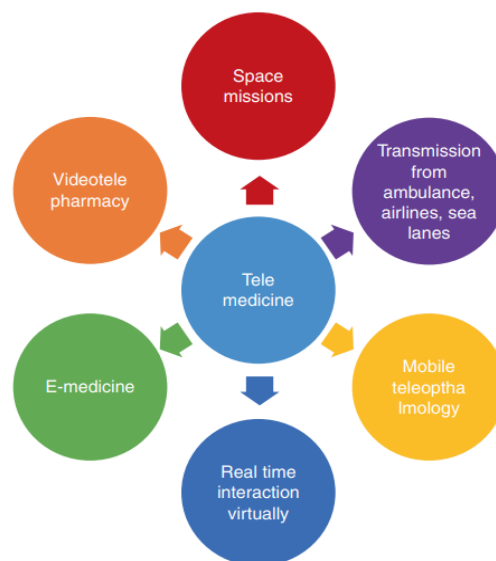
**Figure 1: Rural population Distribution Across the Globe [2]**

## 2. BACKGROUND

The term “Telemedicine” was devised in the year 1970 [4]. Though there is a misconception that the system came into existence in the 1970s the concept came into existence even long before the invention of the telephone and radio [4]. Further, NASA and the Indian Health Service made significant contributions to the system by pioneering the use of telehealth to provide healthcare access to astronauts and Native American populations [4]. The recent advancements in the system came along with the high-speed internet, cloud computing, and mobile technology, widespread utilization was limited by technological limitations.

At present, telemedicine platforms are transforming the delivery process of healthcare. The system not only reduces the requirement for direct visits but also helps in decreasing the costs associated with commutes and long waiting periods. A greater proportion of telemedicine users are older with Medicare Advantage insurance plans and existing chronic conditions or reside in predominantly non-Hispanic Black or African American Census tracts [5].

Despite such advancements in the telemedicine system, rural areas still lack sufficient services due to challenges with technology and infrastructure. Moreover, barriers such as cost, resistance from healthcare providers, and lack of public trust in technology enhance the challenges of telemedicine integration. Therefore, the need for a more flexible, secure, and easy-to-use solution is persistent to address these problems effectively. Further, the modern advancements like cloud computing, AI, and wearable devices would transformed telemedicine strengthening the healthcare system.



**Figure 2: General Applications of Telemedicine [4].**

## 3. PROBLEM STATEMENT

The key problem that this research article focuses on is the limited access to healthcare services in rural areas. Patients in remote areas experience challenges like the lack of appropriate infrastructure along with insufficient exposure to healthcare personnel [1]. These challenges lead to significant healthcare deficiencies in rural and remote regions. There is an increased likelihood of experiencing preventable diseases, including hypertension, diabetes, and chronic respiratory illnesses by patients located in remote regions due to delayed identification and care.

The problem gets maximised with the rural or remote areas-based patients receiving timely and high-quality healthcare services [1]. The patients are required to travel to cities in person, which consumes considerable time and money. For instance, approximately 43.6% of rural uninsured patients are found lacking usual source of care [11]. These challenges, including delayed care in rural areas contribute to national healthcare challenges

by increasing the hospitalization rates or healthcare costs. The need for the development of a safe telehealth platform is important for patients to receive prompt medical assessments, tests, and check-ups in their own neighbourhoods.

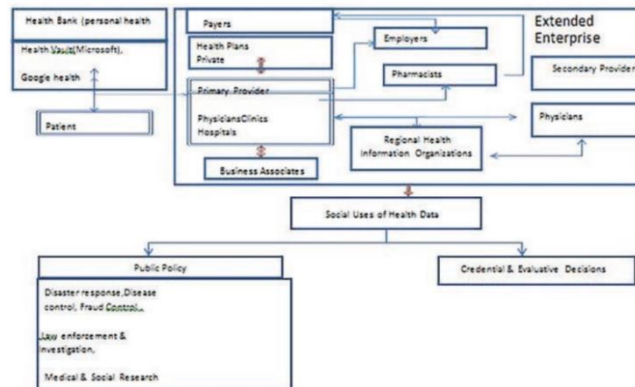


Figure 3: Information Flow in Telemedicine System [4]

