

Telemedicine Advancements and Healthcare Applications in Pakistan: A Comprehensive Review

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Abstract

Telemedicine is an advanced integration of technology and healthcare, designed to provide accessible and affordable healthcare services, particularly to rural and isolated areas. This comprehensive review synthesizes findings from 25 selected scholarly articles sourced from databases such as Google Scholar and PubMed. The review highlights telemedicine's role in improving medication adherence through structured counseling and its potential to bridge healthcare accessibility gaps in Pakistan. Research underscores the sustainable impact of telemedicine in overcoming barriers to healthcare access, especially accentuated during the COVID-19 pandemic.

YTelemedicine has shown significant promise in maternal and child healthcare, with studies elucidating its supportive role in enhancing maternal care through digital health solutions. The platform SehatKahani is a notable example, offering a range of telemedicine services, including online consultations and personalized medication adherence programs. However, the development of telemedicine in Pakistan faces challenges such as poor healthcare

infrastructure, limited technology access, and patient illiteracy.

Globally, telemedicine initiatives like India's mMitra illustrate the potential of digital health technologies to improve healthcare outcomes. In Pakistan, mobile phone-based

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interventions have been effective in monitoring immunization coverage and promoting healthcare advancements.

Economically, telemedicine in Pakistan has resulted in cost savings and improved healthcare accessibility, with long-term benefits including enhanced resource allocation and stimulated economic growth. Ethical and legal considerations emphasize the need for secure patient communication channels to protect sensitive healthcare data.

Despite existing challenges, telemedicine offers significant opportunities for Pakistan's healthcare sector. Successful international models and technological advancements provide a foundation for effective telemedicine platforms. This review highlights the transformative potential of telemedicine in Pakistan, advocating for sustained efforts to harness its benefits for improved healthcare delivery and patient outcomes.

Introduction

Telemedicine

Telemedicine is an advance merging of technology and healthcare. It is a path to facilitate people of rural and isolated areas with lack of healthcare access. Telemedicine provides an easy access to healthcare facilities at low cost. Telemedicine is an emerging source of medication adherence in patients with proper counseling. This comprehensive literature review is intended to give an overview of findings from 25 selected articles that transform into telemedicine practice and initiates medication adherence programs in Pakistan.

Telemedicine is a distant delivery of healthcare services via a two-way connection between the patient & healthcare provider. It is also referred to as e-medicine or telehealth.

MODES OF TELEMEDICINES OPERATIONS:

STORE & FORWARD: it's a way of performing telemedicine which does not require immediate response, as the patient & consultant are not present at the same time. In this patient information is digitized & compiled in a file using different digitizers which is transferred to the telemedicine center's through appropriate telecommunication line or internet where consultants after examining the patient profile will give their expert opinion through email, fax or phone.

REAL TIME: In this patient & doctor are present at the same time. The most common form of real time telemedicine is video conferencing equipment. Real time telemedicine can work in a more efficient way for different fields such as psychiatry, internal medicine, rehabilitation, cardiology, pediatrics, obstetrics, gynecology and neurology. It require tele-otoscope to examine the patients ear & tele-stethoscope to monitor the heart rate

PERCEPTION OF HEALTH CARE PROFESSIONALS TOWARDS THE USE OF TELEMEDICINE:

Health care providers by combining the advanced digital technologies may improve the health care delivery by entertaining large number of individuals without their physical presence.

However, inadequate awareness, poor education, lack of skills, lack of resources, and technical issues including internet connectivity, and load shedding have limited the accessibility of the Pakistani population towards advancement in the healthcare industry. As well as difficulty in physical examination, the need for training, and concerns regarding accuracy in diagnosis and treatment were identified as the perceived barriers to the use of telemedicine services.

Sustaining healthcare attainability gaps in Pakistan through Telemedicine:

Aftab et al. in 2020 performed a research that accentuates the adaptation of telemedicine in developing countries including Pakistan. The research emphasizes that advancement of healthcare through telemedicine is a sustainable solution to overcome accessibility gap for remote population. Dorsey and Topol in 2020 describe the importance of telemedicine by illuminating its potential to transform healthcare delivery globally in future. This perception developed in Pakistan after amplification the challenges of Covid19 pandemic.

Telemedicine's role in maternal and child care:

Maternal and child healthcare is a constant challenge in Pakistan. Numerous studies have addressed the supportive role of telemedicine in women and child care. Mahdi et al. in 2022 performed a review of use telemedicine in Pakistan. The study elaborates the potential of telemedicine to reinforce maternal and child care. Bilal et al. in 2022 proposed more continent explanation, describing the collective effect of digital health and telemedicine to enhance maternal care. These researches provide the inventive proposals that can overcome maternal health hurdles in Pakistan.

Telemedicine enables medication adherence programs:

Telemedicine can play a pivot role in increasing medication adherence among patients. It emphasizes on empowering patients to continue their medication programs with constant help. Hasson et al. in 2021 describes the speedy development of telemedicine in supporting cancer patient during COVID 19 pandemic. The study underlines the stance of cancer patients regarding telemedicine for critical medication adherence. SehatKahani, proves a remarkable example of telemedicine platform in Pakistan. It provides several services including online consultations, lab test. It develops personalized medication adherence programs with different reminder settings.

