

## Education and Training for Improving Pharmacist's Telepharmacy Competencies: A Scoping Review

### (Pendidikan dan Pelatihan untuk Peningkatan Kompetensi Apoteker terkait Telefarmasi: *Scoping Review*)

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**Abstract:** The high demand for telepharmacy services led to the urge for proper training and education to enhance their quality. This review aimed to assess the implementation and outcomes of telepharmacy training and education programs. This scoping review was conducted on ScienceDirect, Sage Journal, SpringerLink, and Google Scholar databases using the keywords “training” OR “education” AND “telepharmacy,” “training” OR “education” AND “digital competency” AND “pharmacy.” Only English-written articles published between 2000–2023, original research and brief report were included in this review. Eight of 171 articles met the criteria and the study's objectives. Those studies discussed telepharmacy learning program for pharmacy students in the USA (5 articles), UAE (2 articles), and Malaysia (1 article). The learning methods included didactic learning, case-based study, simulation/roleplay, and clerkship employing technological tools. Rubrics, quizzes, questionnaires, and objective structured clinical examination (OSCE) were used as assessment methods. All studies reported improved students' knowledge, perceptions, and telepharmacy competencies. In conclusion, the telepharmacy learning programmes have effectively upgraded students' knowledge and skills by various methods at every level. However, there remains a considerable need for evidence on suitable training for pharmacists to improve their telepharmacy competencies and service quality.

**Keywords:** Digital competence, education, pharmacist, telehealth.

**Abstrak:** Peningkatan kebutuhan pelayanan telefarmasi mengarah pada urgensi pendidikan dan pelatihan telefarmasi untuk meningkatkan kualitas layanannya. Tujuan dari artikel ini adalah mengkaji implementasi program pendidikan dan pelatihan telefarmasi serta output yang dihasilkan. Kajian *scoping* dilakukan pada literatur dari pangkalan data ScienceDirect, Sage Journal, SpringerLink, dan Google Scholar menggunakan kata kunci “*training*” atau “*education*” dan “*telepharmacy*,” “*training*” atau “*education*” dan “*digital competency*” AND “*pharmacy*.” Hanya artikel berbahasa Inggris, dipublikasikan pada periode 2000 – 2023 serta merupakan hasil riset dan laporan singkat yang diikutsertakan pada kajian ini. Delapan dari 171 artikel yang ditemukan memenuhi kriteria inklusi dan tujuan kajian. Studi tersebut membahas implementasi dan evaluasi program pendidikan terkait telefarmasi di negara Amerika (5 artikel), Arab (2 artikel), dan Malaysia (1 artikel). Metode pembelajaran yang digunakan meliputi paparan, pembelajaran berbasis kasus, simulasi/roleplay, dan magang menggunakan berbagai media teknologi. Metode penilaian menggunakan rubrik, kuis, kuesioner, dan *objective structured clinical examination* (OSCE). Seluruh penelitian melaporkan peningkatan pengetahuan, persepsi dan kompetensi telefarmasi mahasiswa. Dapat disimpulkan bahwa program pembelajaran terkait telefarmasi efektif untuk meningkatkan pengetahuan dan kemampuan mahasiswa dengan berbagai metode pada setiap tingkat. Namun, masih sangat dibutuhkan bukti program pelatihan yang sesuai bagi apoteker untuk meningkatkan kompetensi dan kualitas pelayanan telefarmasi.

**Kata kunci:** Apoteker, kompetensi digital, pendidikan, *telehealth*.

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## INTRODUCTION

TELEPHARMACY represents the integration of technology into distance pharmaceutical services. The use of telepharmacy has varied from pharmaceutical handling to the provision of clinical care. It has been a solution to pharmacists' shortages both in urban and rural areas<sup>(1)</sup>. Telepharmacy practices have been used for medication review, remote dispensing, medication therapy management, and remote consultations<sup>(2,3)</sup>. It was proven to improve access to healthcare services, economic benefits, patient satisfaction, speed of medication processing, augment pharmacy filling ability during peak hours, and improve patient care, including adherence<sup>(2,4)</sup>. With the growing inclusion of digital transformation in health services, telepharmacy has become an inevitable service differentiation for "future pharmacists"<sup>(1,5)</sup>.

