A Recent Review on Current Challenges and Development of Telepharmacy

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Abstract- **The purveying of pharmaceutical care through telepharmacy has arose as a important strategy to increase the patient outcome and make healthcare more accessible. The development, techniques, application, benefits, challenges, and potential outcomes of telepharmacy are examined in this review. Telepharmacy includes a wide collection of activities such as remote medication reviews, adherence monitoring, patient counselling, and medication dispensing. Researches shows that telepharmacy underwrites to enhanced medication safety, greater approach to pharmaceutical care especially in undeserved zones. However, there are still issues with technology infrastructure, legal frameworks, and integrating telepharmacy into existing healthcare systems.**

I. INTRODUCTION

The profession of pharmacy is continuously changing to discourse the dynamic needs of patients and the healthcare system. Advanced technologies and techniques that allows pharmacist to provide care are progressively enhancing traditional pharmacy framework which totally depends upon physical interaction with patients. Telepharmacy is a part of telehealth which uses information technology and telecommunication to deliver a comprehensive pharmaceutical service to patients at a distance. The usefulness of medication management could be improved, geographical barriers could be removed, and undeserved people or groups could have easier access to pharmaceutical services. Telepharmacy's important role in balancing permanency of services during the times of social distancing and strain on healthcare system is emphasized by COVID-19 pandemic's substantial acceleration of global implementation. Telepharmacy is expected to become an important part of pharmaceutical care as healthcare systems adapt to a post- pandemic environment. As a result, is it important to fully understand its applications, benefits, challenges and potential outcomes.

- Definition and evolution of Telepharmacy:

Telepharmacy refers to deliver the pharmaceutical services to patients who are unable to physically present at pharmacy through the use of information technology and telecommunications. This advanced approach involves various activities such as;

1) Remote medication order review: Pharmacists carefully review and validate medication orders provided by healthcare professionals to ensure prescriptions are accurate, safe, and tailored to meet each patient's specific health requirements
2) Dispensing and delivery of medication: A pharmacist can manage the dispensing of medications at an inaccessible location. Typically, automated systems or pharmacy technicians are used to make the process easier.
3) Patient education and counselling: pharmacist consult patients via video conference or phonically to offer information on medication use, disease management and adherence approaches.
4) Medication therapy management (MTM): pharmacist conduct wide-ranging assessments of patient medication regimens to spot possible drug-related issues, improve treatment plans, and improve results.
5) Remote patient monitoring: pharmacist tracks patient adherence to medications, monitor therapeutic responses, and identify any side effects or adverse effects, enabling timely adjustments to treatment as essential.(Bashshur et al., 2016; Le et al., 2020)

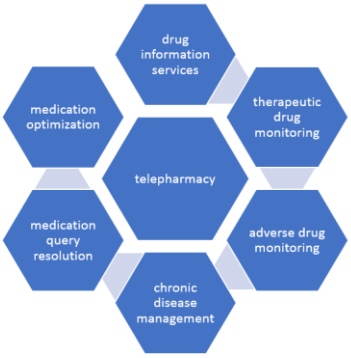

Fig: 1

Evolution of telepharmacy

The Technological developments and changing healthcare requirements have increased the growth of telepharmacy, which has changed the healthcare system. The Telepharmacy was first supposed of as a method to reduce the gap in pharmaceutical care for rural and undeserved areas when it first appeared in the late 20th century. In the beginning era, basic communication approaches like telephone consultations were used to bring pharmacist expertise closer to remote areas.

With the integration of internet-based platforms and regulatory frameworks, the 20th century marked as an essential period. For example, the North Dakota Telepharmacy Project of 2002 established a precedent for state-level legislation by allowing remote pharmacies to function under centralized supervision. Telepharmacy grew to include electronic health record (EHR) interoperability, patient counselling via video conferencing, and verification of medication dispensing.

