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DOI: 10.46903/gjms/23.3.1929

REVIEW ARTICLE

REVOLUTIONIZING PATIENT CARE: THE EXPANDING ROLE AND IMPACT OF TELEPHARMACY IN MODERN HEALTHCARE

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ABSTRACT

Telepharmacy is an innovative approach of pharmaceutical treatment that uses telecommunications technology to improve access to medication management and counseling services, especially for patients in rural and deprived regions. This review article analyzes the evolving function and influence of telepharmacy in contemporary healthcare, outlining its historical progression, operational frameworks, and various advantages it offers. Primary benefits encompass increased accessibility to healthcare services, improved drug management and safety, and cost efficiency for both individuals and healthcare systems. Despite these advantages, the implementation of telepharmacy encounters considerable obstacles, including legislative impediments, technological constraints, and concerns over patient acceptability and confidence. The future of telepharmacy is optimistic, with trends suggesting significant development in the post-COVID-19 era and the opportunity for integration with new technologies like artificial intelligence and virtual reality. Moreover, telepharmacy is set to assume a crucial role in chronic illness management by providing ongoing assistance and education to patients. This paper concludes by emphasizing the transformative potential of telepharmacy in redefining healthcare delivery and urges stakeholders, including policymakers, healthcare providers, and pharmacy organizations - to adopt this model to enhance patient outcomes and guarantee equitable access to pharmaceutical care for diverse populations.

KEY WORDS: Accessibility; Healthcare delivery; Medication safety; Patient care; Patient engagement; Telemedicine; Telepharmacy.

Cite as: Ash A, Alanazi M, Alanazi FJ, Alotaibi NM, Ali A, Ghazanfar A, et al. Revolutionizing patient care: the expanding role and impact of telepharmacy in modern healthcare. Gomal J Med Sci 2025 Jul-Sep;23(3):348-52. https://doi.org/1046903/gjms/23.3.1929

INTRODUCTION

In recent years, healthcare delivery has experienced a significant transformation, driven by rapid advancements in technology. [1]Among the most influential developments is telepharmacy, a novel approach that leverages digital tools to bring pharmacy services directly to patients. Telepharmacy, a subset of telehealth, involves the provision of pharmaceutical care remotely through various digital communication platforms.[2] From remote consultations and digital prescriptions to virtual counseling sessions, telepharmacy is reshaping how medication management and healthcare services are delivered, making them more accessible and efficient.[3]This study seeks to examine the growing significance and influence of telepharmacy in modern healthcare, highlighting its potential advantages and the issues it poses. This will offer a thorough examination of telepharmacy's primary benefits, including increased access to care for rural and underprivileged communities, enhanced drug management, and decreased total healthcare expenses. In addition to emphasizing these advantages, the paper will examine the numerous challenges obstructing the extensive application of telepharmacy. These encompass legislative and legal restraints, technological limitations, reimbursement challenges, and ethical considerations—all essential

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Date Submitted: 11-01-2025
Date Revised: 25-08-2025
Date Accepted: 07-09-2025

variables that must be addressed to realize telepharmacy's full potential. Through the analysis of these difficulties and the extraction of lessons from effective telepharmacy models, we intend to offer a balanced and forward viewpoint. The article will also illuminate developing trends and future developments, including the integration of artificial intelligence and the progression of customized medicine, which may further transform telepharmacy.

