REVIEW ARTICLE

Telepharmacy in the Digital Age: Improving Accessibility and Efficiency of Pharmaceutical Services

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Abstract

Telepharmacy, the remote delivery of pharmaceutical services through information and communication technology, enhances access to healthcare, improves patient outcomes, and addresses challenges in underserved areas. This review consolidates evidence from scholarly publications, national health-care documents, and case reports to explore the global integration and potential of telepharmacies. The COVID-19 pandemic has accelerated telepharmacy adoption, maintaining high-quality pharmaceutical care while adhering to social distancing. Telepharmacy includes services, such as patient assessment, medication evaluation, prescription verification, and patient education. Countries such as Australia, the US, Canada, and the UK have used telepharmacy for decades, especially in rural areas. Innovative models such as medication consultation systems, WeChat-based services, and Telepharmacy Robotic Delivery Services improve access to therapies. Studies have shown that telepharmacy has a positive impact on disease management, medication adherence, and adverse events. Successful deployment of telepharmacy requires addressing confidentiality, digital literacy, cultural acceptance, and legal support. Collaborative efforts among health-care professionals and their integration into the existing systems are essential. As healthcare evolves, telepharmacy is crucial for enhancing clinical safety, expanding pharmaceutical access, and optimizing patient care.

Key words: Digital technology, patient outcomes, remote pharmaceutical care, telemedicine, telepharmacy

INTRODUCTION

Digital technology has significantly enhanced healthcare efficiency and outcomes by enabling operational consistency. Big data has advanced personalized therapy and is influenced by economic factors, demographic changes, and patient behavior. Technology use has reduced costs, prevented unnecessary deaths, improved clinical outcomes and quality of life, increased care efficiency and quality, and has advanced new medications and therapies.[1]

Digital innovations in clinical practice include telemedicine, telepharmacy, artificial intelligence, advanced medical equipment, and electronic medical records, transforming the communication between health-care professionals and patients.[2] Sophisticated technology that identifies health conditions and new diseases will revolutionize the pharmaceutical sector, expand options,

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create new treatments, improve diagnostic precision, and facilitate collaborative decision-making. Patients are becoming increasingly proactive in managing their health conditions.[3]

Although digital health promises a comprehensive and equitable revolution in healthcare and universal health coverage, challenges remain. The significant impact of digital technologies on health outcomes highlights the need to address ethical and privacy issues in their design guided by evidence-based methodologies to ensure fairness.[4] Technological transformation in health-care systems and pharmacies necessitates prioritizing cost reduction, meeting patient expectations, and enhancing illness predictions. Modern consumers are increasingly seeking improved experiences and more efficient health-care services equipped with abundant health-related information and technological skills.

The technology revolution presents an opportunity for community pharmacies to add value by adopting digital technologies such as telepharmacy to remain competitive and enhance their healthcare role. These technologies enable pharmacists to create cohesive patient communication platforms, access previously unavailable data, store patient information, streamline electronic prescriptions, automate medication dispensing and administration, simplify pharmaceutical management across the supply chain, and monitor the effectiveness and safety of drugs. Implementing such technology can improve patient care, treatment adherence, and medication safety by detecting problems, offering personalized support, and incorporating automation, allowing pharmacists more time for consultation and collaboration with other health-care professionals.[5] As electronic devices and smartphone health apps gain popularity, pharmacists play a crucial role in guiding their use and advising patients regarding their relevance. To navigate the rapidly evolving technology landscape, it is essential to integrate digital health topics into university curricula to equip students with the skills necessary for future practice.[6]

Integrating telepharmacy into telehealth enhances communication with pharmacists and improves pharmaceutical service quality and accessibility, leading to improved patient satisfaction and outcomes. Expanded access to pharmaceutical services increases the number of patients and clinical outcomes.[7] Pharmacists play a crucial role in managing drug interactions, vaccinations, and test results, whereas telepharmacies enable convenient home consultations. Rising recognition of telepharmacy among patients significantly enhances treatment and care.[7]

This narrative review explores the global integration and potential of telepharmacy to transform pharmaceutical services, emphasizing its ability to improve access to care, enhance patient outcomes, and address challenges in remote and underprivileged areas.

METHODOLOGY

This narrative review examines the importance and impact of telepharmacy by consolidating evidence from scholarly publications, national health-care documents, and case reports from online repositories, such as PubMed, Scopus, and Web of Science. Search terms used included "telepharmacy," "remote pharmaceutical care," and "telemedicine integration." This review incorporated relevant research on the benefits, challenges, and advancements in telepharmacy with a focus on developments during the COVID-19 pandemic. Information was thematically organized to explore how telepharmacy enhances care access, improves safety, and affects clinical outcomes. Special attention has been given to global practices such as automated medication delivery systems and national strategies in Denmark, Australia, and Switzerland. This review also assessed challenges related to confidentiality, regulatory frameworks, and technological proficiency, and proposed solutions to optimally integrate telepharmacy into health-care systems.