The advancement in telehealth technologies like high-definition video systems and mobile health applications sped up growth in the 2010s. the adoption of Telepharmacy was further sparked by the COVID-19 pandemic because healthcare systems were encouraged to use it for permanency of care by governing flexibilities like loosening licensing requirements and growing settlement policies.

The Future trajectories highlight AI-driven clinical decision support, drone-assisted medication delivery, and incorporation with Internet of Things (IoT) devices, promising a more patient-centric and unbiased pharmaceutical landscape.(Andy, 2024; Peterson & Anderson, 2004)

Historical context of pre covid and post covid

- Pre covid-19

the implementation telepharmacy dates back to the latter half of the 20th century, when the healthcare systems began investigating the remote care models as a means of reducing inequalities in rural and undeserved areas by basic telecommunications, such as telephone- based medication counselling and faxed based prescriptions, early initiatives focused on overwhelming geographical barrier.

The telepharmacy project of North Dakota which was implemented in 2002, standardized remote pharmacy processes by allowing satellite pharmacies to distribute medications under the supervision of centralized pharmacist. States like Alaska and Texas adopted almost same framework as North Dakota as a result of this model's demonstration of the feasibility of telemedicine.

More advanced utilisation like on- person consultation, remote prescription verification and incorporation with electronic health records (EHRs) were only made possible by broadband internet and video conferencing during 2010s. however, regulatory obstacles like varying imbursement policies and interstate licensing laws kept adoption to a minimum.

In spite of these hurdles, telepharmacy gained traction in decisive areas like chronic disease management and follow-ups after hospital discharges, mostly in the areas having shortage of pharmacists.

- Post covid-19

The incorporation of telepharmacy into healthcare system was enhanced by the covid-19 pandemic from 2020 to the present. Temporary waivers for interstate licensure, improved Medicare reimbursement for telehealth services, and relaxed HIPAA execution for consultations through video conferencing were among the rapid regulatory adaptations imposed by lockdown and social distancing mandates. The changes made by the mandates permitted the pharmacists to conduct virtual medication assessments, manage therapy adherence and deliver Covid-19 testing/vaccination guidance remotely.

Since the pandemic, the telepharmacy has become a crucial component of care delivery. In modern healthcare system, technological tools like smart medication dispenser, secure blockchain system for tracking prescription and other automated tools become standard. Alongside these advancements, healthcare providers are blending traditional in-person care with digital solutions to balance patient care and convenience. The covid-19 pandemic also emphasized telepharmacy's role in public health and emergencies, prompting relationship with pharmacies, policymaker and technology companies to streamline vaccine access and expand delivery of critical treatments during emergencies.(Carylee Gali, 2022; Thomas et al., 2023)

II. TECHNOLOGICAL FOUNDATIONS

- Core tools in telepharmacy: telehealth platforms, E-prescribing systems and remote monitoring devices

Telepharmacy depends on a variety of innovative technologies to deliver effective, safe, and patient focused care. Telehealth platforms, E-prescribing systems, and remote monitoring devices are crucial components of modern pharmaceutical care.

1. Telehealth platforms

It is the core component of telepharmacy. It facilitates the real-time communication between the pharmacist and patients. These platforms improve the virtual consultations, medication therapy management (MTM), and patient education through features like sharing of files, messaging, and video conferencing. Improved video conferencing enables clear communication, while encryption measures security and ensures compliance with protocols such as HIPAA. During the covid-19 pandemic, popular platforms like google meet, zoom for healthcare became crucial as they allowed pharmacists to endure providing care deprived of disruption during lockdown.

2. E-prescribing system

The conversion of hand written prescription with digital systems has modernized the how medications are managed. With this system, doctors can directly send the prescriptions to the pharmacist, minimizing risks like dosing errors or unreadable writing. Tools like Surescript further allows clinicians by sensing potential drug conflicts, authenticating insurance coverage, and deliver immediate access to patient medication history.

