

Maximising Patient Care: The Crucial Role of Clinical Pharmacists in Virtual Hospital and Telehealth Settings: A Review

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ABSTRACT

The emergence of virtual hospitals and telehealth has improved the ways of providing healthcare services, although it also brings new obstacles in patient management. In these settings, clinical pharmacists are indispensable in ensuring the safety of medications, patients' compliance with the regimen, and providing education to co-patients. The objective of this review is to assess the impact of clinical pharmacists on the healthcare practice when the latter is provided remotely, emphasizing their core activities of medication reconciliation, management of drug interactions, and dispensing of tailored therapy. Based on the inclusion of clinical pharmacists in telehealth procedures, the goals of treatment, safety and adherence, and quality of care in a digital environment can all be achieved.

Keywords: Clinical Pharmacists, Telehealth, Virtual Hospital.

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INTRODUCTION

The prescription of medication is the most common intervention practice in health services. Still, risky medication uses practices and errors constitute a leading cause of harm and avoidable harm across health systems around the world and are thus critical to patients' safety. In this study area, rural and remote health service sites usually experience constraints such as inaccessibility to clinical pharmacy services and lack of sufficient medication management resources as well as shortage of qualified individuals to direct complex medication treatment regimes.

Recently, healthcare delivery has transformed significantly with the increasing number of virtual hospitals and telehealth services. This change, influenced by technological advancements and the need for accessible, efficient, and patient-centered care, has created new opportunities to fill the gaps in medication safety and management. However, the involvement of clinical pharmacists in these virtual healthcare settings is an underexplored region, creating a crucial research gap. There is a dearth of information regarding how virtual clinical pharmacy services may reduce medication errors, improve patient outcomes, and alleviate pressure on healthcare systems in underserved areas.¹

During such challenges and opportunities, the role of clinical pharmacists in a healthcare team has emerged and significantly contributed to optimizing the management of medication and assuring safe and effective treatment results. Virtual clinical pharmacy represents the use of telehealth technologies to expand the availability of clinical pharmacy expertise, especially for rural and remote healthcare facilities where access to specialized services is limited.²

This review aims to address the multiple contributions of clinical pharmacists in virtual hospital and telehealth settings, with specific attention to their impact on patient care, medication safety, and the efficiency of the health system. This study seeks insights into the potential of virtual clinical pharmacy to transform healthcare delivery in underserved regions by identifying the current issues and gaps in research.

CLINICAL PHARMACISTS

Clinical pharmacists possess a distinctive role throughout the entirety of the medication management process while patients are hospitalized. They offer specialized knowledge in assessing medication lists, educating both staff and patients and conducting medication reconciliation during transitions of care. By delivering these essential services, clinical pharmacists mitigate medication errors, which constitute a significant preventable contributor to morbidity and mortality on a global scale. Substantial evidence supports the effectiveness of hospital-based clinical pharmacy services in achieving tangible outcomes, such as reducing



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preventable hospital admissions, minimizing medication-related harm, enhancing communication regarding medications during transitions of care to primary care providers, empowering patients with improved medication understanding, promoting adherence to medication management, and fostering evidence-based prescribing practices.^{3,4}

VIRTUAL HOSPITAL

Emerging trends in healthcare include collaborative efforts among health professionals, hospitals, medical centres, and insurance experts in virtual environments for information exchange. Technological and socioeconomic advancements have created opportunities for many patients to access Internet-based information systems.⁵ The emergence of virtual hospitals facilitates the integration of diverse medical services provided by distinct institutions, enhancing interoperability within the healthcare landscape.⁶

The Virtual Hospital consists of multimedia files, each containing a multimedia Continuing Medical Education (CME) lesson. It utilizes pre-existing computer and communication standards and adopts the Multipurpose Internet Mail Extensions (MIME) multimedia file format to store its multimedia files, along with appropriate software technology for organizing these files. Efficient diagnosis and therapy depend on timely access to information.⁷

