Methods for telepharmacy evaluation – A systematic review

Dragiša Obradović[1][*][†], Jovana Ilkić[1], Valentina Marinković[1]

[1]University of Belgrade – Faculty of Pharmacy, Department of Social Pharmacy and Pharmaceutical Legislation, Vojvode Stepe 450, Belgrade, Serbia

†PhD student at the University of Belgrade – Faculty of Pharmacy, Vojvode Stepe 450, 11221 Belgrade, Serbia

*Corresponding author: Dragiša Obradović, e-mail: dragisa.obradovic@hotmail.com

Abstract

The purpose of this systematic review was to analyze and summarize telepharmacy evaluation methods. A systematic review of articles was conducted in accordance with the PRISMA guidelines, using proper inclusion criteria. After the initial keyword search, duplicate check and screening for titles and abstracts, 22 papers entered the next phase, which was deep analysis. Most of the studies included in the in-depth analysis were classified as retrospective and were mainly focused on drug dispensing and pharmacotherapeutics monitoring and management. According to the Donabedian model, in 16 cases researchers analyzed processes, while 9 times the focus was set on the outcome. Using the ECHO model, it was found that 13 analyses were focused on clinical outcomes, 11 on humanistic, while economic outcome issues were explored in 2 papers. Risk of bias assessment showed that the highest risk of bias came from attrition bias. There are no unique recommendations on how telepharmacy evaluation should be performed. Interestingly, ECHO telepharmacy evaluation marginalized economic outcome issues, even though these outcomes are often a decision factor when it comes to the implementation. Our results confirm that stronger study designs and more rigorous evaluation methods are recognized as necessary so that new trends could be identified.

Key words: telepharmacy, evaluation, pharmacy service, systematic review

Introduction

Telepharmacy is a digital health method used in pharmacy practice where pharmacists make use of communication technologies to provide patient-care services or oversee pharmacy operations. Its utilization especially increased during the COVID-19 pandemic, and it has demonstrated the potential to benefit the healthcare system (1). However, due to the potential for high risk of bias in research surrounding telepharmacy, it is hard to reach definitive conclusions about telepharmacy outcomes, and a need for stronger study designs and more rigorous evaluation methods is being recognized across available literature (2). Besides evaluation, establishing monitoring processes and capturing progress over time is essential to ensure that efforts and services are effective. Digital health is an area for which either suitable internationally accepted monitoring measures or adequate data are currently lacking, and overcoming this would require continuous data collection in order to compare and measure key performance indicators against set goals and expectations, as well as to further steer policy decisions and investments (3). Despite the widespread use of technological solutions to facilitate pharmacy care delivery, research exploring the actual use and consequences of such solutions in pharmaceutical care is still very limited (4). Since healthcare digitalization, including pharmacy digitalization, proliferated during the pandemic, when most research was concentrated on opportunities coming with digital solutions, the possibility that detailed evaluation and monitoring of digital tools and processes was put aside remained present (5). Given the speed of digital transformation, keeping up in terms of evaluation and monitoring is still challenging.

The objective of this systematic review is to explore the evaluation and monitoring methods and metrics used to assess telepharmacy models and services, as well as to identify any new trends that have emerged in comparison to similar studies from the past few years.

Methods

Search strategy

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (6). PubMed (MEDLINE) research database was searched from 7 December 2023 until 17 December 2023.

The keywords used for the database search in this study were *telepharmacy*, *evaluation* and *monitoring*, in the following way: (telepharmacy) AND ((evaluation) OR (monitoring)).

Ethical approval was waived because this study did not involve human subjects and only collected and analyzed data from public databases.

Selection criteria

The inclusion criteria of this systematic review were: (a) original research articles; (b) interventions involved any form of telepharmacy (e.g. Internet-based system, video-conferencing, telephone); (c) telepharmacy model/services were evaluated and/or monitored; (d) evaluation/monitoring method and parameters were outlined; (e) papers were published after 1st January 2013. Non-English publications, studies lacking evaluation/monitoring metrics for telepharmacy service assessment, as well as systematic and scoping reviews, were excluded.

Study selection and data extraction

Two independent reviewers performed the literature search to identify eligible studies. In case of uncertainty regarding eligibility, a third reviewer was consulted. The following information was extracted from studies that met the eligibility criteria: article title, name of the first author and study reference, study type, study (sample) size (N of participants, performed procedures, surveys – depending on how this was defined in the assessed articles), telepharmacy service/model which was evaluated/monitored (definition of the evaluated service), evaluation/monitoring method, metrics, parameters and indicators described and used for evaluation (including classification of indicators according to the Donabedian model – structure, process and outcome (7)), as well as study outcomes (including what was reported as the evaluated outcome in the assessed research papers, whether the outcomes were positive, negative or neutral, and classifying outcomes per the ECHO model, i.e. based on whether the outcomes were economic, clinical or humanistic (8)).

Risk of bias

A tool recommended by Cochrane was used to assess the risk of bias in each included study (9). The assessment was also performed by two independent reviewers, and a third reviewer was consulted for any uncertainties. The tool helped to grade the studies as "low risk," "high risk," or "unclear risk" in five domains: selection bias, performance bias, detection bias, attrition bias, and reporting bias.