These system works as a link to reduce the gaps and irregularities in remote healthcare, allowing pharmacist to authenticate and dispense medications more efficiently even in underserved areas. (Tara Dragert, 2024)

3. Remote monitoring devices

Pharmacist nowadays use remote monitoring tools to detect patients' medication data immediately to deliver them timely care before health deteriorate. For example, wearable devices like fitness bands, wireless glucose monitors and connected pill dispensers let individuals with ongoing health needs such as diabetes and hypertension automatically share updates like blood sugar levels and heart analyses with the pharmacy team. The on-time monitoring helps pharmacist to deliver treatments or instruct patients without necessitating in person visits.

Tools like Medminder and Philips automated dispensers also nudge patients with reminders to direct the medicines reducing missed doses, irregularities and improve steadiness in care.(Obiezu et al., n.d.; Shoji & Onda, 2024)

- Emerging technologies: AI driven management, blockchain for prescription security-

1. AI driven medication management

The innovative medication management tools connect advanced data analysis to support pharmacist to enhance patient care. By evaluating patient details like patient's medical background, existing health conditions and how medications might interact and ongoing health trends- these tools help to give personalized medication delivery for specific patients according to their requirements. For example, tools such as IBM Watson health and Medaware acts as a security net, detecting risks such as dosage errors or harmful side effects in early stage so pharmacist can step in promptly.

The advanced solutions like pillo health take this more offering voice guided tools to make daily medication routines more reliable, while data-driven insights highlight patient who need more closer care due to complex health challenges. Furthermore, virtual assistants and chatbots are extensively used to provide instant answers to common queries about prescription, managing side effects and suggest practical lifestyle routines, making consistent heath management more than ever.(Aggarwal & Madhukar, n.d.)

2. Blockchain for prescription security

By creating tamper-proof, decentralized records of medication transaction, blockchain is transforming prescription security. Transparency and traceability are ensured because each prescription is recorded as a "block" in a secure, immutable chain. This technology eradicates dangers like false prescription, counterfeit medications, or unofficial changes by locking data lastingly once documented.

This system also reorganizes tasks like confirming prescription or processing insurance claims by smart contracts digital agreements that automatically enforces rules without the human interferences. This

helps to cut down interruptions and reduced paperwork. Beyond efficiency, blockchain strengthens patient privacy by letting individual decides who accesses their medication details, ensuring compliance with strict privacy laws like HIPAA in U.S or GDPR in Europe.(A. C. Smith, 2023)

III. TELEPHARMACY AND ITS APPLICATIONS

The Telepharmacy has occurred as a dynamic solution for bringing pharmaceutical care through diverse operational models designed to address changing healthcare needs. These frameworks consist of synchronous, asynchronous, and hybrid approaches, as well as community- and hospital-based systems, each offering unique advantages and challenges tailored to detailed patient populations and settings.

Operational models

- Synchronous / asynchronous / hybrid

1. Synchronous model of telepharmacy

Real time telepharmacy synchronizes pharmacists and patients or healthcare providers through video calls or live chats, for consultations and medication guidance in addressing care requirements like explaining inhaler usage to an asthma patient via live video sessions by a pharmacist is one use case of this model which proves beneficial especially in rural regions with scarce, in person pharmacy services availability.

2. Asynchronous model of telepharmacy

Telepharmacy that operates asynchronously and goes by the name of "store and forward" depends on sending information, like prescriptions or lab results to be reviewed later by a pharmacist. This method is beneficial for tasks that don't require attention such as checking medications consistency or managing diseases. For example a pharmacist can assess a patients drug list. Offer suggestions, to a care provider without needing immediate communication.

3. Hybrid model of telepharmacy

Hybrid telepharmacy is a hybrid approach being a combination of synchronous and asynchronous care, thus ensuring a flexible and holistic care model. As an example, a pharmacist may apply asynchronous approaches to examine a patient's medication history and later recommend synchronous times for customized counselling. This model is becoming more common in integrated healthcare systems, where it helps facilitate efficiency while still focusing on patient engagement.(Angaran, 1999; Sudip Kumar Yadav, 2024)

- Community based/hospital based

1. Community based

In addition, community-based telepharmacy provides pharmaceutical care to patients in an outpatient setting (retail pharmacy, clinic, and rural health center). This model will especially benefit underprivileged populations by providing them access to medication dispensing, educate patients about medication use, and perform medication therapy management (MTM). For example, pharmacy services in rural areas can be restored by community-based models such as the North Dakota Telepharmacy Project.