#### 4. PROPOSED SOLUTION

The key or main proposed solution to address these problems is the development of secure telemedicine software for remote consultations, diagnostics, and follow-ups. The platform should support end-to-end encryption for performing safe video calls and sharing diagnostic data, and patients’ records [3]. Further, Artificial intelligence (AI) has emerged as a great technology, which can be used to assist in patient categorisation through the analysis of symptoms and medical history using machine learning algorithms [8]. The ML algorithm offers an extensive The healthcare service is a complex method and therefore, must be integrated with the medical equipment. Real-time data from electronic medical devices, including glucose meters, ECG machines, and others will be required to be transmitted to healthcare providers, enabling remote monitoring and assessment [8].

In addition, the cloud-based Electronic Health Records (EHRs) will offer a safe storage of information of patients with enhanced access to the professionals from remote areas [3]. These components ensure a secure and efficient remote healthcare service with reduced need for in-person hospital visits for minor ailments, management of chronic conditions, and routine examinations [3].

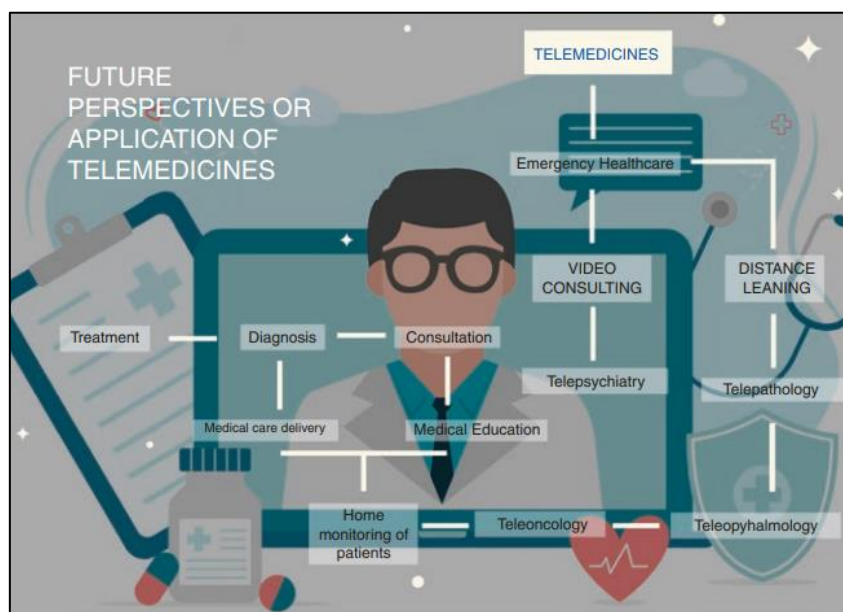


Figure 4: Future Scope of Telemedicine [4]

5. METHODOLOGY

A systematic approach to the implementation of the telemedicine platform is described below.

**Needs Assessment:** The first step of the implementation of the platform will be to assess the needs. Conducting surveys in target remote areas to identify healthcare challenges, internet accessibility, and essential telemedicine features, including video calls and managing patient information will be important [10]. The understanding of the patients regarding the platforms will also form an important part of the process.

**Software Development:** The development of user-friendly and easy-to-access software is important, therefore, contracting software developers for this purpose is necessary as this is the key resource of the entire plan [3].

**Medical Device Integration:** The integration of medical devices is necessary to support the successful implementation of the platform and yield benefits. Devices like BP monitors and others will be integrated to provide professionals with access to data [7]. For the integration, it is important to transfer data through manual practice.

**Cloud-based Electronic Health Records:** Setting up a cloud-based electronic health records system is an important part, which ensures that professionals can securely access patient information by using different platforms for storing Electronic Health Records (EHR) in the cloud [7].

