RESEARCH ARTICLE

Identification of teaching and learning components of a telepharmacy training module for undergraduate pharmacy students in Malaysia: A qualitative study

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Abstract

Background: Telepharmacy is a pharmaceutical care service provided by qualified pharmacists via telecommunication, meant to reach particularly remote patients. Although telepharmacy was introduced several years ago, the curriculum for providing telepharmacy services is scarcely developed in many pharmacy schools in Malaysia. As a result, pharmacy students might lack the knowledge and skills to offer telepharmacy services to the community. **Objective:** This study aimed to identify the principal teaching and learning components to be included in a telepharmacy training module for undergraduate pharmacy students. **Methods:** Using a validated interview guide, the study applied a qualitative method that involved one-on-one interviews with students, academicians, and pharmacy practitioners. Ethics approval was obtained before data collection between October 2022 and January 2023. The data were analysed using NVIVO software. **Results:** Ten final-year pharmacy students, three academicians, and four pharmacy practitioners were interviewed until responses reached saturation. Four key themes were identified from the interview: the conduct of telepharmacy training, the learning components of the module, the skills required for telepharmacy, and the infrastructure for training. **Conclusion:** The emerging themes can potentially be used in developing the telepharmacy training module to improve the knowledge and skills of telepharmacy among undergraduate pharmacy students.

Introduction

The term "*telepharmacy*" indicates a form of pharmaceutical care pharmacists provide to patients remotely through virtual interactions using information and communication technology (ICT) facilities (Kilova *et al.*, 2021). According to the American Society of Health-System Pharmacists (ASHP), telehealth pharmacy practice is when pharmacists use electronic information and telecommunications technology to offer patient care services (Alexander *et al.*, 2017).

Telepharmacy models have been used for decades, particularly in areas where access to pharmacies is difficult due to geographical location (Viegas *et al.*, 2022). However, during the COVID-19 pandemic, when various global movement limitations were implemented, telepharmacy services received increasing attention to enable remote pharmaceutical care services (Elnaem *et al.*, 2022). Services that can be delivered by telepharmacy include patient prescription assessment or review, refills for prescribed medication, patient education and counselling, supervision of the preparation of antineoplastic agents, oversight of

formulary compliance, drug information services, therapeutic drug monitoring, clinical outcome evaluation, and diagnostic and disease prevention services (Hedima & Okoro, 2021). All these services must be provided by registered pharmacists or pharmacy technicians under the supervision of pharmacists.

Telepharmacy is well-established and available in many developed countries. For example, in the United States, numerous telepharmacy services have been provided, such as medication adherence, patient education on asthma and chronic obstructive pulmonary disease, prescription screening for the inpatient unit, and medication reconciliation checks before patient discharge (Baldoni *et al.*, 2019). In Australia, pharmacists conduct patient medication reviews via videoconferences or teleconferences (Viegas *et al.,* 2022). In France and Canada, telepharmacy is also used to supervise antineoplastic medicine formulations (Baldoni *et al.*, 2019). Previous research has highlighted a significant gap in telepharmacy education and training to meet the need to build pharmacists' capacities to integrate technology into their pharmaceutical care (Viegas *et al.,* 2022).

Digital health education is crucial to continuing professional development and pharmacist awareness (International Pharmaceutical Federation, 2021). With the increasing use of digital health tools in practice that change how a pharmacist provides pharmaceutical care services, the undergraduate pharmacy curriculum should include telepharmacy training to ensure that students are prepared for rapid technological advances when they enter the workforce. The need to incorporate telepharmacy in pharmacy education started effectively after the pandemic by highlighting the topics that needed to be covered and how to incorporate them into the pharmacy curriculum (Frenzel & Porter, 2021). Furthermore, there was an emphasis on providing unique training opportunities to prepare students to undertake complex tasks, such as virtual device use counselling or drug administration (Dickinson, 2022). In a recent US study that aimed to design and assess the impact of telepharmacy training modules on students' knowledge, perceptions, and intent to deliver services, the students were knowledgeable and perceived these services positively, but they showed lower intention to offer these services (Frenzel & Porter, 2023), suggesting the need for further efforts in building the capacity to provide telepharmacy services among students.

