

PHARMACISTS KNOWLEDGE, PERCEPTION, AND READINESS FOR TELEPHARMACY IMPLEMENTATION: A SYSTEMATIC REVIEW

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ABSTRACT

Background: Telepharmacy has emerged as the latest approach for remote pharmaceutical services. However, some factors influence the success of this technology, such as pharmacists knowledge, readiness to adopt, and perspectives. **Objective:** This study aims to evaluate the level of knowledge, perception, and readiness to use telepharmacy systems among pharmacists. **Methods:** Articles from PubMed, Google Scholar, and Scopus (November 2023) were reviewed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines in 2022. Inclusion criteria encompassed cross-sectional studies examining knowledge, perception, and readiness to use telepharmacy among pharmacists within the last ten years. The quality of studies was assessed using the Joanna Briggs Institute Critical Appraisal Checklist. **Results:** Eight articles were included in the study, with the largest respondent pool from a study in Vietnam (414) and the smallest from Indonesia (78). All included articles demonstrated good quality with no significant bias. Five studies discussed knowledge levels, with four showing good knowledge (89.74%, 82.67%, 62.3%, 96.83%). Regarding telepharmacy perspectives, two studies had less favorable perspectives. Three studies indicated adequate readiness for telepharmacy implementation (87%, 72%, 63.23%), while one was unprepared (27.74%). **Conclusion:** Most studies show good knowledge, perception, and readiness to implement telepharmacy. There is a need for telepharmacy training programs in pharmacy schools or hospitals.

Keywords: Telepharmacy; Knowledge; Perception; Readiness to Use; Pharmacists

INTRODUCTION

In the current era, telepharmacy has become a part of technology-based medical services^[1]. Telepharmacy is a concept of pharmaceutical services in digital form, allowing it to reach communities living far from healthcare centers^[2-5]. Telepharmacy has significantly increased across healthcare systems in many countries^[6]. This increase was driven by the COVID-19 pandemic that swept across nations, forcing some services to transform into online platforms^[6,7].

Telepharmacy will likely continue growing as it allows for efficient resource allocation and access to more patients^[8,9].

The implementation of a telepharmacy system poses a challenge for pharmacists accustomed to conventional work, as it requires adapting to new technology, remote communication skills, and patient data protection^[10]. Moreover, telepharmacy can only be accessed by pharmacists^[11,12]. Additionally, pharmacists' perspectives on telepharmacy will help identify positive

aspects and potential barriers to integrating this technology into daily practice^[13]. Collaboration between the public and private sectors, as well as scientific institutions and universities, is crucial to achieving appropriate results and enhancing the effectiveness of telepharmacy^[14].

The scope of telepharmacy services is vast, including reviewing pharmaceutical product orders, drug distribution, patient counseling and evaluation, monitoring therapeutic drug use, and medication management^[15]. Pharmacists' readiness to adopt telepharmacy should be underpinned by factors such as technological expertise, policy support, and responses to changes in the patient-pharmacist relationship dynamic^[16]. For that reason, it is crucial to understand the level of knowledge, perspectives, and readiness of individuals for telepharmacy to be implemented by every pharmacist.

Knowledge, views, and readiness of pharmacists towards this service in developing countries still need to be better understood. Therefore, studies across various countries are necessary as a means of understanding the technological advancements in the pharmacy profession as an implementation of digitalization efforts to face the technological era. This systematic review aims to examine the extent of pharmacists' knowledge, perspectives, and willingness to use telepharmacy systems in several countries. This research is also expected to enhance the level of communication between patients and pharmacists.

METHODS

1. Study design

This study utilized the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology to review relevant articles^[17].

2. Eligibility criteria

The relevant articles on the research topic were obtained from the PubMed, Google Scholar, and Scopus databases in November 2023. Only eligible relevant articles were included in the study. The keywords used in the search are presented in Table 1.

The inclusion criteria were cross-sectional studies investigating pharmacists' knowledge, perceptions, and readiness towards the utilization of telepharmacy services, studies focused on pharmacist groups or communities, and articles published between 2013 and 2023. The exclusion criteria were types of publications other than journal articles (e.g., books, reviews, and letters); articles not available in full-text and not in English or Indonesian language; and lack of titles related to the abstract or full-text of the article with the research objective.