Results

The search conducted by using telepharmacy keywords yielded 148 papers. After duplicate check and screening for titles and abstracts, 4 papers were eliminated. From the remaining 144 papers, 22 papers were chosen based on how well they answered the research question in abstracts, and these papers entered the next phase, which was deep analysis. Papers which did not proceed to the next phase were mainly eliminated because those studies estimated views and attitudes about telepharmacy generally reported by pharmacy students or pharmacists, or contained methods which could involve a more subjective point of view, or the paper in its entirety or the full-text article was unavailable in English. Several papers were not open-source papers and those were not taken into consideration. The study selection flow chart is shown in Figure 1.
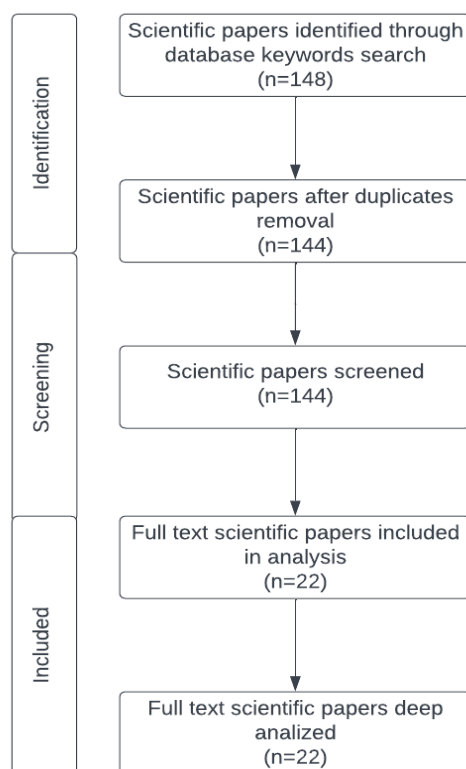
```
Identification   Scientific papers identified through
                 database keywords search
                 (n=148)

                 Scientific papers after duplicates
                 removal
                 (n=144)

Screening        Scientific papers screened
                 (n=144)

Included         Full text scientific papers included
                 in analysis
                 (n=22)

                 Full text scientific papers deep
                 analized
                 (n=22)
```

Figure 1.   **Study selection flowchart**
Slika 1.   **Dijagram toka izbora studija**

The analyzed studies were classified according to their characteristics – type of study, sample size, telepharmacy service, metrics type, indicators by Donabedian, outcomes by ECHO models, bias analysis and other. Of the studies included in the deep dive, 8 studies were classified as retrospective, 4 were surveys and questionnaires, 3 were classified as observational and prospective, 2 were data analyses, and 1 of analyzed studies was classified as a cross-sectional and a longitudinal study. Services or models which the studies provided and explored were mainly focused on drug dispensing (n=7), as well as pharmacotherapeutics monitoring and management (n=6). Pharmacy intervention and consultation were present in 4 studies, transcripts and electronic record reviews were analyzed 3 times, while drug dispensing was a research topic in 2 studies.

The analyzed studies were classified by indicators per Donabedian – of the studies included in the deep dive, in 16 cases researchers analyzed processes, while 9 times the focus was on the outcome. Positive outcomes were found in almost all of the studies (n = 21), while 1 study had a neutral research outcome.

Using the ECHO model, it was found that 13 analyses focused on clinical outcomes, 11 on humanistic, while economic outcome questions were explored in only two papers. Additionally, in the two studies there were no ECHO models present. The characteristics of all studies in the systematic review are presented in Table I. Studies were also assigned their study number, and they are presented with the study name and reference in Table I.

Table I   Study design and characteristics

Tabela I   Dizajn studija i njihove karakteristike

Study number	Reference	Study
1	Villanueva-Bueno et al. 2022.	Implementation and evaluation of a home pharmaceutical care model through Telepharmacy
2	Cigolle et al. 2023.	Telepharmacy Model of Care
3	Pathak et al. 2022.	Telepharmacy and Quality of Medication Use in Rural Areas, 2013-2019
4	Margusino et al. 2021.	Outpatients' Opinion And Experience Regarding Telepharmacy During The COVID-19 Pandemic: The Enopex Project
5	Mercadal-Orfila et al. 2022.	Outpatient pharmaceutical care satisfaction survey through Telepharmacy during COVID-19 pandemic in Spain
6	Mohamed Ibrahim et al. 2020.	Evaluation of Telepharmacy Services in Light of COVID-19
7	García-Queiruga et al. 2022.	Evaluation of a Telemedicine pharmaceutical care program for coordination patient's transfer between hospital and primary care, using Telepharmacy
8	Jirjees et al. 2022.	The rise of telepharmacy services during the COVID-19 pandemic: A comprehensive assessment of services in the United Arab Emirates
9	Stockton et al. 2019.	Evaluation of Outcomes of a Pharmacist-Run, Outpatient Insulin Titration Telepharmacy Service
10	Lertsinudom et al. 2023.	Telepharmacy services to support patients with epilepsy in Thailand: A descriptive study
11	Bruns et al. 2022.	Controlling Blood Pressure During a Pandemic: The Impact of Telepharmacy for Primary Care Patients
12	Ho et al. 2014.	Chat-based telepharmacy in Denmark: design and early results
13	Sankaranarayanan et al. 2014.	A retrospective evaluation of remote pharmacist interventions in a telepharmacy service model using a conceptual framework
14	Taylor et al. 2018.	Integrating Innovative Telehealth Solutions into an Interprofessional Team-Delivered Chronic Care Management Pilot Program
15	Schneider et al. 2013.	Evaluating the impact of telepharmacy
16	Ryan et al. 2022.	An evaluation of telephone versus videoconference consults for pre-treatment medication history taking by cancer pharmacists
17	Farzadeh et al. 2022.	Impact of a Clinical Pharmacist Telehealth Service in a Geriatrics Assessment Clinic
18	Morillo-Verdugo et al. 2023.	Evaluation of Patient Experience with a Model of Coordinated Telematic Pharmaceutical Care Between Hospital and Rural Pharmacies in Spain: A Proof of Concept
19	Stading et al. 2014.	Initial Experience of Clinical Pharmacy Services Delivered by Computer Communication via Cisco Jabber Video in a US Veterans Administration Medical Center
20	Livet et al. 2021.	The pharmacist as a public health resource: Expanding telepharmacy services to address social determinants of health during the COVID-19 pandemic
21	Amkreutz et al. 2020.	Medication safety in a German telemedicine center: Implementation of a telepharmaceutical expert consultation in addition to existing tele-intensive care unit services
22	Wise et al. 2022.	Australian hospital outpatient pharmacies: service adaptations during the 2020 national coronavirus disease 2019 lockdown