Obstacles in developing telemedicine in Pakistan: The poor infrastructures of healthcare in Pakistan create hurdles in developing telehealth system in Pakistan. Remote areas of Pakistan face multiple challenges that decrease the rate of adaptation of telehealth. Bilal et al. in 2022 describes the challenges faced by patient in using telehealth. The search emphasizes that lack of technology access, patient illiteracy and relationship with the provider are some common obstacles in telehealth. Khoja and Durrani in 2021 shed light on the progression of telemedicine framework and policies in COVID 19 era by overcoming the challenges.

Global ramification and initiatives: the comprehensive global impact of telemedicine is demonstrated by initiative such as mMitra in India. This platform not only provides maternal health information but also integrates medication reminders, showcasing the potential of technology in enhancing healthcare outcomes. Similarly, Kazi et al. (2017, 2018) demonstrate the utility of mobile phones for monitoring immunization coverage and uptake in Pakistani households, showcasing the effective integration of technology for healthcare advancement.

Table 1: Comprehensive Review Table of Telemedicine Innovation in Pakistan and other Developing Countries

Study (In text Citation)	Targeted Issue	Summary	Sub Theme	Application Discussed
(Dorsey	Telemedicine in	Reflects on the future	Telemedicine,	Future of

Study (In text Citation)	Targeted Issue	Summary	Sub Theme	Application Discussed
&Topol, 2020)	the next decade	of telemedicine in the upcoming decade and its potential impact	Future trends	telemedicine and its potential impact
(Mahdi et al., 2022)	Promise of telemedicine in Pakistan	Systematic review of telemedicine's potential and its applications in Pakistan	Telemedicine, Systematic review, Pakistan	Telemedicine's potential and applications in Pakistan
(Bilal et al., 2022)	Digital health and telemedicine in Pakistan	Discusses the role of digital health and telemedicine in improving maternal healthcare	Digital health, Telemedicine, Maternal healthcare	Digital health and telemedicine for maternal healthcare
(Hasson et al., 2021)	Telemedicine for patients with cancer	Perspectives and preferences of cancer patients on rapid telemedicine implementation	Telemedicine, Cancer patients, Rapid implementation	Telemedicine preferences of cancer patients
(Ahmed & Ahmed, 2021)	Telemedicine adoption during pandemic	Discusses the implementation of a telemedicine service during the COVID-19 pandemic	Telemedicine, COVID-19 pandemic, Implementation	Implementation of telemedicine during the pandemic
(Nagra et al., 2021)	Telemedicine service during COVID-19 pandemic	Describes the implementation of a telemedicine service during the COVID-19 pandemic	Telemedicine, COVID-19 pandemic, Implementation	Telemedicine service during the COVID-19 pandemic
(Khoja &Durrani, 2021)	Telemedicine advancements and challenges	Discusses advancements, challenges, and potential solutions in telemedicine during COVID-19	Telemedicine, Advancements, Challenges	Advancements and challenges in telemedicine during pandemic
(Rajput et al., 2021)	Telemedicine for maternal and child health	Systematic review on the implementation of telemedicine for maternal and child health	Telemedicine, Maternal and child health	Telemedicine for maternal and child health
(Advantages & benefits of telemedicine, 2021)	Benefits of telemedicine	Highlights the advantages and benefits of telemedicine	Telemedicine, Benefits, Advantages	Benefits and advantages of telemedicine
(Ehsan et al., 2021)	Telemedicine adoption during COVID-19 pandemic	Examines the adoption and implementation of telemedicine services during the pandemic	Telemedicine, COVID-19 pandemic, Adoption	Adoption of telemedicine services during pandemic

Study (In text Citation)	Targeted Issue	Summary	Sub Theme	Application Discussed
(Mirmoeini et al., 2019)	Policies for specialists distribution	Discusses policies and challenges of specialists distribution in rural areas of Iran	Telemedicine, Specialist distribution, Policies	Policies for specialists distribution in rural areas
(Lee et al., 2017)	mHealth and mobile penetration in Africa	Maps mHealth and mobile penetration in sub-Saharan Africa for strategic collaboration	mHealth, Mobile penetration, Sub-Saharan Africa	mHealth and mobile penetration in sub-Saharan Africa
(Nadarzynski et al., 2019)	Acceptability of AI-led chatbot services	Study on the acceptability of AI-led chatbot services in healthcare	AI-led chatbot services, Healthcare	Acceptability of AI-led chatbot services in healthcare