2. Hospital based

Hospital-based telepharmacy utilizes the foundational principles of telemedicine to remotely support inpatient care by providing pharmacy services to hospitals, offering a more affordable means of staffing hospitals with a sufficient pharmacy presence, particularly where on-site pharmacists are limited. Pharmacists can check medication orders, monitor drugs to be given, and give clinical support to health care teams. This model is critical for small or rural hospitals, which often face staffing shortages. Hospital-based telepharmacy found across US hospitals has been an integral part of the continuity of care for critically ill patients over the course of the COVID-19 pandemic.

Clinical applications

1. Chronic disease management

Long-term illnesses like diabetes, heart disease and hypertension necessitate ongoing monitoring and involvement of the patient. Telepharmacy has been substantial in treating such conditions through providing remote patient care, medication counselling, and following an adherence plan. Telepharmacy is also used in anticoagulation clinics to monitor patients on therapeutic doses of anticoagulant medications (e.g., warfarin) to achieve the best therapeutic result without leading to the more common problems of bleeding or thrombosis. Diabetes care programs use telepharmacy services to

offer tailored insulin management, dietary guidance, and glucose monitoring, resulting in improved patient outcomes—all of which help reduce costs in the long run.

2. Medication therapy management (MTM) and reconciliation

Medication Therapy Management (MTM), which seeks to optimize drug regimens and optimize adverse drug events, is a pillar of telepharmacy. During medication reconciliation, pharmacists perform comprehensive medication reviews, drug interaction checks, and resolve discrepancies using telepharmacy platforms. This is especially useful for patients flowing from one setting of care to another, for example, hospital to home. Some of the benefits of telepharmacy include real-time consultation and continuity of care, which enhances medication adherence and minimizes MTMP.

3. Oncology/ chemotherapy supervision

Telepharmacy has value in oncology especially for verification of chemotherapy regimens. Using telepharmacy, an oncology pharmacist can remotely maintain watch over the chemotherapy order, confirm dosage accuracy and check for any possible negative effects the drugs may cause. This promotes the safe usage of high-risk medications and improves lack safety. Moreover, telepharmacy enables teaching patients about chemotherapy side effects and supportive care, ultimately enhancing the quality of life in cancer patients.(Strand, 2020; Weingart, 2018)

IV. IMPACT OF COVID-19 ON TELEPHARMACY ADOPTION

1. Role in maintaining pharmaceutical care during lockdown

During the COVID-19 pandemic regular healthcare delivery systems suffered disruptions so pharmacies along with healthcare staff adopted telepharmacy methods to provide uninterrupted medical prescriptions and pharmaceutical care services. Medical staff employed telepharmacy solutions to provide remote medication dispensing and consulting services which helped lower patient and staff transmission of the virus. Pharmacists led medicine ration management while providing digital healthcare sessions and teaching patients about COVID-19 medical guidance. The transition demonstrated both care consistency and proved that telepharmacy could establish itself as an operational healthcare approach.