Significant achievements in telepharmacy integration include the development of extensive telehealth networks and the adaptation of state and federal laws to support remote pharmaceutical services.[4] In the United States, the Indian Health Service (IHS) pioneered the use of telepharmacy to serve Native American communities across vast rural areas. The IHS initiatives enhanced medication safety and adherence, setting a standard for other healthcare organizations.[5] The adoption of electronic health records (EHRs) marked another milestone, facilitating seamless communication and data exchange between pharmacists and healthcare professionals.[6]The COVID-19 pandemic further accelerated the evolution of telepharmacy. Lockdowns and social distancing measures severely restricted in-person healthcare interactions, making telepharmacy a crucial component of healthcare delivery. During this period, telepharmacy ensured continuity of care, allowing patients to maintain access to essential medications. The pandemic also prompted a relaxation of some regulatory barriers, leading to broader acceptance and expanded use of telepharmacy services.[7]

Telepharmacy leverages a wide range of technological tools to deliver pharmaceutical care effectively and improve patient outcomes.[29] (Table 1). Videoconferencing is essential for facilitating real-time consultations between pharmacists and patients,

Table 1: Comparison of Telepharmacy with Traditional Pharmacy

Aspect	Traditional Pharmacy Services	Telepharmacy Services
Interaction Method	Face-to-face, in-person communication between pharmacist and patient[8]	Remote communication via video conferencing, phone, or chat[9]
Accessibility	Limited to geographic location; requires physical travel to the pharmacy[10]	Accessible from anywhere with an internet connection, reducing travel needs[11]
Operating Hours	Fixed operating hours; may not be convenient for all patients[12]	More flexible service hours, sometimes available 24/7[13]
Personalized Care	In-person counseling allows for a direct and personal interaction[14]	Personalized care via digital means; some argue the connection may feel less personal[15]
Medication Dispensing	Physical dispensing at a pharmacy counter[16]	Remote dispensing, often with delivery options or collaboration with local clinics[17]
Suitability for Rural Areas	Often inaccessible, requiring long-distance travel[18]	Ideal for rural and remote areas, providing services where pharmacists are not physically present[19]
Technological Requirements	Minimal; standard pharmacy setup with physical records[20]	High; requires reliable internet, video conferencing, secure software for records[21]
Cost Considerations	Traditional infrastructure and staffing can be costly[22]	Potential for cost savings through reduced overhead and broader reach[23]
Medication Management	In-person follow-ups and consultations[18]	Digital monitoring tools and virtual consultations for adherence and management[18]
Regulatory Environment	Well-established, with long-standing regulations[24]	Evolving regulations that differ by region, often more complex[17]
Safety and Quality Concerns	Direct oversight of medication handling and patient consultation[25]	Concerns over data security, quality of virtual interactions, and medication verification remotely[26]
Adoption Challenges	Well-accepted but geographically limited[27]	Resistance from some stakeholders, technology barriers, and initial skepticism[28]

offering education on prescription usage, discussing potential side effects, and addressing patient inquiries. This technology is especially advantageous for those in isolated areas with restricted access to conventional pharmacy services. Research indicates that videoconferencing can uphold the quality of patient care, rendering it similar to face-to-face encounters, so guaranteeing that patients receive sufficient assistance and guidance regarding their prescriptions.[30] Mobile applications function as vital instruments in telepharmacy, enabling contact between pharmacists and patients. These programs facilitate functions including prescription refills, medication reminders, and access to instructional resources. They can monitor drug adherence, dispatching notifications to patients regarding impending doses and markedly enhancing compliance and engagement.[31] Wearable technology is crucial in telepharmacy by tracking patients' health parameters, including heart rate and blood pressure, and relaying real-time data to pharmacists. This ongoing surveillance is essential for chronic disease care, allowing pharmacists to make informed judgments and intervene swiftly when required.[32] Artificial intelligence improves telepharmacy services by utilizing predictive analytics to discern patterns in drug adherence and forecast future health problems. AI algorithms enable pharmacists to preemptively resolve difficulties before they intensify, hence enhancing patient outcomes. Moreover, AI-driven Chabot's can offer round-the-clock support, addressing frequent patient queries in the absence of pharmacists.[26]