Numerous diseases, both harmful and contagious, can be effectively treated at home through remote consultations with a doctor. This approach alleviates the need for patients to physically visit a hospital, thus conserving beds and equipment for those with more urgent medical needs. Technology plays a pivotal role in realizing this concept. In our daily lives, we witness the convenience of ordering food and transportation within min, monitoring stock market trends, and accessing sports scores on our mobile phones. Businesses thrive by meeting such needs efficiently, and technology can similarly be leveraged to create a simple Virtual Hospital web system accessible to people worldwide. The development of virtual hospitals fosters interoperability among various medical services provided by different institutions.⁶⁻⁸

TELEHEALTH

Tele healthcare is swiftly emerging as a means to enhance patient access to healthcare services and optimize health outcomes. It holds the promise of addressing the needs of underserved populations in remote regions.^{9,10} Although patient satisfaction with traditional in-person visits has generally been high, satisfaction with telemedicine visits, primarily investigated in outpatient clinic settings, has shown variability. However, numerous studies have indicated that patient satisfaction with telemedicine visits is generally positive, with some demonstrating it to be equivalent to or better than in-office visits. Telehealth

presents a promising avenue for providing clinical pharmacy services by enhancing healthcare accessibility, expanding the scope of clinical services, and enabling pharmacists to interact with patients who may otherwise be underserved.^{11,12}

Integration of Clinical Pharmacists in Virtual Hospital and Telehealth

Incorporating clinical pharmacists into virtual hospitals and telehealth platforms strengthens interdisciplinary cooperation and fosters holistic patient care. Utilizing remote consultations and virtual rounds, pharmacists can perform medication reviews, evaluate therapeutic suitability, and offer medication counselling to patients, irrespective of geographical limitations. Through the use of telecommunication technologies, clinical pharmacists play an active role in coordinating care, reconciling medications, and managing adverse drug events, thus enhancing medication safety and efficacy within virtual care environments.¹³

Medication Management and Optimization

As the healthcare sector evolves to meet the ever-changing medical needs of society, medication discrepancies persist as a leading cause of hospitalization despite therapeutic advancements. The significance of "medication misadventure" consequences has prompted the development of cognitive services to improve medication management. However, in rural communities, access to timely and high-quality medication services remains a significant challenge. This has spurred a growing demand for clinical pharmacy services. Clinical pharmacists, with their expertise in pharmacotherapy and medication management, are invaluable assets in virtual hospital and telehealth environments. They conduct medication reconciliations to ensure accurate medication histories and identify potential drug interactions or discrepancies. Through virtual Medication Therapy Management (MTM) sessions, pharmacists collaborate with patients and healthcare providers to optimize medication regimens, address medication-related concerns, and promote adherence to treatment plans. Additionally, clinical pharmacists play a crucial role in monitoring therapeutic outcomes, evaluating medication adherence, and facilitating transitions of care, thereby reducing the risk of medication errors and hospital readmissions.^{14,15}

Patient Education and Empowerment

Empowering patients with knowledge about their medications and health conditions is essential for achieving the best treatment outcomes. In virtual hospital and telehealth settings, clinical pharmacists play a crucial role as educators, offering patients comprehensive medication information, guidance on proper medication administration, insights on medication reimbursements, and advice on lifestyle adjustments. Leveraging interactive virtual platforms, pharmacists engage patients in shared decision-making, promote strategies for medication adherence, and address any misconceptions or concerns about

Table 1: Roles and Contributions of Clinical Pharmacists in Virtual Hospital and Telehealth Settings.