Table 1. Article Search Keywords

No	Database	Keywords
1	PubMed	“Knowledge AND Telepharmacy” or “Preception AND Telepharmacy” or “Readiness AND Telepharmacy”
2	Google Scholar	“Knowledge AND Perspective AND Readiness AND Telepharmacy”
3	Scopus	“Knowledge AND Telepharmacy” or “Preception AND Telepharmacy” or “Readiness AND Telepharmacy”

3. Data extraction and synthesis

All articles were collected through literature searches, and duplicate articles were removed. Titles and abstracts were independently screened based on certain eligibility criteria. Articles that did not meet the inclusion criteria were excluded from the analysis. Subsequently, the full texts of the

articles were retrieved and evaluated by researchers according to predetermined eligibility criteria. To extract data for our study, we used a form with the following items: year, country, number of respondents, instrument used, study objective, knowledge about telepharmacy, perceptions about telepharmacy, and readiness for telepharmacy implementation.

4. Quality assessment

We are conducting the assessment of this article using the Joanna Briggs Institute Critical Appraisal Checklist for analytical cross-sectional studies^[18]. There are eight questions with four possible answers for each question: Yes (Y), No (N), Unclear (U), or Not/Applicable (NA). The maximum score attainable is "8" if the article meets all the questions in the checklist. Each item is rated as "Y" (one point), "N" (zero points), "U" (zero points), or "NA" (one point). The results of the assessment are presented in Table 2.

RESULTS

1. Study selection

In this study, a total of 510 articles were obtained (40 articles from PubMed, 437 articles from Google Scholar, and 33 articles from Scopus). The process of identifying and selecting articles for the study was based on the PRISMA guidelines, as illustrated in Figure 1. Finally, eight articles were deemed eligible for inclusion in the research.

2. Quality assessment

The quality assessment of the articles is shown in Table II. The results demonstrate that there is no significant bias in these studies, and all the studies included in our research are of high quality.

3. Study characteristic

The characteristics of the studies can be seen in Table III. There are eight articles included in the research, with two articles from Saudi Arabia^[16,19], two articles from Indonesia^[20,24], and one article each from Pakistan^[15], Malaysia^[21], Canada^[22], and Vietnam^[23]. The number of participants in the articles varied, with the largest sample size of 414 people in the study from Vietnam, while the smallest sample size was 78 people in the study from Indonesia. Seven studies used online surveys^[15,16,19,21-24], and only one study used a paper-based questionnaire^[20].

Table 2. Summary of the quality assessment of articles using the JBI Critical Appraisal Checklist

Study/ Question	1	2	3	4	5	6	7	8	Score
2023, Saudi Arabia ^[19]	Y	Y	Y	Y	Y	N	Y	U	6
2023, Indonesia ^[20]	Y	Y	Y	Y	N	N	Y	Y	6
2023, Saudi Arabia ^[16]	Y	Y	U	Y	Y	Y	N	Y	6
2022, Pakistan ^[15]	Y	Y	U	Y	Y	Y	U	Y	6
2023, Malaysia ^[21]	Y	Y	U	Y	Y	Y	Y	Y	7
2022, Canada ^[22]	Y	Y	U	Y	Y	Y	N	Y	6
2022, Vietnam ^[23]	Y	Y	N	Y	Y	Y	N	Y	6
2023, Indonesia ^[24]	Y	Y	Y	Y	N	N	Y	Y	6

Abbreviations: JBI *Joanna Briggs Institute, N *no, Y *yes, U *unclear

4. Pharmacists' knowledge of telepharmacy

Telepharmacy knowledge was investigated from several articles across five countries. Four articles^[16,20,23,24] with questionnaire instruments showed that pharmacists had good knowledge regarding telepharmacy available in their countries, with percentages ranging from 62.3% to

96.83%. However, research in Saudi Arabia, with a sample of 404 respondents working in hospitals, showed a low percentage of knowledge at 43.33%^[19]. This is certainly not in line with other research.

A good level of knowledge about telepharmacy is essential for implementing telepharmacy in practice. These findings reveal that, in general, pharmacists have adequate knowledge about telepharmacy, but there are still populations with low knowledge. Factors such as education, access to technology, and cultural and social influences can affect the level of knowledge.

had more positive perceptions than senior pharmacists regarding the benefits^[21]. Various perspectives on telepharmacy included being able to provide services in emergencies, improving medication adherence, reaching access to drug information in rural areas, saving patients' money and time, and addressing pharmacist shortages. Additionally, there was a perspective that technology seminars should be held for telepharmacy implementation^[24]. Pharmacy schools should include telepharmacy information technology education programs to prepare for future telepharmacy implementation^[16]. Respondents in a Pakistani study suggested that telepharmacy should have regulations and a legal framework so it can be implemented not only during social restrictions but also continuously^[15]. A Canadian study had a similar perspective, with most respondents (72.2%) believing telepharmacy enhances clinical practice, and they felt comfortable managing minor illnesses using telepharmacy (80.4%)^[22]. This was confirmed by Dat *et al.*, who showed positive perceptions regarding the use of telepharmacy regarding attitudes and behaviors^[23].