In Malaysia, pharmacy curricula do not include a well-structured telepharmacy training module to adequately prepare undergraduate pharmacy students for the telepharmacy workforce. Therefore, this study aimed to identify the essential learning components to be incorporated into the telepharmacy training module from the perspectives of academicians, pharmacy practitioners, and pharmacy students.

Methods

Design

This qualitative study used interview sessions to identify the essential teaching and learning components for developing a telepharmacy training module. The study was conducted with identified respondents from October 2022 to January 2023.

Subjects and settings

The interviews were conducted face-to-face or online using Zoom and involved individual academicians, pharmacy practitioners, and senior-year pharmacy students. The eligibility for academicians and pharmacy practitioners was determined based on prior experience in teaching or practising, focusing on the research topic. Concerning students, only senior students from the pre-final and final years were recruited to ensure they were exposed to the topic in their study and experiential learning components.

Sample size

In collaboration with Rhazes Telehealth and its panel of pharmacy consultants, this study recruited seven male and female academicians and pharmacy practitioners from both the public and private sectors interested in telepharmacy. Moreover, ten male and female senior-year pharmacy students from public and private universities were also interviewed to explore their thoughts on telepharmacy training. These participants were purposely selected to provide a wide range of perspectives. Their viewpoints were thoroughly examined, and other cases were sought out and compared to achieve data saturation.

Study instrument

A semi-structured interview guide was designed according to the theoretical framework of the Association of American Medical Colleges (AAMC) Telehealth Competencies, which consists of six domains: 1) Patient safety and appropriate use of telepharmacy; 2) Data collection and assessment via telepharmacy; 3) Communication via telepharmacy; 4) Ethical practices and legal requirements for telepharmacy; 5) Technology for telepharmacy; and 6) Access and equity in telepharmacy (Association of American Medical

Colleges, 2021). This study used these domains to help identify the learning and training components that may contribute to developing the telepharmacy practice module in Malaysia. The content validity assessment was conducted by a panel of experts who assessed the relevance and clarity of all questions in the interview guide. As the panel involved five experts, a value of a minimum of 0.78 and higher for the item-level content validity index (I-CVI) was deemed acceptable (Polit *et al.*, 2007). After validation, a trial run was conducted to improve the interviewing process and time management skills. It also helped further assess the questions' feasibility and comprehensibility.

Study procedure

Online or face-to-face individual interviews were conducted to communicate with the participants. The Zoom platform was used for those who opted for the online format. Informed consent was sought from all participants before carrying out the interview sessions. Each interview took about 40–60 minutes, and all sessions were recorded.

Qualitative data analysis

The retrieved data were analysed using thematic analysis, which involved looking through data collection

to find, examine, and report recurring themes (Kiger & Varpio, 2020). NVIVO software was employed to conduct thematic analysis for the study to simplify the analysis process.

Results

This study presents the findings of 17 interviews conducted with ten final-year pharmacy students, three academicians, and four pharmacy practitioners. The pharmacy practitioners were pharmacists from different fields, including community pharmacies, hospitals, and business backgrounds in digital health. Table I shows the identified themes, subthemes, and codes according to the theoretical framework. The illustrative quotes under the identified vital themes are presented sequentially in this section. Overall, pharmacy students were more interested in topics related to training skills (theme 3), while practitioners had more input regarding the learning components (theme 2). Finally, while they gave inputs across all four themes, academicians gave 50% of the quotes in themes 2 and 3.

Table I: Main themes, sub-themes, and codes identified

Main themes	Sub-themes	Codes
Conduct telepharmacy training	Setting of training	• Duration of training • Methods of training • Assessment
Learning components of the module	Patient safety and appropriate use of telepharmacy	• Knowledge • Importance of telepharmacy • Patient's criteria
	Data collection and assessment via telepharmacy	• Patient data • Electronic Health Record (EHR)
	Ethical practices and legal requirements for telepharmacy	• Policy or privacy and confidentiality
Skills required for telepharmacy	Patient safety and appropriate use of telepharmacy and communication via telepharmacy	• Communication and counselling skills • Interprofessional skills • Empathy
	Technology for telepharmacy	• Technical skills • Information search skills
Infrastructure for the training	Access and equity for telepharmacy education	• Access to internet • Access to devices and software

Theme 1: Conduct telepharmacy training

A central theme identified throughout the interview was the conduct of telepharmacy training related to a

sub-theme of the setting for training. Some participants proposed points regarding the length, training, teaching methods, and telepharmacy training assessment. Most participants suggested that this

training should be conducted within one term for the duration of the module training. Some academicians have explained further how one-term training should be carried out with a proper plan, considering the module's content and the student's learning hours. Next, some participants also mentioned that training or teaching methods should include two stages, i.e. theoretical and practical. First, the lectures provide a basic understanding of telepharmacy practices, and then practical sessions focus on telepharmacy skills and hands-on experience. The evaluation should include the Objective Structured Clinical Examination (OSCE). Table II provides an overview of the codes identified under theme one (conduct telepharmacy training) and all relevant illustrative quotes.