Roles	Description	Patient Care Impact
Medication Reconciliation	Reviewing and ensuring accuracy of patient medication lists during transitions of care.	Reduces medication errors, improves safety.
Drug Interaction Management	Identifying and managing potential drug interactions through Electronic Health Records (EHRs).	Enhances treatment safety, minimises adverse drug reactions.
Therapeutic Monitoring	Regularly monitoring therapeutic drug levels and adjusting dosages as necessary.	Optimises efficacy, prevents toxicity.
Patient Education and Counselling	Providing remote counselling on medication use, side effects, and lifestyle recommendations.	Improves adherence, empowers patient self-management.
Chronic Disease Management	Supporting patients with chronic conditions through tailored pharmacotherapy plans.	Improves disease control, reduces hospital readmissions.
Adverse Event Reporting	Monitoring and reporting adverse drug reactions to improve drug safety and regulatory compliance.	Enhances pharmacovigilance, contributes to public health data.
Interdisciplinary Collaboration	Coordinating with healthcare providers via telehealth platforms for holistic care.	Promotes cohesive care, aligns treatment goals.
Cost-Effective Therapy Recommendations	Offering cost-effective alternatives to prescribed medications where applicable.	Reduces financial burden on patients, supports adherence.

medications. By fostering a collaborative relationship between patients and pharmacists, clinical pharmacists empower patients to actively engage in their healthcare journey, thereby enhancing medication adherence and self-management skills. Expanding these services has the potential to significantly improve patient care.¹⁶

Quality Improvement and Cost-Effectiveness

As the demand for specialized medication knowledge grows, the pharmacy profession continues to evolve. While preparing and dispensing medications are foundational aspects of pharmacy care, providing patient-centered, outcome-focused care is paramount. Pharmacists possess a deep understanding of medication mechanisms and are skilled in addressing complexities that may arise from intricate medication regimens. The integration of clinical pharmacists into virtual hospitals and telehealth initiatives contributes to enhancing quality and cost-effectiveness within healthcare systems. Pharmacists play a pivotal role in medication utilization review, formulary management, and implementing cost containment strategies, thus optimizing resource allocation and promoting evidence-based prescribing practices. Through medication reconciliation processes and optimization interventions, pharmacists mitigate the risks associated with medication errors, adverse drug events, and unnecessary healthcare utilization, ultimately leading to improved patient outcomes and reduced healthcare costs. The inclusion of a clinical pharmacist conducting telemedicine at clinics has shown positive impacts on patient care.^{17,18}

Table 1 summarizes how clinical pharmacists contribute to various aspects of patient care in virtual and telehealth environments, helping to maximise safety, adherence, and overall outcomes.

CHALLENGES AND FUTURE DIRECTIONS

Despite the numerous benefits of integrating clinical pharmacists into virtual hospital and telehealth settings, several challenges exist, including regulatory constraints, reimbursement barriers, and technological limitations. Addressing these challenges requires collaborative efforts among healthcare stakeholders to establish standardized practice guidelines, expand reimbursement mechanisms for pharmacist-provided services, and enhance interoperability of telehealth platforms. To obtain a high level of mediated presence, the virtual environment should be presented in an immersive condition and associated with a contextualized narrative, creating an equilibrium between technological and cognitive elements. Looking ahead, the continued advancement of telecommunication technologies, coupled with ongoing advocacy for the integration of clinical pharmacists, holds promise for further enhancing patient care delivery and optimizing medication management in virtual care environments.^{19,20}

CONCLUSION

In conclusion, clinical pharmacists play a pivotal role in virtual hospital and telehealth settings, contributing to medication management, patient education, quality improvement, and cost-effectiveness within healthcare systems. By harnessing their expertise in pharmacotherapy and patient-centred care, pharmacists enhance interdisciplinary collaboration, promote medication safety, and empower patients to achieve optimal treatment outcomes. As virtual care continues to evolve, the integration of clinical pharmacists will remain essential in maximizing the delivery of comprehensive and patient-centred healthcare services.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

CME: Continuing Medical Education; **MIME:** Multipurpose Internet Mail Extensions; **MTM:** Medication Therapy Management; **EHR:** Electronic Health Records.

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