Study number	Study type	Sample/size	Telepharmacy Service/Model (type)	Evaluation (interventional or non-interventional, period, etc.)	Metrics	Indicators (Donabedian)	Outcome	Outcome (+, - or neutral)	Outcome (ECHO)
1	Observational descriptive study	2,737 patients, 7,758 telepharmacy consultations, 1,230 consultations performed via apps.	Pharmacotherapeutic monitoring – Consultations	Retrospective assessment of the pharmaceutical care model	Indicators of activity, safety, adherence and perceived quality	Outcome	The new pharmaceutical care model increases patient safety and improves treatment adherence, with a high perceived quality	+	Humanistic, clinical
2	Retrospective medical record review / abstraction analysis	60 US veterans	Comprehensive medication review and deprescribing	Descriptive analysis of participant characteristics (n = 60), telemedicine encounters (n = 58), and telepharmacy model findings (n = 58) were performed	The numbers and types of telepharmacy interventions, recommendation on medication list accuracy; safety of medications and their combinations; older adults' cognition, health literacy, and physical abilities and impairments in self-managing medications; and caregivers' ability to compensate for those impairments.	Process	The telemedicine-based and pharmacist/pharmacy technician-delivered model was a feasible method for addressing comprehensive medication review and deprescribing	+	Clinical
3	Telepharmacy dispensing data analysis	more than 150,000 dispensing records for 10,923 patients	Drug Dispensing	Cross-sectional study used retrospective data from the dispensing records of 3 pairs of telepharmacies and the traditional pharmacies that supported them.	adherence for non-insulin diabetes medications, renin-angiotensin system antagonists, and statins, as well as inappropriate use of high-risk medications in older adults and statin use in persons with diabetes	Process	Quality of medication use at telepharmacies that serve rural areas was no worse than at traditional pharmacies.	+	Clinical
4	Cross-sectional observational study	9,442 interviews from 81 hospitals	medication delivery/remote dispensing & pharmacotherapeutic follow-up	24-item questionnaire	Patient satisfaction	Outcome	Patients have shown high satisfaction with telepharmacy and the ENOPEX questionnaire is a tool with sufficient validity and reliability to be used in the evaluation of the care that patients receive through telepharmacy.	+	Humanistic
5	Survey analysis	8,079 interviews	medication delivery / remote dispensing, pharmacotherapeutic follow-up	Four multilevel regressions were performed to evaluate the differences between Spanish regions on the most relevant variables of the study	Patient satisfaction	Outcome	Patients were satisfied with telemedicine pharmaceutical care, through telepharmacy services during the COVID-19 pandemic, being mostly in favor of maintaining these services to avoid travels	+	Humanistic
6	Prospective study using disguised direct observation	52 community pharmacies	dispensing, pharmacist interventions	Disguised direct observation to collect data related to pharmacist interventions and dispensing errors across pharmacies with and without telepharmacy services. Multivariable logistic regression was used as a tool to predict factors associated with effective telepharmacy.	Number of pharmacist recommendations related to COVID-19 at pharmacies with telepharmacy versus those without remote services and rates of medication dispensing errors (MDEs)	Process	Telepharmacy can be used as a tool to reduce the burden on the health care system and improve drug dispensing safety in community pharmacies	+	Clinical