Table II: Summary of theme 1 (conduct telepharmacy training) with illustrative quotes

Theme 1: Conduct telepharmacy training	
Codes	**Illustrative quotes**
Duration of training	The most appropriate one should be between 40 and 80 hours of student learning time. Then, make up to one or two credit hours. (Academician 1)
	By looking at other subjects that need to be considered a burden for students, one semester is adequate for this telepharmacy. (Student 8)
	If we want to embed the training in the course, it can be offered for ten weeks throughout the one semester, so it is fair to the students. (Academician 3)
Methods of training	Theoretical learning, practical learning by simulation, and experiential learning should be included in the training. These three types must be included in any training so that the students can truly understand what they learn theoretically by practicing the service in a class by hand, followed by experiencing the service in real practice in community or hospital settings. (Student 10)
	First, it should be incorporated into academia while you are an undergraduate. Second, fully registered pharmacists (FRPs) should also be offered it. (Practitioner 2)
Assessment	Of course, the module will be assessed so that the developer can assess the student's understanding and ability to give feedback and comments for improvements. (Academician 2)
	Keep providing OSCEs and virtual OSCEs. I will refer to the Bloom taxonomy and assess the student's learning, understanding, and ability to practice independently. Hands and a virtual OSCE are essential to telepharmacy, especially in drug-related problems and medication management. (Practitioner 2)

Theme 2: Learning components of the module

Participants expressed that the module learning components should cover clinical and operational rules and requirements for telepharmacy. Understanding medication and disease was highlighted for better patient management, safety, and outcomes. Some participants suggested that future pharmacists should identify patients eligible for telepharmacy services. While they supported telepharmacy, limitations to direct contact, connectivity, and basic needs for virtual interaction were mentioned as potential challenges. Geriatric and paediatric patients were frequently cited as populations requiring special arrangements and additional personnel involvement.

Furthermore, most participants discussed patient data needed for telepharmacy, including medical and medication histories, sociodemographic and laboratory data, and hospitalisation records. These data are commonly found in electronic health records (EHR), but some participants disagreed on whether EHR-related training is necessary. Some students have struggled with EHR use and should be taught about it before working as pharmacists. The module should cover regulations for telepharmacy to ensure patient safety and privacy. Future pharmacists need to be taught ethical and legal requirements. The students emphasised the need for patient privacy and confidentiality. Pharmacists should obtain explicit consent from patients and use secure online platforms. Table III overviews the codes identified under theme 2 (module learning components) and all relevant illustrative quotes.

Theme 3: Skills required for telepharmacy

Pharmacy students should develop the necessary skills for telepharmacy through training. Participants frequently cited communication, counselling, technical, interprofessional, and information-searching skills as essential. Communication skills should be improved among pharmacy students, as it is their task to counsel patients about medication, disease management, and prevention. Students need to learn motivational interviewing techniques and empathy for effective communication in pharmacy. Collaboration with doctors and nurses is necessary for managing patients in an interprofessional environment. When discussing telepharmacy, technical skills and the use of hardware and software are involved. Training to advance technical skills is proposed. Good technical skills are essential. Future pharmacists need information-

seeking abilities and technical proficiency. Reliable medical information must be filtered and appraised. Pharmacists must know where to obtain reliable information. Patients and healthcare providers will use telepharmacy services. Future pharmacists must choose reliable sources to obtain accurate information. Table IV provides a summary of the identified skills, with illustrative quotes.