However, research on hospital pharmacists in Saudi Arabia showed less favorable perceptions. Respondents disagreed that telepharmacy could improve medication adherence and save patients money and time. They felt telepharmacy increased the responsibilities of pharmacists. Most pharmacists were reluctant to share personal information during telepharmacy services as they perceived it as less effective for monitoring therapeutic drugs in rural areas. Thus, the perception that telepharmacy can overcome pharmacist shortages was low (33.33%).

In general, pharmacists' perceptions of telepharmacy tended to be positive, especially regarding the benefits of

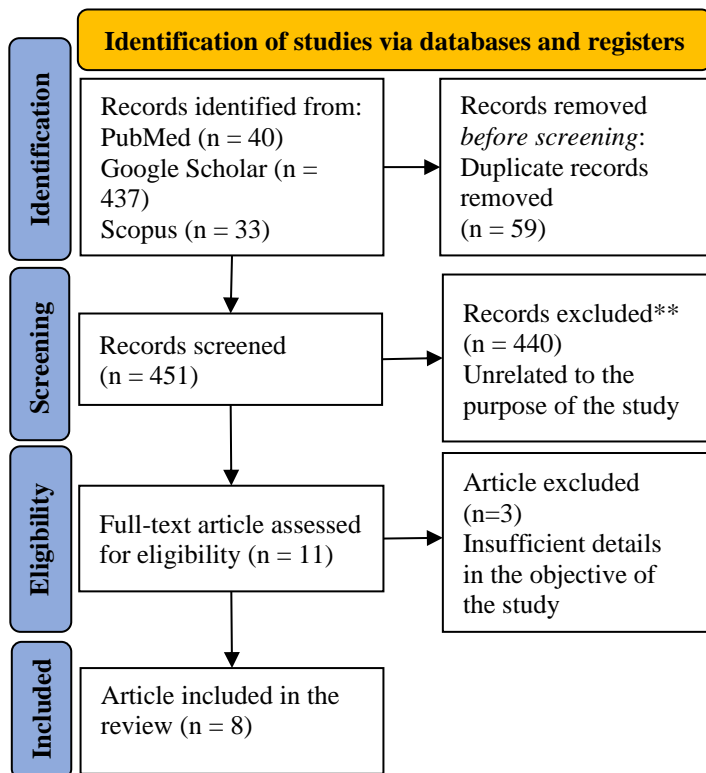


Figure 1. Flowchart of the study selection

5. Pharmacists' perception of telepharmacy

Overall, pharmacists' perceptions of telepharmacy as shown in Table II were positive but varied. Perception is measured using a questionnaire instrument. Research in Malaysia indicated that younger pharmacists

improving medication adherence, saving time and costs, and expanding healthcare access in remote areas. Several studies emphasized the importance of clear regulations and a legal framework to support sustainable telepharmacy implementation, not limited to emergencies like the COVID-19 pandemic. These findings indicate that while the overall perception is positive, there are still variations and certain concerns from pharmacists that need to be addressed to support the wider adoption of telepharmacy in pharmaceutical practice.

6. Pharmacists readiness for the implementation of telepharmacy

Studies in Vietnam, Indonesia, and Saudi Arabia with community pharmacist participants stated their readiness to implement telepharmacy in their work^[16,23,24]. Meanwhile, a study on hospital pharmacists in Saudi Arabia showed that they were less ready to use telepharmacy^[19]. Only 27.74% stated their readiness to use telepharmacy for patients in rural areas without incentives, and 34.55% were ready to work outside working hours if needed. Many of them were not ready to provide pharmacy education through two-way video consultation, such as phone calls, text messages, or voice conversations using mobile devices. They were also reluctant to teach patients how to use their medications through video consultation or other clinical services.

In general, pharmacists demonstrate a fairly good level of readiness toward implementing telepharmacy services. Factors influencing pharmacists' readiness to utilize telepharmacy include proficiency in information technology, communication skills through electronic media, understanding of rules and ethics about telepharmacy practice, and positive perceptions and attitudes towards adopting technology-based pharmaceutical care

services. There are indications that pharmacists will be better prepared to adopt telepharmacy if training programs and seminars on telepharmacy practice are provided.

DISCUSSION

Telepharmacy has the potential for direct benefits to patients requiring prompt and accurate pharmacy services. By providing remote services (such as patient education and counseling, drug information, and patient monitoring), telepharmacy is very helpful in serving patients with communicable diseases^[25,26]. In general, a pharmacist should be willing to use telepharmacy services, considering the excellent benefits.