7	Telepharmacy implementation and evaluation – questionnaires and record analysis	51 patients, 458 consultations	Telepharmacy Hospital Pharmacy / Primary Care Pharmacy Coordination Program & Electronic cross-consultation program	Medication adherence was evaluated using dispensing records. Results were assessed based on a quality questionnaire. Pharmacist evaluation was performed using a satisfaction questionnaire. The economic impact of the programs was assessed from patients' perspective from the estimated 1-year avoided direct costs of traveling from home to the hospital. Web based cross-consultation system was used.	Medication adherence, perceived quality and satisfaction, and economic impact	Process, Outcome	The telemedicine programs enabled coordination of drug therapy monitoring between the hospital and the primary care pharmacy. Patients and professionals reported a high level of satisfaction with the telepharmacy.	+	Humanistic, clinical, economic
8	Cross-sectional study	391 surveys	Telehealth prescribing and product dispensing	Self-administered questionnaire that was distributed to licensed community pharmacists. The evaluation of services was done for three periods: before, during and after lockdown.	Pharmacist satisfaction and experience using telepharmacy	Process	Despite the occurrence of several financial and technical problems, it appeared less frequently in pharmacy chains with a large number of pharmacists when it comes to telehealth prescribing.	+	Humanistic
9	Retrospective chart review	67 patients	Outpatient insulin titration telepharmacy service	Telepharmacy group compared with the diabetes clinic group and the primary care group	A1c levels and change, glucose control	Process	Integration of the clinical pharmacy services for insulin titration positively affected patients' degree of glucose control.	+	Clinical
10	Prospective descriptive study	80 patients	Telepharmacy care services for patients with epilepsy	Descriptive statistics were used to determine patients' demographics and outcomes. The cost-saving by the telepharmacy services from the patients' perspective was calculated by comparing the annual cost of the telepharmacy service with usual care.	Patient satisfaction, DRPs, adherence, identified problems and consequent interventions, costs and savings	Outcome	Telepharmacy services are likely to improve patient outcomes, detect DRPs, and effectively provide cost-savings	+ (non-negative)	Clinical, economic
11	Retrospective single-center cohort study	77 patients	Blood pressure management	The study compared in-person pharmacist visits and telepharmacy visits in primary care patients with hypertension via electronic chart review.	Number of patients with controlled blood pressure based on a blood pressure goal of less than or equal to some goal following telepharmacy visit vs in-person visit. Medication adherence, pharmacist intervention, incidence of antihypertensive side-effects.	Outcome	Telepharmacy visits resulted in a nonsignificant change in blood pressure control when compared to in-person visits. Results suggest that the utilization of either in-person or telepharmacy strategies benefits the management of hypertension.	+	Clinical
12	Chat transcripts analysis	500 chat transcripts	Transcripts analysis	Content evaluation	Patients' reason for using chat consultations, consultation result, patient satisfaction	Process	Diverse enquiries require professional chat operators with broad experience. Continued monitoring is considered essential.	+	Humanistic - patient satisfaction

13	Retrospective evaluation using a conceptual framework	450,000 prescription, 19,222 remote pharmacist interventions	Analysis of pharmaceutical interventions	Documented remote pharmacist interventions for patients at eight rural hospitals in the Midwestern United States during prospective prescription order review/entry from 2008 to 2011 were extracted from RxFusion(®) database for capturing remote pharmacist-documented intervention data.	Intervention – 8 categories, patient medication management – two categories, and health system-centered medication use process	Process	This framework could enhance the design of electronic data capture and can be used as a quality metric tool for routine real-time evaluations of telepharmacy service models.	Neutral – comparing two methods	No ECHO based outcome
14	A retrospective EHR review	69 patients	Electronic record review	A retrospective EHR review: The telepharmacist conducted a comprehensive medication review (CMR) via video-conferencing technology, providing CCM based on primary diagnosis, current medications and allergies, laboratory results, and previous chart notes.	Telepharmacy intervention number and type. patients' providers acceptance of telepharmacists' recommendations	Process	This telehealth program constituted an added service for patients while simultaneously filling a gap in on-site pharmacist counseling services. Integrating the telepharmacist and registered nurse was crucial to clinical service provision.	+	Clinical and humanistic
15	Longitudinal study	3 community hospitals	Pharmacist intervention review	Comparing with/without intervention	Number of pharmacist interventions and cost savings	Process, outcome	Remote review of medication orders by pharmacists when the hospital pharmacy was closed decreased the number of potential adverse drug events reported and improved job satisfaction.	+	Clinical and humanistic
16	Survey	81 cancer patients consults via videoconference and 105 via telephone	Utilizing telepharmacy in evaluation and comparison regarding completed medication checkup	Survey responses	Successful completion rates of pre-treatment medication history consults conducted by pharmacists. Secondary aims were to examine pharmacist perceptions of the telephone and videoconference consults and explore patient perceptions of videoconference consults.	Process, outcome	A significantly higher completion rate (p < 0.0001) was found for the videoconferencing model, with 94% (76 of 81) completed successfully compared to 72% (76 of 105) of the unscheduled telephone consults. Survey responses revealed that 100% of patients/support people and 82% of pharmacists reported satisfaction with videoconference consults.	+	No ECHO based outcome
17	Retrospective, single-center, non-blinded cohort study	204 tests subjects + 200 control group	Using telepharmacy for detecting DRPs and other determinants and comparing it to the traditional way of counseling	The difference in number of recommendations made by the pharmacist vs medication changes made by the provider	Number of drug-related problems detected by the pharmacist compared with the provider. Secondary outcomes: number of medication history discrepancies, accepted medication-related recommendations, potentially inappropriate medications, deprescribed, and adverse drug reactions detected.	Process	The addition of a clinical pharmacist conducting telepharmacy at a geriatrics assessment clinic had a positive impact on patient care as it related to DRPs, deprescribing PIMs, and optimizing medication adherence.	+	Clinical