While conducting telepharmacy, pharmacists may face difficulties integrating the skills typically used in face-to-face services into remote services with technology involvement. It was reasonable that telepharmacy services require substantially unique skill sets, which may be expanded from current pharmacy education<sup>(3,6,7)</sup>. The 2023 International Pharmaceutical Federation Global Competency Framework (FIP GbCF) encloses digital literacy skills for early-career pharmacists. It considers managing and processing digital information, applying technological tools, and ensuring patient security and safety. Thus, before delivering the services, pharmacists must equip themselves with sufficient knowledge and skills in telepharmacy<sup>(8,9)</sup>. It was known that the knowledge, perception, and competence of pharmacists or students in telepharmacy were found to be affected by their level of education, previous experience in telepharmacy, rural or urban settings, and history of certified trainings<sup>(10–12)</sup>.

A review of telehealth education and training from 2004–2014 found that telehealth education and training have been promoted through traditional classrooms and e-learning at the university level and in vocational courses. The identified studies targeted clinicians, nurses, and therapists at undergraduate, postgraduate, or professional levels. However, no related findings were specified for pharmacy students or practitioners<sup>(13)</sup>.

Studies emphasise that one of the major barriers to telepharmacy services was a lack of professional training for pharmacist<sup>(10)</sup>. Continuing education plays a crucial role in addressing the gaps in telepharmacy and promoting its effective implementation. Research

studies have highlighted the importance of continuing education in increasing knowledge and promoting a positive attitude towards telepharmacy, particularly among older pharmacists<sup>(14,15)</sup>. By addressing telepharmacy education and training, academic institutions and practice settings can ensure that pharmacists were prepared to meet the growing demand for telepharmacy services. It will contribute to high-quality pharmaceutical care, improved patient outcomes, and increased access to healthcare services, particularly in underserved areas. This article aimed to describe the telepharmacy training and education programme, including their methodologies, participants, targeted skills, and outcomes.

## MATERIALS AND METHODS

**MATERIALS.** This review collected relevant published manuscripts from ScienceDirect, Sage Journal, SpringerLink, and Google Scholar databases using keywords with the Boolean method. The used keywords were "training" OR "education" AND "telepharmacy"; "training" OR "education" AND "digital competency" AND "pharmacy".

**METHODS. Eligibility Criteria.** The articles included in this review were (1) studies on telepharmacy educational or training programs; (2) published as original research, brief reports, or recommendations; and (3) published in English language during 2000–2023. The lengthy study inclusion period intended to collect sufficient evidence since the first period of telepharmacy was implemented in most countries<sup>(16)</sup>. This study excluded proceeding papers and papers with non-full text access.

**Selection Process.** The identified articles were collected in Mendeley® to be screened in two phases. The first screening phase consecutively evaluated the relevant article type, title, and abstract. The selected articles were included in the second phase, which thoroughly screened relevant full-text publications to the study objective.

**Data Charting Process.** The process of information extraction, analysis, and presentation used Joanna Briggs Institute (JBI) data charting guidance, which consists of authors, year of publication, country, aims, sample criteria, methods (intervention type, comparator, outcome measures), key findings that relate to research questions. The team approach was employed to ensure data extraction completeness<sup>(17)</sup>.

This study uses Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Scoping Review guideline to report the findings.

## RESULTS AND DISCUSSION

**Identification of Studies.** The computerised search identified 171 articles, which continued to the first phase of selection. 114 articles were excluded because of irrelevant types of papers, titles, and abstracts based on review questions. The remaining articles underwent full-text screening, leaving eight studies as the final set in this review, as shown in Figure 1.