DISCUSSION

Telepharmacy significantly enhances access to healthcare services, especially for people in rural or underserved regions. Numerous patients in these areas encounter difficulties in accessing essential medications and pharmaceutical treatment due to the remoteness of pharmacies or healthcare facilities. Telepharmacy addresses this disparity by facilitating remote connections between patients and pharmacists, thereby providing consultations and prescriptions without necessitating substantial travel. This is particularly vital for older patients or individuals with mobility challenges who may find it difficult to attend physical sites.[20] Telepharmacy improves patient convenience by enabling remote consultations with certified pharmacists. Patients may participate in video conferences or telephone consultations to discuss their pharmaceutical requirements, obtain counseling, and address any issues with their prescriptions. This flexibility not only conserves time but also enables patients to administer their healthcare more efficiently according to their own schedules. Accessing pharmaceutical care from home markedly enhances patient satisfaction and compliance with treatment regimens. [18]Telepharmacy allows pharmacists to do customized drug assessments based on specific patient requirements. Pharmacists can evaluate a patient's pharmaceutical regimen, offer guidance on appropriate usage, and address any adverse effects through remote consultations. This tailored strategy enables patients to engage actively in their healthcare, resulting in enhanced drug compliance. Research indicates that patients who participate in regular consultations with pharmacists are more inclined to adhere to their recommended regimens, leading to improved health results.[33] The incorporation of telepharmacy into healthcare systems is essential for improving medication safety. Pharmacists can conduct remote surveillance of patients' prescription usage, detecting potential drug interactions or adherence problems before they develop into significant difficulties. Pharmacists can rapidly intervene upon detecting anomalies by checking drug profiles and conducting follow-ups through telecommunication technology. This proactive strategy markedly diminishes the likelihood of prescription errors and adverse drug events, enhancing overall patient safety.[34]Telepharmacy facilitates financial savings for patients and healthcare institutions alike. The removal of travel costs related to pharmacy visits can provide substantial financial relief for patients, especially those residing in distant regions.[21] Moreover, telepharmacy diminishes the necessity for physical appointments for routine consultations, so further reducing out-of-pocket expenses associated with transportation and time away from work. From a healthcare system standpoint, telepharmacy enhances resource efficiency by refining pharmacy procedures. Permitting pharmacists to oversee several patient sessions remotely enables healthcare institutions to function more efficiently while maintaining treatment quality. This efficiency may result in diminished operational expenses and enhanced service delivery universally.[35] Telepharmacy improves the efficacy of pharmacy operations by enabling pharmacists to concentrate on high-value duties such as patient counseling and medication monitoring, rather than on routine dispensing procedures that can be automated or conducted remotely. This transition enhances pharmacy workflow and facilitates improved resource allocation, ensuring pharmacists remain accessible for intricate cases necessitating their knowledge.[36]

CONCLUSION

Telepharmacy represents a transformative approach to healthcare delivery that addresses many challenges associated with traditional pharmacy practices. Its ability to improve access to pharmaceutical care, enhance medication management, and integrate advanced technologies positions it as a critical component of modern healthcare systems. The trends indicating growth post-COVID-19 underscore the increasing acceptance of remote healthcare solutions among patients and providers alike. As we

look toward the future, it is essential for stakeholders, including healthcare providers, policymakers, and pharmacy organizations—to embrace telepharmacy as a viable solution for improving patient outcomes. By investing in technology infrastructure, developing clear regulatory frameworks, and promoting education about telepharmacy's benefits among patients and providers, we can create a more inclusive and efficient healthcare system that meets the diverse needs of all individuals. In conclusion, embracing telepharmacy not only aligns with current healthcare trends but also paves the way for a future where quality pharmaceutical care is accessible to everyone—regardless of their location or circumstances. The potential for improved health outcomes through innovative pharmacy practices is immense; thus, it is imperative that we collectively work towards realizing this vision.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
GRANT SUPPORT AND FINANCIAL DISCLOSURE
None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	AA, MA
Acquisition, Analysis or Interpretation of Data:	AA, MA, FJA, NMA, AA, AG
Manuscript Writing & Approval:	AA, MA, FJA, NMA, AA, MIS, MI

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.