2. Case study: Jordan tele anti-coagulant clinics

Tele-anticoagulation clinics operated by Jordan managed warfarin and other anticoagulant patients throughout the pandemic. Through telepharmacy services the clinics remotely checked patient INR numbers and adjusted medication amounts and delivered therapeutic advice. The healthcare system model permitted chronic disease patients to get their required care while staying protected from COVID-19 risks. Tele-anticoagulation clinics in Jordan proved that telepharmacy effectively manages high-risk medications and delivers better healthcare results across public health emergencies.(Al Ammari et al., 2021)

3. Case study: Pakistan's Guddi baji model

The "Guddi-Baji" telepharmacy model in Pakistan became a community-focused service when medications and healthcare reached underserved populations by female telepharmacists during the pandemic. Female healthcare workers received specialized training to operate telepharmacy platforms which they used to provide medication counselling and support along with health education to outreach underserved communities. Through this initiative rural communities gained better pharmaceutical care services while female members of these communities became stronger through increased empowerment. (Bukhari et al., 2021)

V. BENEFITS AND EFFICACY

1. Patient outcomes: The healthcare results include less hospital stays and better medication following. The implementation of telepharmacy services leads to better patient results through reduced hospital stays and more successful drug usage practices. Pharmacists using remote monitoring and counselling tools detect medication problems in advance through which they prevent hospital admissions by addressing these issues. Patients who need chronic care with conditions like diabetes and hypertension receive better services through scheduled telepharmacy consultations which optimize their medication use and enhance their follow-through with treatments. The use of telepharmacy services leads to important decreases in both hospital readmissions and emergency room visits for patients according to research studies.

2. Economic benefits: Telepharmacy decreases healthcare costs by helping medical facilities reduce expenses along with the costs

patients face. The practice of telepharmacy creates important economic advantages through lower spending on healthcare at both institutional and patient levels. The healthcare facilities experience reduced financial strain because telepharmacy cuts down the number of hospitalizations and emergency room visits. Healthcare facilities achieve significant cost savings through remote medication management services alongside remote consultations which deliver financial relief to patients who reside in remote or underserved territories. Telepharmacy effectively managed anticoagulation through cost-effectiveness analysis which proved to save healthcare systems $1,200 annually for each patient.(Peterson, 2018; Sarasmita et al., 2024; Shane & Gouveia, 2008)

3. Accessibility: Telepharmacy effectively brings clinical services to close the medical service gap that exists between metropolitan areas and countryside regions. The majority of rural populace experience issues because they lack medical personnel along with prolonged commuting requirements for healthcare services. Through telepharmacy patients gain point-to-point contact with pharmacists who provide drug counselling and medicating prescription analysis. Patients residing in rural United States areas now benefit from rapid healthcare services through their participation in telepharmacy programs eliminating the necessity for excessive travel.(Kruse et al., 2017)

VI. CHALLENGES AND LIMITATIONS

Telepharmacy brings many advantages yet its deployment faces different kinds of obstacles to overcome. The general adoption of telepharmacy remains limited by three crucial issues including technological barriers and regulatory and legal hurdles and privacy concerns.

1. Technological barriers: digital literacy and infrastructure gaps

The biggest challenge in telepharmacy practice emerges through technical barriers which most strongly affects those living in underserved rural areas. Inadequate medical digital skills between healthcare providers and patients creates challenges for maximizing telepharmacy system capabilities. Telepharmacy service usage becomes limited because of insufficient infrastructure which includes faulty internet connections and unavailable digital devices. The unequal sharing of telepharmacy advantages happens mainly to physically challenged elderly people and residents with restricted resources.

2. Regulatory and legal hurdles: licensure across regions

Telepharmacy service implementation faces substantial barriers because it demands the resolution of regulatory and legal standards regarding pharmacist license procedures and service boundary environments. Different states require pharmacists to possess separate licenses for each patient location thus creating obstacles for telepharmacy service delivery between states. The service delivery shows inconsistency because each region maintains individual rules regarding prescription dispensing and remote consultation. Telepharmacy requires states to modify their laws so they can create satisfactory mutual agreements to enable proper functioning of the service.