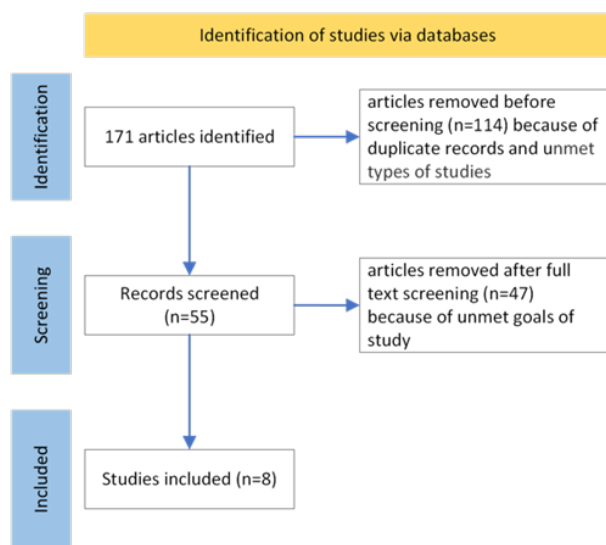


Figure 1. Flow of selection process.

**Characteristic of Studies.** Five studies in this review were conducted in the United States of America (USA), while others came from the United Arab Emirates (UAE) (2 studies) and Malaysia (1 study). Details of the included studies can be seen in Table 1. Most studies were relatively new since they were published in the last ten years in the American Journal of Pharmaceutical Education<sup>(18–22)</sup>. Only two studies (in Malaysia and the USA) were published in 2002 and 2004, respectively<sup>(23,24)</sup>. Other platforms that provided the studies were the Journal of Pharmacy Technology and Drug Information Journal<sup>(23,25)</sup>. It represents less variation in telepharmacy education and training studies compared to the studies on similar reviews regarding telehealth in 2016. That telehealth review found nine relevant studies on Australia, Brazil, the UK, the USA, and Japan on seven platforms<sup>(13)</sup>. Nevertheless, it shows studies on appropriate telehealth or telepharmacy learning programs were still limited, in contrast with abundant suggestions for improving digital health services skills.

**The Learning Programs.** According to the included research, telepharmacy education extends beyond specific telepharmacy modules. It can be seamlessly incorporated into other subjects,

including communication, pharmacotherapy, pharmacoinformatics, or clinical rotation/clerkship. Generally, there were three main categories of learning methods: didactic, simulation-based, and experiential learning. Most studies incorporate simulation with case-based and roleplay techniques. Cases were developed by tutors with additional practitioners, if any, as clinical settings in the final assignment, which was roleplay in simulation. Those methods promote effectiveness in evaluating students' performance, especially in technical or affective skills such as communication in patient assessments, counselling, or medication history taking. In addition, clinical skills can also be assessed within the expected outputs from cases that students should identify<sup>(18–21,24–26)</sup>.

Furthermore, one study in the USA proved that asynchronous instructive learning methods also have the potential to be integrated into telepharmacy education. It can be effective and efficient for courses targeting knowledge and positive attitude improvement towards telepharmacy. Students can adjust their learning strategy with the available resources in the learning management system (LMS) and self-paced settings<sup>(19)</sup>.

Experiential learning was well-suited for final-year students who have already acquired the necessary knowledge and skills. Students can be involved in telepharmacy services at healthcare facilities under the mentorship of field tutors. This approach has proven effective in equipping students to navigate real-world scenarios in the field in preparation for their future roles as pharmacists. Moreover, this strategy enriches students' proficiency in devising solutions for practical challenges encountered during fieldwork<sup>(21,24)</sup>.

Overall, those selected learning methods have been recommended for telepharmacy education. It can be integrated or applied separately, depending on the specific learning objectives and the students' levels<sup>(6,9,22)</sup>. The mapping of learning methods to targeted objectives and students was shown in Figure 2. In line with the recommended competencies for pharmacists in telepharmacy services, it becomes apparent that the selection of learning methods should encompass acquiring knowledge and developing essential technical and clinical skills for pharmacists<sup>(3,8,27)</sup>. However, there is a lack of studies equipping students with the substantial skills to ensure patient data privacy and security. Likewise, the focus on quality assurance measures, a critical component in ensuring patient safety within the telepharmacy context, was also unidentified.