Table III: Summary of theme 2 (Learning components of the module) with illustrative quotes

Theme 2: Learning components of the module	
Codes	**Illustrative quotes**
Knowledge	The first is the clinical part of telepharmacy; second is the operational part of telepharmacy, and third is the rules and regulations regarding telepharmacy. (Practitioner 2)
	I think the first concerns the introduction of telepharmacy, the definition of telepharmacy, the history of telepharmacy, the evolution of telepharmacy when it started, and how it is progressing in the coming years. Also, we must include the common diseases that can use telepharmacy and are suitable to be counselled via a virtual platform. (Academician 1)
	The module may cover pharmacists' role in the healthcare system and different workflows for different types of telepharmacy. The module can include patient assessment and medication management in a telepharmacy setting and how to maintain medication safety by identifying these medication problems and providing interventions. (Practitioner 3)
Importance of telepharmacy	You need to provide sufficient information and knowledge to the students about why telepharmacy is important as a platform for future pharmacists to provide virtual consultations. (Practitioner 2)
Patient's criteria	It depends on the patient itself. First is the connectivity or availability of the device. For example, for elderly patients or patients from rural areas, we need to consider the situation or disease of the patient and whether it is suitable or not. Moreover, the level of understanding of the patient is important because sometimes, when some patients do online sessions and not face-to-face sessions, it is not easy for them to understand all the information provided by the pharmacists. (Practitioner 4)
Patient data	As usual, patients' past medication, medical history, food and drug allergies, and other information about family history and social history is the required data in case clerking. In addition, we need information about patients' lifestyles or any OTC products the patient is taking or supplementing. (Academician 3)
Electronic Health Records (EHR)	Training related to EHR is essential to ensure that the student knows how to operate the system. Also, to ensure that the session is conducted smoothly without any problems induced by students' unfamiliarity with the system. (Academician 1)
Policy/privacy and confidentiality	We need a slot or section about ethical practice in the training module and ethics when handling patient information. Students must be vigilant because they must know that patient information is confidential. (Academician 3)

Table IV: Summary of theme 3 (Skills required for telepharmacy) with illustrative quotes

Theme 3: Skills required for telepharmacy	
Codes	**Illustrative quotes**
Communication and counselling skills	If we do not have that skill, we cannot get the information from the patient. You must teach students communication skills in class, including motivational interviewing skills. (Academician 3)
	This communication skill is vital because we want to ensure that the information, we convey reaches the patient, even if we do not meet face-to-face. If this communication skill is insufficient, our objective for telepharmacy will not be successful at the end of the day. (Student 8)
Interprofessional skills	Another essential skill is interprofessional collaboration because if we use the same platform in the future, this platform can be accessed by other healthcare professionals, like doctors or nurses. Interprofessional collaboration is needed. (Academician 1)
Empathy	Empathy is another essential attribute to gain the patients' trust and increase their openness toward the pharmacist by understanding their physical, emotional, and financial burden. (Student 10)
Technical skill	You must have skills in IT or technology. For example, how we want to handle a website, a meeting, how we want to present it, and so on. (Student 6)
	They require technical skills, so pharmacy students should be able to use telepharmacy technologies, such as teleconference platforms, electronic prescribing systems, and medication management systems. This ensures that they can provide care to patients remotely and then access and enter patient information accurately and efficiently. (Practitioner 3)
Information search skill	Telepharmacy is related to ICT, information, and communication technology, so they need to search and get clarification during the discussion. Therefore, information search skills are essential. (Academician 1)
	Evidence-based pharmacy understanding would also be essential so that you can see through this information and then select the ones that are credible and applicable to the specific patient's condition you are dealing with. (Academician 2)

Theme 4: Infrastructure for telepharmacy training

The participants identified issues with telepharmacy training, particularly regarding infrastructure such as computers, laptops, and internet connections. The training cannot be conducted as planned without this infrastructure, and resources are needed to purchase the necessary equipment. A stable internet connection is crucial for online consultations and telepharmacy training. Table V summarises theme four (infrastructure for telepharmacy training) with illustrative quotes.