**Continuous Support and Monitoring:** Regular monitoring and technological improvement are the most important part of the implementation process. Technical support and frequent updates are critical to ensure the longevity of the platform and compliance with standards [7].

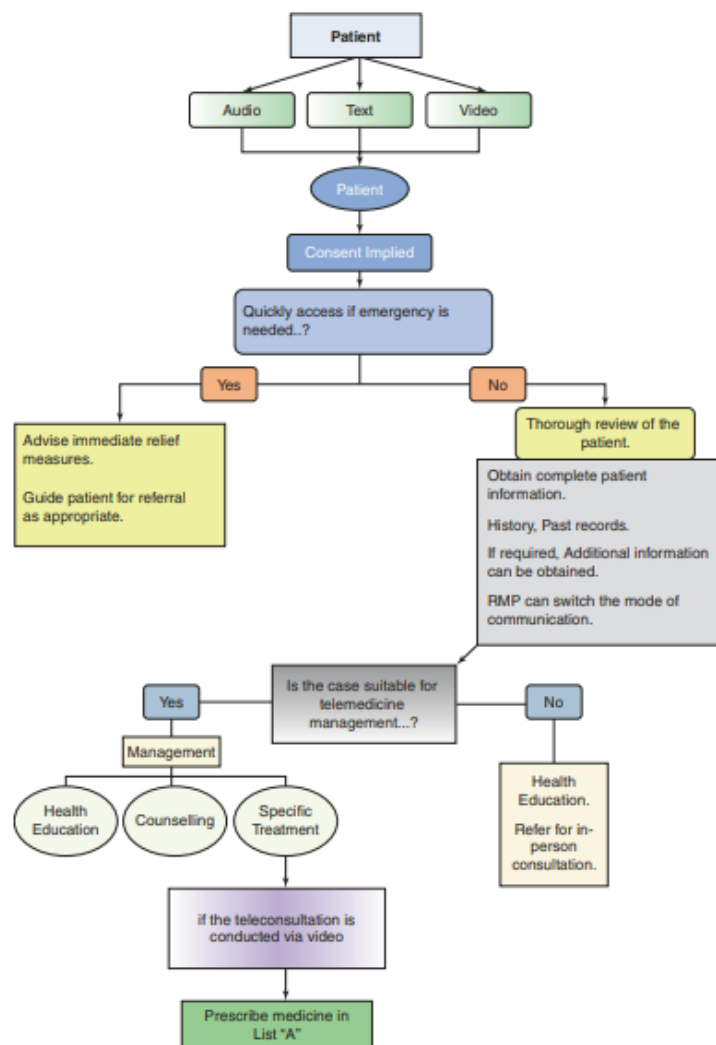


Figure 5: Flowchart of Teleconsultant [4]

## 6. IMPLEMENTATIONAL CONSIDERATION

The benefits of the system are diverse and supported by significantly appropriate implementation. Certain aspects need to be considered while implementing a telemedicine system in real time. The setup of telemedicine is completely different from the regular healthcare setup; therefore, the considerations are described below.

**Internet Infrastructure:** Internet infrastructure remains a challenge in remote areas which hinders Internet access. The need to involve telecom providers is significant to increase broadband availability [3]. Moreover, video conferencing can benefit from data compression techniques by decreasing bandwidth needs.

**Data Security:** The patients' data is sensitive and therefore data security is essential to protect healthcare data [3]. In addition, multi-factor authentication and blockchain technology can be utilized to enhance security measures.

**Regulatory Compliance:** Adherence to local and international healthcare regulations such as the General Data Protection Regulation (GDPR) and National Health Services (NHS) is necessary [9]. Regulatory compliance will guarantee that both patients and healthcare providers trust and approve of the telemedicine system.