The results show that most pharmacists have good knowledge about telepharmacy. However, a small portion still lacks good knowledge of telepharmacy. Overall, pharmacists' perspectives on telepharmacy are very positive. Telepharmacy is very helpful for patients living far from healthcare services with limited pharmacists^[26]. This research used 8 articles meeting the inclusion criteria. Among the inclusion criteria were studies using cross-sectional methods and evaluating knowledge, perceptions, and willingness to use telepharmacy among pharmacists. The demographics of participants were dominated by females, with an average age of 30-40 years, and the most common education level was a Bachelor's degree.

Our findings indicate that five studies discussed how well pharmacists' knowledge of telepharmacy^[16,19,20,23,24]. According to Nursalam (2016), a person's knowledge can be interpreted using a quantitative scale: good knowledge (76%-100%), sufficient knowledge (56%-75%), and poor knowledge (<56%). Reflecting on these knowledge levels, one study showed poor knowledge, which was the study by Ahmed *et al.*^[19].

Table 3. Summary of study characteristic

Year, Country	Study setting	No. of participant	Purpose of study	Knowledge of telepharmacy	Perception of telepharmacy	Readiness to implementation of telepharmacy	Research outcomes
2023, Saudi Arabia ^[19]	Hospital pharmacists	411	Investigate hospital pharmacists' understanding, attitudes, and readiness level toward telepharmacy services	43.33% knew telepharmacy, indicating low knowledge	Low perception. Only 29.33% agreed telepharmacy could improve medication adherence and 34.00% agreed it could save patients' money and time %	27.74% stated readiness, dominated by pharmacists with <5 years experience	Respondents showed uncertainty regarding knowledge, attitudes towards telepharmacy, and readiness to adopt it in future practice. Need telepharmacy practice model in education programs
2023, Indonesia ^[20]	Community pharmacists	78	Analyze pharmacists' knowledge, attitudes, and behavior related to telepharmacy use	89.74% had good knowledge of telepharmacy	Varying perceptions. 66.67% had a good attitude towards telepharmacy use. 86.22% perceived benefits but 52.89% thought it complicated services	-	Good knowledge does not translate to implementation due to resource and time constraints. Patients are perceived to have technology, financial, and acceptance limitations.
2023, Saudi Arabia ^[16]	Community pharmacists	404	Assess knowledge, perceptions, and readiness towards telepharmacy	82.67% had good knowledge, recognizing telepharmacy's role during COVID-19 (85.40%), in monitoring and reporting adverse drug reactions (83.67%), and reaching remote patients (80.94%)	Telepharmacy improves patient adherence (70%) and access for rural patients (70%). Can save money/time (84.4%) but consultation is still effective (82.43%) despite limited pharmacists (73.76%)	81.68% ready to implement telepharmacy in pharmacies to improve care and reduce medication errors/reconciliation issues. Ready to use after hours without compensation if needed	Can contribute to implementing comprehensive telepharmacy services in Saudi Arabia. Pharmacy colleges can initiate including telepharmacy practice in the curriculum

Year, Country	Study setting	No. of participant	Purpose of study	Knowledge of telepharmacy	Perception of telepharmacy	Readiness to implementation of telepharmacy	Research outcomes
2022, Pakistan ^[15]	Community pharmacists & Hospital pharmacists	380	Assess perceptions and readiness of pharmacists working across sectors in a resource-limited country	-	Need legal framework for telepharmacy implementation (71.3%) to enable use during/after COVID-19 (82.1%). Overall, pharmacists in one Pakistani province had good perceptions of telepharmacy and its advancement	-	Pharmacists in Pakistan view telepharmacy favorably. Its implementation is crucial for providing timely, better patient care in remote areas and assisting disease prevention/treatment
2023, Malaysia ^[21]	Community pharmacists	217	Assess Malaysian community pharmacists' perceptions and attitudes towards telepharmacy implementation.	-	37.8% showed positive perceptions, believing telepharmacy has benefits (53.9%). Age-influenced benefit perceptions, with younger, less experienced pharmacists tending to have more positive attitudes	-	Pharmacists practicing in urban Malaysia have positive perceptions and attitudes towards telepharmacy's benefits despite barriers. Need training/education to enhance telepharmacy utilization
2022, Canada ^[22]	Hospital pharmacists & Community pharmacists	136	Understand Canadian pharmacists' use, experiences, and views of telepharmacy	-	telepharmacy users (72.2%), felt it enhanced clinical practice and were comfortable managing minor illnesses (80.4%). Of non-users (84.9%), indicated telepharmacy would enhance practice and (90.6%) would feel comfortable managing minor illnesses.	-	Canadian pharmacists perceive telepharmacy can enhance clinical practice in managing minor illnesses, even if not used before. Important factors are ease of system implementation, privacy/data protection, and learnability of technology.