Table V: Summary of theme 4 (Infrastructure for telepharmacy training) with illustrative quotes

Theme 4: Infrastructure for telepharmacy training	
Codes	**Illustrative quotes**
Access to internet	We are far behind compared to other countries regarding Internet speed and accessibility. (Practitioner 2)
	We can conduct the sessions of the telepharmacy training within the university compound because I think all universities in Malaysia have their area with internet access and connections. (Academician 1)
Access to devices and software	Currently, Malaysian students, especially those of low-income families and those who live in rural areas, are not adequately equipped with IT devices compatible with the telepharmacy service. (Student 10)
	Providing telepharmacy training may require specialised equipment for teleconferences such as PC. Then a trained faculty or staff member who provides the instruction. Limited resources or funding can make achieving and providing adequate training difficult. (Practitioner 3)
	The university's well-equipped facilities, such as updated software, strong internet connections, and sufficient facilities, are necessary to allow the students to develop their technology-related skills. (Academician 1)

Discussion

Four key telepharmacy training themes for pharmacy students were identified: conducting telepharmacy training, learning components of the module, skills required for telepharmacy, and infrastructure for telepharmacy training. The training should include theoretical and practical learning, as recommended by the participants. Other studies have stated that telehealth education frequently combines didactic instruction with simulations and hands-on training. Developing an awareness of telepharmacy, technologies, telepharmacy etiquette, rules governing practices, and norms for privacy and confidentiality are just a few examples of possible tele-educational topics (Frenzel & Porter, 2021). It is well-established that providing students with theoretical and experiential learning may improve their understanding of what they have learned. Future pharmacists must also learn how to provide treatment digitally through training and hands-on experience informed by the most recent research (Galpin *et al.,* 2021). The mobilisation and application of knowledge to administrative, social, therapeutic, and regulatory actions are supported by longitudinal practical experiences; therefore, it is essential to provide students with longitudinal experiences across the curriculum and a solid knowledge base (International Pharmaceutical Federation, 2021).

Moreover, future pharmacists need to learn various skills from the training, such as those highlighted by the participants, to deliver care via telepharmacy. This finding supports the commentary's recommendation that, in pharmacy programmes, students learn practical skills such as managing electronic health data, consulting with other professionals, and checking prescriptions and medication orders (Frenzel & Porter, 2021). The dramatically increased acceptance and utilisation of telemedicine during the pandemic reinforces the necessity to ensure pharmacists develop the skills to give treatment via telehealth pharmacy. Therefore, healthcare systems must adopt the necessary training, policies, and procedures to facilitate the shift of their workforce and ensure the sustainable delivery of comprehensive services through telehealth (Galpin *et al.,* 2021).

Since telepharmacy uses telecommunication technology, the training programme must teach students basic information technology skills. With the advent of information and communication technologies (ICTs), a substantial avenue for acquiring health-related information is increasingly gaining significance. ICTs are becoming essential in health education, enabling the creation of courageous, creative, and innovative pedagogical health initiatives (Massucato *et al.,* 2021). Future pharmacists can prepare for using, troubleshooting, and optimising technology for telehealth care by having IT skills and recognising the available technology capabilities and limitations, including patient-owned devices and their impact on telehealth care (Galpin *et al.,* 2021).

Considering participant concerns about device and software accessibility and internet connectivity, the responsible authorities must take specific measures to increase students' access to telepharmacy education

and practice. Research has found that 51% of the world's population has no internet access (Pandita, 2017). A study conducted in Malaysia found that urban consumers made up 70% of internet users, while people in rural areas made up only 30% (Malaysian Communications and Multimedia Commission, 2018). Moreover, home was the most preferred location for people to access the internet (88.6%), while the least frequent one was an educational place (12.0%) (Malaysian Communications and Multimedia Commission, 2018), which raises questions about the wide availability of reliable internet connections across educational institutions in Malaysia.

In addition to a stable internet connection, devices and software are required to support learning activities, such as experiential and simulated learning, perceived by students as efficacious tools for teaching self-care (Tai *et al.,* 2020). MyDispense is an example of a readily accessible and free online pharmacy simulation that allows students to practice pharmacy skills in a secure virtual setting by filling prescriptions, assisting patients with self-care needs, and validating virtual colleagues' work to ensure that medications are accurate, legal, and safe before dispensing in real-world pharmacy scenarios (Rahman *et al.,* 2020; Mak *et al.,* 2021). However, there

is a limitation in that the students will not have devices capable of navigating the software, and this issue should be further resolved to make learning telepharmacy more accessible to students.