3. Privacy concerns and data security risks

The protection of private patient information remains a major issue for telepharmacy practice because digital patient record exchange between systems creates opportunities for unauthorized data intrusion and breaches. Healthcare providers must maintain comprehensive HIPAA compliance as well as data protection standards for the regulation-prescribed protection of patient trust. The integration of robust cybersecurity approaches creates expenditure and technological limitations that affect small healthcare service providers the most. The growth of telepharmacy depends on immediate resolution of critical issues that will shape its long-term expansion prospects.(Adams & Chopski, 2020; Saeed et al., 2024; Williams & Woodward, 2015)

VII. GLOBAL CASE STUDIES

Region	Case study	Description	Key features	Impact
Asia	WeChat-based "Cloud Pharmacy Care" in China	A telepharmacy model integrated with WeChat, a popular messaging app, enabling patients to consult	Integration with WeChat - Digital prescriptions	Improved access to pharmacy services, especially in rural areas. Enhanced medication

		pharmacists, order medications, and receive digital prescriptions.	- Online consultations	adherence and reduced healthcare costs.(Li & Zhang Y, n.d.; Yen et al., 2022)
Middle east	UAE's Telepharmacy Expansion for Vulnerable Populations	The UAE expanded telepharmacy services to cater to vulnerable groups, including the elderly and chronically ill, by providing remote medication management and consultations.	Focus on vulnerable populations - Remote medication management - Virtual consultations	Increased accessibility for underserved groups. Reduced hospital visits and improved medication adherence among chronic disease patients.(Alawadhi & Alshamsi, 2021)
Europe	Spain's Home-Delivery HIV Medication Programs	Spain implemented home-delivery services for HIV medications, ensuring patients receive their prescriptions discreetly and conveniently, supported by telepharmacy consultations.	- Home delivery of medications - Telepharmacy consultations - Discreet service	Enhanced privacy and convenience for HIV patients. Improved treatment adherence and reduced stigma associated with HIV medication collection.(García & Lopez, n.d.)

VIII. ETHICAL AND LEGAL CONSIDERATIONS

1. Cross-border prescription verification challenges

Telepharmacy activities include border-crossing medication delivery it produces ethical as well as legal uncertainties. The main hurdle in cross-border medication practice emerges from authenticating medical prescriptions issued within a different country than the dispensing location. Each nation maintains distinct standards about the prescription process as well as medication control measurements and professional sanitary endorsement. This can lead to:

- Regulatory misalignment: The laws between different nations can create crucial legal risks because a prescription valid in one nation might not obey the rules of another nation leading to problems for patients and pharmacists.
- Fraud and abuse: Cross-border prescription scenarios face an elevated risk of prescription fraud because fraudulent activities become more common through digital platforms.
- Patient safety concerns: Patient safety faces risks because improper medication verification exposes them to inadequate medicines that could prove dangerous.

2. Liability in remote dispensing errors

Remote dispensing of medications introduces unique liability issues. Pharmacists may face legal consequences if errors occur during the telepharmacy process, such as:

- Lack of physical interaction: The lack of physical interaction between patient and dispenser causes pharmacists to overlook essential patient cues which raises the probability of drug-related harm events in patients.
- Incorrect medication or dosage: Remote consultation errors or incorrect interpretation of digital prescriptions will trigger medication dosage mistakes or medication selection mistakes.
- Jurisdictional issues: The establishment of liability and the determination of legal obligations become complicated when telepharmacy staff members operate in different legal jurisdictions since telepharmacy regulations differ significantly between jurisdictions. Telepharmacy providers should establish comprehensive protocols which aim to reduce risks during operations.

i. Enhanced verification processes: double checking prescriptions and patient information to mitigate errors.
ii. Clear documentation: Detailed records for remote consultations along with dispensing decisions must be properly documented through clear documentation standards.

iii. Professional indemnity insurance: Telepharmacy professionals must secure professional indemnity insurance to obtain protection from legal consequences that result from remote drug dispensing mistakes.(American Society of Health-System Pharmacists (ASHP)., 2017; Johnson, 2021; J. Smith & Brown. L, 2020)

IX. FUTURE DIRECTIONS

1. Integration with AI/ML for predictive medication management

Telepharmacy gets revolutionized through AI and ML technologies which provide predictive capabilities for medication treatment. The technologies analyse large patient datasets for the following purposes:

- Personalized interventions can be delivered to patients whose adherence risk analysis shows non-compliance.
- The system should provide recommended drug therapy prescriptions that combine medical records with patient DNA data alongside live health information.
- The system permits notifications of upcoming drug interactions or contraindications to help prevent adverse events.
- The system helps pharmacists make well-informed choices when giving teleconsultations through access to data-driven information.