**The Targeted Students and Skills.** All the included studies mentioned the programs for undergraduate students, and only one study in the

UAE evaluated graduating students in the programs<sup>(21)</sup>. Telepharmacy learning can be distributed throughout the pharmacy education level. In the first and second years, pharmacy students were directed towards learning objectives aimed at introducing telepharmacy, enhancing their knowledge, and fostering positive attitudes while also acquainting them with the nuances of communication techniques through technological media<sup>(18,19,25)</sup>. Then, in the subsequent years, the clinical skills in various scopes of pharmacy services should be assessed by implementing appropriate learning methods. The pharmacy services in selected studies include patient assessment, medication history taking,

order review, reconciliation, medicine dispensing, medication counselling, patient education, and drug information services<sup>(20,21,23,24,26)</sup>.

Numerous competencies or skills appear to be relevant in telepharmacy, for instance, communication etiquette, which encompasses distinct behaviours that facilitate effective telepharmacy consultations. Effective telepharmacy etiquette includes verbal and nonverbal communication skills associated with heightened patient satisfaction and successful interactions<sup>(20)</sup>. It can also be found in the included studies, which focused on communication skills in various telepharmacy services.

**Table 1. Competencies, learning and assessment methods in telepharmacy educational programme.**

Author, Year	Country	Competencies	Participants	Learning and Assessment Methods	Outcomes
Hasan et al, 2022	UAE	Communication skill	Second semester students (n=79)	Case study and medication counselling roleplay via Zoom® platform as final assignment. Assessment by rubric form with scoring.	Online roleplay have the same efficacy with in-person assessment. The students' score between assignment and examination were aligned.
Hasan et al, 2023	UAE	Patient assessment and education	Clinical rotation student (graduating batch) (n=90)	Experiential learning by attending field training and discussion with virtual workshop format. Assessment by virtual objective structured clinical examination.	Most students effectively assessed the patient and deliver medication counselling. Students gave positive feedback on module.
Seifert et al, 2004	USA	Medicines dispensing	Fourth year student (n=14)	Didactic learning, hands on, and clerkship.	Students expressed positive attitude toward telepharmacy learning and clerkship
Skoy et al, 2015	USA	Patient counselling	Second year student (n=82)	Lectures and standardized patient simulation. Assessment by rubric	Students successfully deliver counselling in telepharmacy but face-to-face performance was better.
Schroeder & Lengel, 2022	USA	Medication history taking and reconciliation	Third year student (n=67)	Telehealth simulation using Blackboard Collaborate®. Competencies and etiquette communication skill were assessed based on rubric.	The assessment rubric can be used in assessing competencies and etiquette in telepharmacy simulation.
Porter, Frenzel, Siodlak, 2022	USA	Order review and patient counselling	Third year student (n=16)	Case-based simulation for prescription verification and medication counselling. Assessment by pre-post online survey.	Improved knowledge and positive perceived to telepharmacy practices.
Frenzel & Porter, 2023	USA	Knowledge and attitude toward telepharmacy	Second and third year student (n=390)	Asynchronous self-paced learning with readings and video in learning management system (LMS). Assessment by questionnaires and final essay.	Student's knowledge were improved yet the perceived challenges arise due to technical problems in telepharmacy services.
Rahman et al, 2002	Malaysia	Drug information services	Fourth year student (n=173)	Lectures and project-based learning in pharmacoinformatics modules. Assessment by assignment and final essay.	Students claimed knowledge enhancement of pharmacoinformatics.