18	Prospective cohort study in outpatients receiving telepharmacy	4 hospitals and 29 rural community pharmacies	Patient experience using telepharmacy	Outcomes measured before and after	Patient experience and satisfaction; secondary variables included pharmaceutical care interventions, care coordination and clinical variables	Process	Telepharmacy based on the CMO-PC model, using the "Telemaco" tool, improved patient experience, satisfaction, and offered other advantages over the traditional model, including more pharmaceutical interventions adapted to the needs of each patient.	+	Humanistic
19	Single-center, retrospective review	112 patients	Clinical biomarkers improvement using services in traditional vs telepharmacy mechanism	Before and after interventions	Deviation reduction in HbA1c, reduction in LDL-cholesterol, number of patients	Outcome	This study shows that telepharmacy allows patients to have access to pharmacy services in a rural environment with minimal inconvenience to the patient. This study also suggests that outcomes of disease management are similar to face-to-face visits.	+	Clinical
20	Exploratory study	26 unresolved COVID-prompted SDOH concerns across 66 patients	Telepharmacy usage in detection of social determinants	Through SDOH screening, concerns were addressed by the pharmacist through three types of brief interventions.	COVID-prompted SDOH concerns	Process	These data provide preliminary insights into the expanded role that pharmacists can play to address current population health gaps that can directly impact patients' engagement with their medication regimen and overall health status.	+	Humanistic
21	Observational study	210 DRPs in 103 patients	Telepharmacy usage in detection of DRPs and others	A total of 210 DRPs in 103 patients were identified and discussed.	Number and type of drug related problems identified in a comprehensive medication safety check	Process	Telepharmaceutical consultation as part of tele-ICU services was successfully implemented and can improve medication safety. Telemedicine infrastructure provides the possibility to implement guidelines recommending pharmaceutical service in the ICU in remote hospitals not having access to clinical pharmacists. Thus, quality of care can be improved.	+	Clinical
22	Cross-sectional survey	34 hospitals in Australia	Usage of telepharmacy services during and after COVID pandemic	How many actually used telepharmacy after intervention	Patient counseling, conducted remote medication reconciliation, while eight undertook remote dispensing.	Process	Australian hospital pharmacists adapted face-to-face services, as well as introducing telepharmacy, to ensure the continued provision of pharmaceutical care during COVID-19 lockdowns.	+	Humanistic

Risk of bias assessment results are presented in Table II. The highest risk of bias came from attrition bias, as 4 papers had a high risk of this bias. The risk of all other bias types was assessed to be either low or unclear. When it came to selection bias, including random sequence generation and allocation concealment, the risk of bias was mostly unclear due to most of the studies not stating whether the participants or their care

providers were blinded, and the same applied to blinding of participants and personnel (performance bias). In 14 studies, detection bias appeared to be quite low, while in the remaining ones the risk was unclear due to insufficient information. Reporting bias was low for all except one paper, while no other bias types were detected.

Table II Risk of bias analysis evaluation
Tabela II Evaluacija rizika pristrasnosti

Study	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants & personnel (performance bias)	Blinding of outcome assessment (detection bias): Self-reported outcomes	Blinding of outcome assessment (detection bias): Objective measures	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
1	Unclear	Unclear	Unclear	Low	Low	Low	Low	Low
2	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low	Low
3	Unclear	Unclear	Unclear	Low	Low	Low	Low	Low
4	Unclear	Unclear	Low	Low	Low	Low	Low	Low
5	Unclear	Unclear	Low	Low	Low	Low	Low	Low
6	Unclear	Unclear	Unclear	Low	Low	Low	Low	Low
7	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low	Low
8	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Unclear	Low
9	Low	Unclear	Unclear	Unclear	Unclear	Low	Low	Low
10	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low	Low
11	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low	Low
12	Unclear	Unclear	Low	Low	Low	Low	Low	Low
13	Unclear	Unclear	Unclear	Low	Low	Low	Low	Low
14	Unclear	Unclear	Low	Low	Low	Low	Low	Low
15	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low	Low
16	Low	Low	Low	Unclear	Unclear	High	Low	Low
17	Low	Low	Unclear	Low	Low	High	Low	Low
18	Low	Low	Low	Low	Low	High	Low	Low
19	Unclear	Unclear	Unclear	Low	Low	Low	Low	Low
20	Unclear	Unclear	Unclear	Low	Low	Low	Low	Low
21	Unclear	Unclear	Unclear	Low	Low	High	Low	Low
22	Unclear	Unclear	Unclear	Low	Low	High	Low	Low

Low risk of bias	Unclear risk of bias	High risk of bias

Discussion

Telepharmacy is becoming more and more popular, especially for rural areas, as it has demonstrated the potential to improve clinical, humanistic and economic outcomes, and to improve access to care. As telepharmacy gains popularity, the quality of such services should be maintained, regularly monitored and evaluated. This systematic review explored studies where telepharmacy evaluation was the key research focus.