Year, Country	Study setting	No. of participant	Purpose of study	Knowledge of telepharmacy	Perception of telepharmacy	Readiness to implementation of telepharmacy	Research outcomes
2022, Vietnam ^[23]	Hospital pharmacists & Community pharmacists	414	Assess current use status and factors associated with willingness to use telepharmacy by Vietnamese pharmacists	62.3% had good knowledge	Though positive attitude (74.2%), implementation behavior was low (58.7%)	At least 87% implemented telepharmacy in their work	86.7% used telepharmacy through phone calls/Zalo. Willing to take ICT training for telepharmacy and collaborate with ICT companies. Need to document telepharmacy activities. Telepharmacy hoped to remotely manage chronic patients
2023, Indonesia ^[24]	Community pharmacists & Hospital pharmacists	378	Assess knowledge, perceptions, and readiness to use telepharmacy in Indonesia	Very good knowledge (96.83%)	58.20% had positive perceptions	63.23% readiness stated	The majority had adequate knowledge, perceptions, and readiness for telepharmacy implementation. However, they need additional incentives. Telepharmacy practice training is required.

They explained that hospital pharmacist respondents in Saudi Arabia had poor knowledge of telepharmacy because their knowledge level was less than 56%. Meanwhile, the other studies, as shown in Table 2, explained that pharmacists already had a good level of knowledge, above 76%. The lack of knowledge could be due to their never having used this technology before.

Pharmacists perceptions of telepharmacy implementation were discussed in all the studies we examined^[15,16,19-24]. Most studies considered telepharmacy to improve patient medication adherence, reduce control costs, reduce medication errors, and monitor treatment in patients with chronic diseases^[15,16,20,21]. As many as 91% of pharmacists participating in the Alanazi *et al.* study believed that using a telepharmacy system could save time and money^[27]. According to Baldoni *et al.*, telepharmacy is a solution to the pharmacy workforce deficit^[28]. This study was also supported by research by Kosmisky *et al.*, which found that implementing telepharmacy in the ICU with limited pharmacists can increase clinical benefits, lower costs, prevent adverse events, and improve timely identification and management. Telepharmacy can also provide benefits to patients in emergencies. Overall, pharmacists' perspectives on using telepharmacy in various countries are positive. Some factors regarding perspectives on using telepharmacy are gender, age, and education level^[25].

Four articles studied the readiness to use telepharmacy. The study by Ahmed *et al.* mentioned that very few hospital pharmacists in Saudi Arabia were interested in using telepharmacy^[19]. They find it difficult to implement. In contrast, another study in Saudi Arabia with community pharmacist respondents found that at least 72% of pharmacists stated their readiness to use telepharmacy even without payment^[16]. According to Dat *et al.*, more than 87% of

respondents stated their readiness to use telepharmacy^[23]. Most respondents ready to use telepharmacy were young pharmacists. This was supported by the research findings from Ilkic *et al.*, which stated that young pharmacists tended to be more ready to use telepharmacy technology^[29]. Before implementing telepharmacy, training or incorporating telepharmacy practice into the education program should be considered, such as a telepharmacy applicative case study^[30]. The study conducted by Wathoni *et al.* explained that additional incentives may be needed if telepharmacy is to be implemented^[24]. On the other hand, pharmacists' readiness for telepharmacy implementation was already good. However, it remains uncertain whether telepharmacy can be implemented in each country, given the barriers to adopting new technology.

Based on this systematic review article, some potential new findings that can be developed and further researched include studying the effectiveness of implementing telepharmacy curricula or education programs in pharmacy higher education to improve the knowledge and readiness of prospective pharmacists. Additionally, studies on interventions through technology training for pharmacists are worth conducting.

The lack of studies on telepharmacy is a limitation of this research. It is hoped that in the future, there will be more similar studies with more respondents and in different countries emphasizing the confidence to adopt telepharmacy in the workplace, given the many benefits of telepharmacy.

CONCLUSION

The study findings indicate that pharmacists possess a high level of knowledge about telepharmacy, and their outlook is positive. The readiness to use telepharmacy is good, but there are barriers to its implementation. Good knowledge and

perceptions about telepharmacy do not always directly correlate with readiness for its implementation. Further studies that can be conducted include the effectiveness of implementing telepharmacy curricula or education programs in pharmacy higher education to prepare future pharmacists who are open to technology.

CONFLICT OF INTEREST

The author declares no conflicts of interest in this manuscript.

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