The interviews showed that the telepharmacy module needs several learning components, including an introduction, an operation, a clinical component, skills, and rules and regulations in telepharmacy (Figure 1). The definition, development, significance, and roles of pharmacists in telepharmacy must all be included in the introduction. Furthermore, ICT and her should be covered through the telepharmacy operations part. Training students in drug-related problem identification and disease management via telepharmacy is necessary for the clinical section. The skills required in the telepharmacy section may include communication, counselling, interprofessional, and information search skills. Despite receiving a theoretical education, the operation, clinical, and skills sections should have some practical training so that the students can experience what it is like to be a pharmacist in a telepharmacy setting. The importance of protecting patient data and the need for ethics in telepharmacy must also be emphasised when teaching students the rules and regulations in the telepharmacy part.
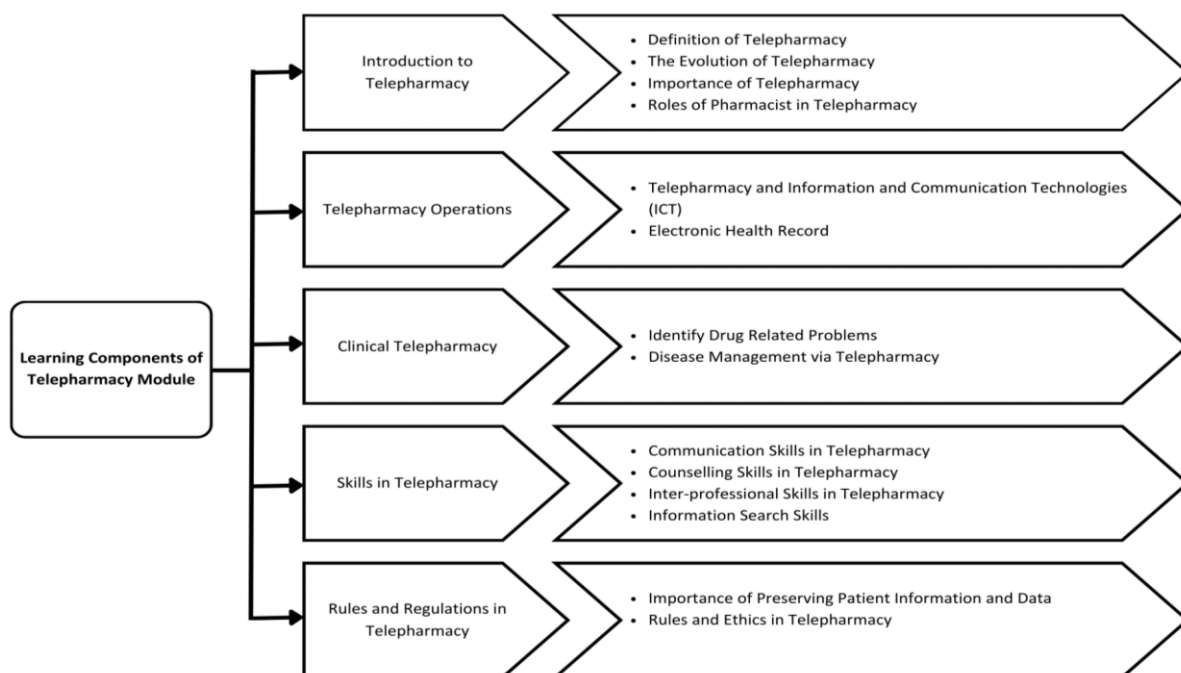

Figure 1: Learning components of telepharmacy module

Strengths and limitations

The main strength of this work is the involvement of academicians and practitioners who had a pronounced

contribution and interest in the field to be in a better position to provide recommendations that might improve student education. Once the module is developed, future research should be conducted to

examine pharmacy students' feedback following the telepharmacy training. It is also essential to consider feedback from academicians and practitioners about students' progress and the training impact.

This study has several limitations. There was an unequal participation share of all included stakeholders. In addition, participants were purposively recruited with no random selection, especially for the academicians and practitioners, as interest and expertise were primary considerations. Finally, illustrative quotes exhibited varying input breadth and depth, challenging the consensus. However, the main learning and training components were identified according to the study objective.

Conclusion

This study identified learning components that could serve as a reference for developing a telepharmacy practice module to help pharmacy students increase their knowledge and abilities and prepare themselves for telepharmacy practice. Pharmacy curricula should consider telepharmacy as a core training requirement for pharmacy students.

Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

Before data collection, official ethics approval was received from the IIUM Research Ethics Committee (IREC 2022–230). All the participants were contacted before the interview to share with them the study objectives and get their assent to participate and informed consent accordingly.

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