Villanueva-Bueno et al. (10) conducted research on indicators of activity, safety, adherence and perceived quality of telepharmacy service. The study reports that the new pharmaceutical care model increases patient safety and improves treatment adherence, with a high perceived level of quality. In Margusino-Framiñán et al.'s (11) cross-sectional observation study on medication delivery, remote dispensing and pharmacotherapeutic follow-up, a total of 8072 interviews were administered to patients from 81 hospitals. Patients showed high satisfaction with telepharmacy, and the ENOPEX questionnaire was found to be a tool with sufficient validity and reliability to be used in the evaluation of the care that patients receive through telepharmacy. Mercadal-Orfila et al. (12) confirm high levels of patient satisfaction when it comes to telepharmacy usage during the COVID-19 pandemic, especially in favor of avoiding unnecessary travel.

Even though a lot of scientific research on telepharmacy reports a high quality of service and level of satisfaction based on customer experience, this systematic review found that there is no official valid tool which could be used for measuring experience and satisfaction in all telepharmacy evaluations. The introduction of standardized evaluation methods is therefore needed.

The clinical utility of telepharmacy, as well as its economic advantage over classical healthcare models, are among the key focus areas when it comes to the implementation of this service. In a study conducted in Thailand by Lertsinudom et al. (13), a prospective descriptive study was conducted on 80 epilepsy patients, with the key focus on drug-related problems (DRPs), adherence and costs and savings, comparing telepharmacy and usual-care model. Telepharmacy services were found to be likely to improve patient outcomes, detect more DRPs, and effectively provide cost savings.

Shireen Farzadeh et al.'s (14) study on the impact of a clinical pharmacist telehealth service in a geriatrics clinic showed that the introduction of a clinical pharmacist conducting telepharmacy at a geriatrics assessment clinic had a positive impact on patient care in terms of DRPs, deprescribing PIMs, and optimizing medication adherence. Namely, 204 test subjects were tested and compared to 200 control subjects. Telepharmacy was used in order to detect drug-related problems (DRPs), medication discrepancies, as well as adverse-drug reactions (ADRs). In the intervention/pharmacist (n = 204) vs control / no pharmacist (n = 200) groups, the number of DRPs was significantly greater (338 vs 218; P = 0.031) and driven by unnecessary drug therapies, doses too high, ADRs, and drug-drug interactions (230 vs 147, P = 0.045; 37 vs 7, P = 0.010; 36 vs 17, P = 0.023; 32 vs 1, P = 0.003, respectively). The difference in the number of recommendations made by the pharmacist vs medication changes made by the

provider was significant: 457 vs 319, P < 0.001, respectively. This shows how significant telepharmacy service can be in a clinical environment, and why clinical evaluation of telepharmacy is important. In almost all studies observed in this research, using telepharmacy had a positive effect on different stakeholders, including patients, clinicians and pharmacists. Several studies compared the same clinical outcomes, but using pre- and post-intervention effects.

An identified gap in research and outcome selection concerns the economic potential and evaluation of telepharmacy service, as this was by far the least explored outcome according to the ECHO model, and sometimes this outcome is the key driving force for service implementation. This review identified 148 papers and provided an in-depth analysis of 22 (2) (10-29) of those studies, which gave important insights into economic, humanistic, and especially clinical improvements associated with the routine use of telepharmacy. Only two scientific studies focused on the issues of economic feasibility. A limitation of this study is that it only included research indexed in the PubMed database.

Conclusion

There are various telepharmacy evaluation methods, and they can explore different areas and outcomes. The absence of a general evaluation method suggests that it should be developed, as evaluation of telepharmacy service would thus be made more consistent and comprehensive. We suggest that more economic evaluation methods and tools should be involved and used in telepharmacy service evaluation, as this is one of the most important determinants when it comes to large-scale telepharmacy implementation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author contributions

DO – Conceptualization, Data Curation, Formal analysis, Methodology, Recources, Writing – original draft; JI – Conceptualization, Data Curation, Formal analysis, Methodology, Recourses, Writing – original draft; VM – Conceptualization, Methodology, Project administration, Recourses, Supervision, Validation, Writing – review & editing.

References

1. Unni EJ, Patel K, Beazer IR, Hung M. Telepharmacy during COVID-19: A Scoping Review. Pharmacy (Basel). 2021;9(4):183. doi: 10.3390/pharmacy9040183.

2. Pathak S, Blanchard CM, Moreton E, Urick BY. A Systematic Review of the Effect of Telepharmacy Services in the Community Pharmacy Setting on Care Quality and Patient Safety. J Health Care Poor Underserved. 2021;32(2):737–50. doi: 10.1353/hpu.2021.0102.

3. World Health Organization. Monitoring the implementation of digital health: an overview of selected national and international methodologies [Internet]. 2022 [cited 2024 Feb 25]. Available from: https://www.who.int/europe/publications/i/item/WHO-EURO-2022-5985-45750-65816.

4. Lobo Borba HH, Woronowicz Carvalho DM. Impact of the Fourth Industrial Revolution on clinical pharmaceutical services: A scoping review. Res Social Adm Pharm. 2023;19(2):235–42. doi: 10.1016/j.sapharm.2022.09.008.