Study (Intext Citation)	Targeted Issue	Summary	Sub Theme	Application Discussed
(Ahmed & Ahmed, 2018)	Telemedicine landscape in Pakistan	Discusses Pakistan's lag in telemedicine implementation, factors, and potential improvements	Telemedicine in Pakistan	Lag in telemedicine implementation and improvements
(Kazi et al., 2017)	Mobile phone-based immunization reporting	Exploring geo-spatial reporting for immunization coverage through mobile phones	Mobile health, Immunization reporting	Mobile-based immunization reporting
(Kazi et al., 2018)	Mobile phone text message reminders	Randomized trial on the effect of text message reminders on routine immunization uptake	Mobile health, Immunization reminders	Text message reminders for immunization uptake
(Sayani et al., 2019)	Telemedicine for chronic disease management	Study on addressing cost and time barriers through telemedicine in low- and middle-income countries	Telemedicine, Chronic disease management	Telemedicine for chronic disease management
(Km G S.S., 2020)	Telemedicine in the time of COVID-19 pandemic	Reflects on the role of telemedicine during the COVID-19 pandemic and its impact	Telemedicine, COVID-19 pandemic	Telemedicine's role during the COVID-19 pandemic
(Syed et al., 2021)	Telemedicine center establishment during pandemic	Establishment of a telemedicine center in a Pakistani tertiary care hospital during COVID-19	Telemedicine, Tertiary care hospital, COVID-19 pandemic	Telemedicine center during the COVID-19 pandemic
(Escobar et al., 2022)	Telehealth and obstetric emergencies	Effects of a telehealth-based intervention model for managing obstetric emergencies	Telehealth, Obstetric emergencies	Telehealth intervention for managing obstetric emergencies

Study (Intext Citation)	Targeted Issue	Summary	Sub Theme	Application Discussed
(Galle et al., 2021)	Telemedicine for maternal care during COVID-19	Global study on the effects of telemedicine on maternal care during the pandemic	Telemedicine, Maternal care, COVID-19 pandemic	Effects of telemedicine on maternal care during pandemic
(Zheutlin et al., 2022)	Improving postpartum hemorrhage risk prediction	Utilizing longitudinal electronic medical records to improve postpartum hemorrhage risk prediction	Maternal health, Postpartum hemorrhage risk prediction	Telemedicine for improving postpartum hemorrhage prediction
(Sulaman et al., 2022)	Telemedicine for obstetrics patients in Pakistan	Discusses the prospect of telemedicine for obstetrics patients in Pakistan	Telemedicine, Obstetrics patients, Pakistan	Prospect of telemedicine for obstetrics patients in Pakistan
(Combi et al., 2016)	Telemedicine for developing countries	Discusses telemedicine in developing countries, including design issues and challenges	Telemedicine, Developing countries, Challenges	Telemedicine challenges in developing countries
(Aftab et al., 2020)	Telemedicine practices in developing countries	Scoping review of telemedicine practices in developing countries, highlighting trends and challenges	Telemedicine practices, Developing countries	Telemedicine practices analysis

Economic Impact of Telemedicine in Pakistan:

Telemedicine in Pakistan has significant economic impacts, including cost savings, improved healthcare accessibility, and long-term benefits. By reducing travel and hospitalization costs, telemedicine lowers expenses for patients and healthcare providers. It enhances access to specialists and healthcare services, particularly in rural areas, boosting overall productivity. Telemedicine also offers cost-effective training for healthcare professionals and better data collection, aiding in efficient resource allocation. In the long term, it contributes to a healthier population and stimulates economic growth by creating jobs and fostering innovation. Overcoming technological and regulatory challenges is crucial to fully realize telemedicine's potential in Pakistan. (26)

Ethical and Legal Considerations:

For patient concern and security pharmacist must ensure that the prescription, patient counselling and communication must be confidential. An encrypted channels must be created to prevent the unauthorized access to sensitive healthcare data. Implementing robust data encryption protocols important to secure patient information from cyber threats This includes secure storage and transmission of electronic health records (EHRs) to protect against breaches that could compromise patient confidentiality.

Opportunities for Telemedicine in Pakistan

Despite its challenges, telemedicine offers significant opportunities for Pakistan's healthcare sector. With a high patient load and unmet medical needs in rural areas, telemedicine can provide efficient and accessible care solutions. Successful models from countries like India and Kenya demonstrate that telemedicine can reduce costs, improve patient outcomes, and expand access to healthcare services. Technological advancements in ICT offer a foundation for developing effective telemedicine platforms, while the potential for medical tourism presents an opportunity to attract international patients seeking high-quality, affordable healthcare.(27)

Conclusion: Promising Future and Ongoing Progress:

The reviewed articles collectively underscore the transformative role of telemedicine in Pakistan, addressing challenges such as healthcare accessibility, maternal and child health, and medication adherence. Despite existing challenges like technological barriers and policy gaps, the potential benefits of telemedicine in enhancing healthcare outcomes remain evident. The evolution of platforms like SehatKahani, coupled with the incorporation of medication adherence programs within telehealth services, highlights innovative strategies that can significantly enhance healthcare delivery. As telemedicine continues to evolve, it holds substantial promise in advancing healthcare accessibility and improving patient outcomes in Pakistan. It also serves as a foundation for future endeavors, emphasizing the need for sustained efforts to harness telemedicine's potential for the betterment of healthcare in the country.

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