GLOBAL PERSPECTIVE OF TELEPHARMACY

Telemedicine and telepharmacy use information and communication technology to remotely offer health-care services. Telemedicine provides healthcare from a distance,[8] whereas telepharmacies deliver pharmacological therapy remotely.[9-11] Telepharmacy includes clinical services, such as patient and medication assessments, patient education, prescription verification, disease prevention, and clinical outcome evaluations.[10,12] It efficiently provides pharmaceutical services to individuals in remote areas, those with limited mobility, or those with inflexible schedules without requiring a pharmacist's physical presence.[13]

Telepharmacy has gained prominence during the COVID-19 pandemic, easing the burden on the global health-care systems.[14] Social distancing incurs costs and limits access to health-care services, including pharmacies.[15] Telepharmacy mitigates these issues, while ensuring high-quality pharmaceutical care. For instance, In the US, legislation now permits pharmacists to use video calling services such as Zoom®, despite non-compliance with some data protection regulations.[16] Similarly, in 2020, Australia allowed pharmacists to evaluate prescriptions via video conferencing.[17] Telepharmacy has been implemented for decades, particularly in remote regions: Australia since 1942, the US since 2000, Canada since 2003, and the UK and Hong Kong since 2010.[12] It is vital in rural areas where health-care access is challenging. The scientific literature on telepharmacy is extensive, especially from 2019 to 2022, correlating with the COVID-19 pandemic, and emphasizing the need for continuous pharmacological services when in-person therapy is impractical.[13]

Pharmacists employ innovative methods to deliver telepharmacy services and enhance access to pharmacological therapies. These include a medication consultation system, and a WeChat-based telepharmacy model in China, which effectively manages chronic illness medications.[18] Denmark's national telepharmacy strategy uses chat services to query prescriptions.[19] A 2017 study demonstrated the feasibility of incorporating video-conferencing into a medicine delivery robot, the Telepharmacy Robotic Delivery Service, for remote northeastern Scotland.[20] Switzerland's netCare program enables individuals to consult with their general practitioner at a pharmacy and quickly receive prescribed medications.[21]

Telepharmacy significantly improves the clinical safety and therapeutic outcomes. A 2017 review found that telepharmacy positively impacts disease management, patient self-management, and medication adherence for chronic illnesses, and helps reduce adverse events in hospitals.[22,23] Studies in US indicate that remote prescription evaluations decrease probable adverse events and improve work satisfaction. Although crucial for clinical outcomes, procedures can be optimized for more cost-effective healthcare.[23]

DEPLOYMENT OF TELEPHARMACY SERVICES

Telepharmacy offers both benefits and drawbacks, including issues related to confidentiality and privacy of health information.[12] Therapy success can hinge on a patient's digital and health literacy, and how well the pharmacy is integrated into care pathways. The complexity of telepharmacy is often underestimated and its adoption is influenced by cultural acceptance and legal support.[24] Four main obstacle domains were identified: Technical, organizational, human, and economic.[25] Addressing these obstacles in specific contexts and developing strategies to overcome them are crucial for successful telepharmacy implementation. Identified obstacles include adapting to new environments with the technological advancements accelerated by the COVID-19 pandemic. The use of technology in healthcare has significantly increased, enhancing the delivery of medical services. Integrating telepharmacy is essential for maximizing pharmacists' impact on clinical outcomes, providing them with more value, and improving patient care.[26] Telepharmacy enables extended contact with patients, gathering of information, and optimization of treatment efficiency.[27] Trust and privacy are critical and require patient consent before telepharmacy consultations.[14] Telepharmacy services can reduce patients' travel costs, allowing pharmacists to discern patient preferences and determine the suitability of in-person or remote consultations.

Pharmacists can gauge patient satisfaction by offering telephonic consultations instead of video calls, or by using Wi-Fi for video calls instead of mobile data.[13] Effective telepharmacy requires pharmacists to collaborate with other health-care professionals. An interprofessional care coordinator can facilitate the acceptance of care coordination within a collaborative framework either in person or remotely.[28] Hospital telepharmacy services enable pharmacists to work with medical teams by providing clinical recommendations.[29] In remote locations, telepharmacy services are more efficient when pharmacists access patients' electronic medical records, thereby enhancing the effectiveness of healthcare systems and patient-centered services.[30] Studies indicate that rural hospitals are more likely to offer remote pharmaceutical assistance when they have both an on-site pharmacist and another providing telepharmacy services rather than relying solely on one remote pharmacist.[31] Remote pharmaceutical care allows on-site pharmacists to focus on tasks, such as improving patient care, participating in committees, or teaching. Telepharmacy pharmacists also engage in activities, such as optimizing antibiotic use, conducting drug evaluations, and ensuring accurate prescription reconciliation post-discharge.[32] Justifying the cost of an additional in-person pharmacist is challenging, especially in remote areas where recruitment or retention of full-time pharmacists is difficult.[33]

Telepharmacy should be introduced based on the identified needs of health-care professionals, which differ according to location and situation. Pharmaceutical companies should promote telepharmacy services among pharmacists. The model must consider specific contexts, requirements, and potential clinical, economic, and human benefits.

CONCLUSION

Telepharmacy enhances clinical safety, improves therapeutic outcomes, and expands access to pharmaceutical services by promoting medication adherence, minimizing adverse reactions, and addressing healthcare gaps in underserved areas. Successful adoption requires addressing privacy issues, improving digital competence, and fostering teamwork among health-care providers. Integrating these services into existing health-care systems and equipping pharmacists with the necessary skills is essential to maximize telepharmacy's potential.

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