5. Wong ZS, Rigby M. Identifying and addressing digital health risks associated with emergency pandemic response: Problem identification, scoping review, and directions toward evidence-based evaluation. Int J Med Inform. 2022;157:104639. doi: 10.1016/j.ijmedinf.2021.104639.

6. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ. 2021 Mar 29;372:n71.

7. Toussaint-Schoenmakers R, Versluis A, Chavannes N, Talboom-Kamp E, Kasteleyn M. The challenge of integrating eHealth into health care: systematic literature review of the Donabedian model of structure, process, and outcome. J Med Internet Res. 2021 May 10;23(5):e27180.

8. Deng ZJ, Gui L, Chen J, Peng SS, Ding YF, Wei AH. Clinical, economic and humanistic outcomes of medication therapy management services: A systematic review and meta-analysis. Front Pharmacol. 2023 Apr 5;14:1143444.

9. Higgins JPT, Altman DG, Sterne JAC, editors. Chapter 8: Assessing risk of bias in included studies [Internet]. In: Higgins JPT, Green S, editors. Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 [updated March 2011]. The Cochrane Collaboration; 2011 [cited 2024 Feb 25]. Available from: www.cochrane-handbook.org.

10. Villanueva-Bueno C, Collado-Borrell R, Rodríguez-González CG, Escudero-Vilaplana V, Chamorro-de-Vega E, Ais-Larisgoitia A, et al. Implementation and evaluation of a home pharmaceutical care model through Telepharmacy. Farm Hosp. 2022 Oct 30;46(7):36–46.

11. Margusino-Framiñán L, Fernández-Llamazares CM, Negro-Vega E, Tortajada-Goitia B, Lizeaga G, Mercadal-Orfila G, et al. Outpatients' Opinion And Experience Regarding Telepharmacy During The COVID-19 Pandemic: The Enopex Project. J Multidiscip Healthc. 2021 Dec 31;14:3621–32. doi: 10.2147/JMDH.S343528.

12. Mercadal-Orfila G, Lizeaga G, Fernández-Llamazares CM, Tortajada-Goitia B, García Cabrera E, Morillo-Verdugo R, Negro-Vega E. Outpatient pharmaceutical care satisfaction survey through Telepharmacy during COVID-19 pandemic in Spain. Farm Hosp. 2022 Oct 30;46(7):69–85.

13. Lertsinudom S, Tiamkao S, Mungmanitmongkol S, Dilokthornsakul P. Telepharmacy services to support patients with epilepsy in Thailand: A descriptive study. Heliyon. 2023 Feb 1;9(2):e13361. doi: 10.1016/j.heliyon.2023.e13361.

14. Farzadeh S, Noviasky JA, Brangman SA, Yuksel JM. Impact of a Clinical Pharmacist Telehealth Service in a Geriatrics Assessment Clinic. Sr Care Pharm. 2022 Jul 1;37(7):293–303. doi: 10.4140/TCP.n.2022.293.

15. Cigolle C, Phillips K. Telepharmacy Model of Care. Clin Ther. 2023 Oct;45(10):935-40. doi: 10.1016/j.clinthera.2023.08.009. Epub 2023 Sep 27. PMID: 37775470.

16. Mohamed Ibrahim O, Ibrahim RM, Abdel-Qader DH, Al Meslamani AZ, Al Mazrouei N. Evaluation of Telepharmacy Services in Light of COVID-19. Telemed J E Health. 2021 Jun;27(6):649-56. doi: 10.1089/tmj.2020.0283. Epub 2020 Oct 7. PMID: 33030986

17. García-Queiruga M, Feal-Cortizas B, Porta-Sánchez Á, Blasco-Loureiro L, González-Suárez MP, Souto-Moure C, Gutiérrez-Estoa M, Martín-Herranz I. Evaluation of a Telemedicine pharmaceutical care program for coordination patient's transfer between hospital and primary care, using Telepharmacy. Farm Hosp. 2022 Oct 30;46(7):15-23. English. PMID: 36520556

18. Jirjees F, Odeh M, Aloum L, Kharaba Z, Alzoubi KH, Al-Obaidi HJ. The rise of telepharmacy services during the COVID-19 pandemic: A comprehensive assessment of services in the United Arab Emirates. Pharm Pract (Granada). 2022 Apr-Jun;20(2):2634. doi: 10.18549/PharmPract.2022.2.2634. Epub 2022 Apr 1. PMID: 35919806; PMCID: PMC9296093.

19. Bruns BE, Lorenzo-Castro SA, Hale GM. Controlling Blood Pressure During a Pandemic: The Impact of Telepharmacy for Primary Care Patients. J Pharm Pract. 2022 Oct 27:8971900221136629. doi: 10.1177/08971900221136629. Epub ahead of print. PMID: 36300296; PMCID: PMC9606639

20. Ho I, Nielsen L, Jacobsgaard H, Salmasi H, Pottegård A. Chat-based telepharmacy in Denmark: design and early results. Int J Pharm Pract. 2015 Feb;23(1):61-6. doi: 10.1111/ijpp.12109. Epub 2014 Mar 17. PMID: 24635320.