One study in Malaysia also accommodated the digital literacy competencies of pharmacy students through pharmacoinformatics modules. Students were assigned to provide drug information services through drug databases and introduced to their application in telehealth services<sup>(23)</sup>. Digital literacy competencies were also crucial for pharmacists in this abundant information resource. Since pharmacists were medication experts, they must possess excellent skills in collecting, critically appraising, and delivering essential information to patients or other healthcare practitioners<sup>(22,27,28)</sup>.

**The Assessment Methods.** In the learning process, assessment methods play a crucial role in measuring the attainment of desired outcomes. Inappropriate method selection will fail to accurately depict the achievement of desired competencies<sup>(29,30)</sup>. Based on the identified studies, several assessment methods followed the expected competencies. Rubric-based scoring was implemented in roleplay and virtual OSCE to evaluate student performance in communication and clinical skills<sup>(18,20,21,25)</sup>. Students' level of knowledge and perceptions were assessed using quizzes, questionnaires, or essays<sup>(19,23,24,26)</sup>.

**Outcomes and Responses from Pharmacy Students.** All studies claimed that students have favourable attitudes towards telepharmacy learning programs. Students have been thoroughly prepared prior to engaging in telepharmacy activities using technological tools. The preparation consisted of providing guidance through lectures, learning guidelines, and facility familiarization. As a result, students have no significant difficulties during the learning program. The studies also showed the effectiveness of selected learning methods and assessments in telepharmacy learning programs. However, students also raised challenges with e-learning methods compared to traditional learning, which seems to affect students' acceptability and performance in communication skills<sup>(20,25,26)</sup>.

**Challenges and Opportunities in Telepharmacy Education and Training.** According to the FIP Global Competency Frameworks (GbCF), early-career pharmacists must perform digital literacy skills as identified in several studies regarding future pharmacists' preparedness. These skills include information collection, data handling, critical processing, technology engagement, and

		Targeted competencies related to telepharmacy		
		Knowledge and perception	Basic services skills	Clinical skills
Student's level in pharmacy education	Final Year	Clinical rotation Project-based learning Case-based study Roleplay Hands-on		
	Middle year	Instructive learning or Student-centred learning with synchronous and asynchronous methods	Simulation Case-based study Roleplay Hands-on	
	Early year		Simulation Case-based study Roleplay	

Figure 2. Mapping of telepharmacy learning methods based on students' level and expected competencies.

service integration<sup>(8,9,27,28)</sup>. However, this was still implemented to a limited extent in the telepharmacy learning process. Despite the broad spectrum of pharmacy services integrated in the included studies, they primarily concentrate on assessing communication skills within the context of patient education in telepharmacy. In addition to patient education, telepharmacy also benefits interprofessional collaboration, drug monitoring, remote dispensing, and medicines administration<sup>(22,31,32)</sup>. Those areas were open to being extended in the telepharmacy education and training curriculum.

There was no relevant publication available on telepharmacy trainings for continuing education in this review. This finding aligns with the results of previous studies on insufficient or inadequate dedicated training to enhance the effective utilisation of digital technologies for pharmacists<sup>(12,27)</sup>. Consequently, significant disparities exist in the digital proficiency of pharmacy personnel, particularly between older and younger pharmacists<sup>(7,14,27,33)</sup>. This phenomenon represents a challenge that needs to be promptly addressed and balanced with the establishment of a framework for digital literacy competency among pharmacists. This framework will serve as a reference guide for implementing telepharmacy training and learning programs. Other challenges that need to be considered were the multitude of information technology platforms and healthcare applications, program implementation costs, infrastructure investments, and recognition for competency achievement at each level<sup>(9,12,13,27)</sup>.

## CONCLUSION

Although limited in numbers, research showed that the telepharmacy learning programs have effectively upgraded students' knowledge and skills through didactic, roleplay/simulation, and experiential learning methods. The methodology can be elected to align with targeted outcomes and participants' levels. There remains a huge opportunity to provide evidence on effective training for pharmacists to upscale their digital competencies and telepharmacy services quality. Patients' satisfaction and safety were staked without proper quality assurance on pharmacists' readiness for telepharmacy services.

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