**Healthcare Provider and Patient Training:** The successful implementation of the telemedicine system depends on the engagement between patients and healthcare professionals [3]. For this training a holistic training module need to be developed that will offer successful training of both the patients and the healthcare providers. Therefore, continuity in the training of healthcare professionals is important to support the continuous improvement of technology and diagnostic equipment. Further, the patients need to be taught the utilization of the platform to eliminate the limited technology knowledge.

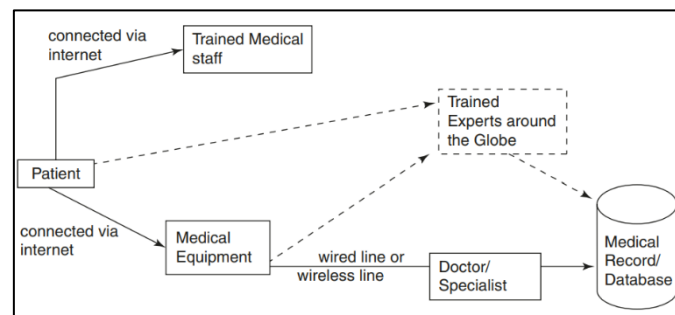


Figure 6: Telehealth Setup [4]

## 7. CONCLUSION

Overall, it has been found that telemedicine platforms have the potential to revolutionize healthcare delivery in remote areas by providing enhanced access to healthcare services. Healthcare providers can offer quick remote consultations and diagnostics by developing secure and expandable telemedicine software that includes diagnostic tools. Though challenges prevail, the benefits of telemedicine, including increased accessibility, reduced costs, and improved patient outcomes underscore its importance in healthcare. The use of the telemedicine platforms will offer benefits like reduced cost and readmission along with appropriate improvement of the healthcare sector.

## REFERENCES

1. Iglehart, J. K. (2018). The challenging quest to improve rural health care. *New England Journal of Medicine*, 378(5), 473-479.
2. World Bank, (2020). Rural Population (% of total population).
3. Haleem, A., Javaid, M., Singh, R. P., & Suman, R. (2020). Telemedicine for healthcare: Capabilities, fea-

- tures, barriers, and applications. *Sensors international*, 2, 100117.
4. Khemapech, I., Sansrimahachai, W., & Toachoodee, M. (2019). Telemedicine—meaning, challenges and opportunities. *Siriraj medical journal*, 71(3), 246-252.
  5. Eberly, L. A., Kallan, M. J., Julien, H. M., Haynes, N., Khatana, S. A. M., Nathan, A. S., ... & Adusumalli, S. (2020). Patient characteristics associated with telemedicine access for primary and specialty ambulatory care during the COVID-19 pandemic. *JAMA network open*, 3(12), e2031640-e2031640.
  6. Gupta, A., Dogar, M. E., Zhai, E. S., Singla, P., Shahid, T., Yildirim, H. N., ... & Singh, S. (2020). Innovative telemedicine approaches in different countries: Opportunity for adoption, leveraging, and scaling-up. *Telehealth and Medicine Today*, 5(1).
  7. Hincapié, M. A., Gallego, J. C., Gempeler, A., Piñeros, J. A., Nasner, D., & Escobar, M. F. (2020). Implementation and usefulness of telemedicine during the COVID-19 pandemic: a scoping review. *Journal of primary care & community health*, 11, 2150132720980612.
  8. Bhaskar, S., Bradley, S., Sakhamuri, S., Moguilner, S., Chattu, V. K., Pandya, S., ... & Banach, M. (2020). Designing futuristic telemedicine using artificial intelligence and robotics in the COVID-19 era. *Frontiers in public health*, 8, 556789.
  9. Ryngaert, C., & Taylor, M. (2020). The GDPR as global data protection regulation?.
  10. Hincapié, M. A., Gallego, J. C., Gempeler, A., Piñeros, J. A., Nasner, D., & Escobar, M. F. (2020). Implementation and usefulness of telemedicine during the COVID-19 pandemic: a scoping review. *Journal of primary care & community health*, 11, 2150132720980612.
  11. RHI. (2020). Healthcare access in rural communities Overview: Rural Health Information Hub. RHI.