AI/ML within telepharmacy systems enables better patient health results alongside lower healthcare expenses and more efficient pharmacy administration procedures. Thirty-eight percent of hospital patients receive medications from pharmacists through telepharmacy platforms. Yet data secrecy and algorithmic errors as well as testing requirements must be countered.(Patel. V, 2022)

2. Policy recommendations for standardized Telepharmacy Frameworks

Standardized frameworks must exist for telepharmacy to deliver safe effective implementation. Key policy recommendations include:

- Standard licensing norms for pharmacists practicing telepharmacy should be synchronized throughout all regions of jurisdiction.
- The organization should develop standards which ensure patient information protection according to GDPR and HIPAA.
- Interoperable standards should be implemented to enable communication system exchange between telepharmacy programs and other healthcare information networks.
- Ethical standards should be established for AI/ML use in telepharmacy to provide transparency together with fairness and accountability for all operations.

Telepharmacy services gain trust from patients when standardized frameworks are implemented for patient care access equity.

3. Research gaps: Long-term efficacy studies and cost-benefit analyses

Telepharmacy demonstrates beneficial results yet scholars need to address multiple research gaps to completely understand its operational effects.

- Telepharmacy interventions lack sufficient proof of their extended impact because longitudinal studies evaluate their effects on chronic disease patient care and beyond.
- Health services and patient financing require additional extensive research to establish proper evaluations of telepharmacy economic effects.
- Research that examines patient opinions about telepharmacy systems and satisfaction rates with services is fundamental to develop better service delivery methods.
- Telepharmacy research must study its ability to remove health care access differences which affect rural underserved populations.(Alotaibi & Federico, 2017; Snoswell et al., 2023)

X. METHODOLOGICAL APPROACHES IN TELEPHARMACY RESEARCH

1. Systematic reviews vs narrative reviews

Aspects	Narrative review	Systematic review
Purpose	To synthesize evidence from multiple studies using a structured and reproducible methodology.	To provide a broad overview of a topic, often based on the author's expertise and interpretation.

Methodology	Follows a predefined protocol, including clear inclusion/exclusion criteria and rigorous data extraction.	Less structured; focuses on summarizing and interpreting existing literature without strict guidelines.
Bias control	Minimizes bias through transparent and replicable processes.	More susceptible to bias due to subjective interpretation and lack of systematic methods.
Outcome	Provides high-quality evidence for decision-making, often used in clinical guidelines.	Offers a comprehensive perspective on a topic, useful for identifying trends and generating hypotheses.
Examples in telepharmacy	A systematic review analyzing the effectiveness of telepharmacy in improving medication adherence.	A narrative review discussing the evolution of telepharmacy and its potential future applications.

2. Metrics for evaluating service quality

Telepharmacy service quality evaluation serves as an essential task for preserving both safety and effectiveness in these services. Key metrics include:

- The evaluation of patient satisfaction relies on survey instruments and feedback instruments to assess how patients experience telepharmacy service usability together with accessibility. Complete patient satisfaction demonstrates that telepharmacy services fulfill the needs and expectations of patients.
- Error tracking for medications which includes incorrect dosages or dispensing errors enables the assessment of telepharmacy system safety and accuracy. Lower numbers of errors indicate superior quality control measures in place.
- The evaluation of adherence rates helps answer how well patients stick to their medications through telepharmacy services reveals their operational effectiveness.
- Telepharmacy service accessibility metrics enable the assessment of healthcare delivery in underserved geographic regions to measure their influence on equity of access to medical service.

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