21. Sankaranarayanan J, Murante LJ, Moffett LM. A retrospective evaluation of remote pharmacist interventions in a telepharmacy service model using a conceptual framework. Telemed J E Health. 2014 Oct;20(10):893-901. doi: 10.1089/tmj.2013.0362. Epub 2014 Mar 10. PMID: 24611489; PMCID: PMC4188381

22. Taylor AM, Bingham J, Schussel K, Axon DR, Dickman DJ, Boesen K, Martin R, Warholak TL. Integrating Innovative Telehealth Solutions into an Interprofessional Team-Delivered Chronic Care Management Pilot Program. J Manag Care Spec Pharm. 2018 Aug;24(8):813-8. doi: 10.18553/jmcp.2018.24.8.813. PMID: 30058982; PMCID: PMC10397863.

23. Philip J Schneider, Am J Health Syst Pharm, 2013 Dec 1;70(23):2130-5. doi: 10.2146/ajhp130138

24. Marissa Ryan 1 2 3, Elizabeth C Ward 4 5, Clare L Burns 5 6, Christine Carrington 1 7, Katharine Cuff 8, Mhairi Mackinnon 8, Centaine L Snoswell 2 3 7, J Telemed Telecare. 2022 Dec;28(10):750-6. doi: 10.1177/1357633X221122140.

25. Ramón Morillo-Verdugo 1, Rosa Morillo-Lisa 2, Jaime Espolita-Suarez 3, Olga Delgado-Sanchez 4, J Multidiscip Healthc 2023 Apr 14:16:1037-46. doi: 10.2147/JMDH.S406636. eCollection 2023.

26. Julie A Stading 1 2, Linda Phan 3 4, Andrea Walter 5, Lisa Bilslend 2, Rebecca White 2, Yongyue Qi 1, J Pharm Technol. 2014 Jun;30(3):76-80. doi: 10.1177/8755122513505744. Epub 2013 Oct 1.

27. Melanie Livet 1, Jordana M Levitt 1, Alyssa Lee 1, Jon Easter 1, Explor Res Clin Soc Pharm 2021 Jun 5:2:100032. doi: 10.1016/j.rcsop.2021.100032. eCollection 2021 Jun.

28. Julia Amkreutz 1 2, Rebekka Lenssen 3, Gernot Marx 2, Robert Deisz 2, Albrecht Eisert 1 4, J Telemed Telecare 2020 Jan-Feb;26(1-2):105-12. doi: 10.1177/1357633X18799796. Epub 2018 Sep 25

29. Sarah Wise LLB, MSc, PhD, Matthew J. Coleshill BSc(Hons), PhD, Natalie Taylor BSc(Hons), MSc, PhD, Michelle Le BPharm, Deborah Debono RN, BA(Hons), PhD, Richard O. Day MBBS(Hons), MD, FRACP, Terry Melocco BPharm, Melissa T. Baysari BPsych, PhD, Tracey-Lea Laba BPharm, PhD, Jane E. Carland BMedSc(Hons), PhD

Metode za evaluaciju usluge telefarmacije – sistemski pregled radova

Dragiša Obradović[1*†], Jovana Ilkić[1], Valentina Marinković[1]

[1]Univerzitet u Beogradu – Farmaceutski fakultet, Katedra za socijalnu farmaciju i farmacetusko zakonodavstvo, Vojvode Stepe 450, Beograd, Srbija

[†]Doktorand na Univerzitetu u Beogradu – Farmaceutski fakultet, Vojvode Stepe 450, 11221 Beograd, Srbija

*Autor za korespondenciju: Dragiša Obradović, e-mail: dragisa.obradovic@hotmail.com

Kratak sadržaj

Svrha ovog sistematskog pregleda bila je analiza i sumiranje metoda evaluacije telefarmacije. Sistematski pregled radova sproveden je u skladu sa PRISMA smernicama, uz odgovarajuće kriterijume za uključivanje. Nakon inicijalne pretrage po ključnim rečima, kao i provere duplikata i skrininga naslova i sažetaka, 22 rada su ušla u sledeću fazu dublje analize. Većina studija je klasifikovana kao retrospektivna i uglavnom su bile fokusirane na izdavanje lekova i farmakoterapijsko praćenje i upravljanje lekovima. Prema Donabedijanovom modelu, u 16 slučajeva istraživači su analizirali procese, dok je 9 puta fokus bio postavljen na ishod. Koristeći ECHO model, utvrđeno je da je 13 radova fokusirano na kliničke ishode, 11 na humanističke, dok su pitanja ekonomskog ishoda istražena u 2 rada. Procena rizika od pristrasnosti pokazala je da najveći rizik potiče od pristrasnosti zbog iscrpljivanja. Ne postoje jedinstvene preporuke o tome kako bi trebalo da se uradi evaluacija usluge telefarmacije. Zanimljivo je da je evaluacija telefarmacije ECHO metodom marginalizovala pitanja ekonomskog ishoda, iako su ovi ishodi često faktor odluke kada je u pitanju implementacija ove usluge. Naši rezultati potvrđuju da je prepoznata potreba za jačim dizajnom studija i rigoroznijim metodama evaluacije kako bi se identifikovali novi trendovi.

Ključne reči: telefarmacija, evaluacija, apotekarska usluga, sistematski pregled