Journal of Pharmacy Technology
2020, Vol. 36(5) 171–178

DOI: 10.1177/8755122520931442
journals.sagepub.com/home/pmt
SAGE

Investigating Pharmacists' Views on Telepharmacy: Prioritizing Key Relationships, Barriers, and Benefits

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Abstract

Background: Telepharmacy can help deliver pharmaceutical advice from an expert pharmacist to another party, such as a physician, inexperienced pharmacist, or pharmacy technician. In this study, we consider term "2-person discussions" as teleconsultation between expert pharmacists to each of the aforementioned persons. **Objectives:** This study has 2 aims: first to prioritize 2-person discussions between the parties involved in telepharmacy services when we have limited budget and time and would like to implement the best efficient telepharmacy system. Second to examine the barriers and benefits of implementing a telepharmacy. **Methods:** The research population included 40 pharmacists working in Kerman pharmacies (Iran). Their viewpoints were evaluated using a valid and reliable researcher-made questionnaire. The first part of the questionnaire focused on professional-demographic information, while the second part addressed the most important 2-person discussions and also asked about barriers to and benefits of implementing telepharmacy. **Results:** The findings indicate that the following 2-person discussions are priority for implementation: physician-pharmacist, pharmacist-hospital ward, and pharmacist-pharmacist. Payment and reimbursement issues and lack of access to information technology infrastructure were among the most important barriers. Efficient training about medicine usage, drug-drug interactions, and adverse effects was the most important benefit of telepharmacy. **Conclusion:** In this study, pharmacists' first priority regarding who to involve in a 2-person telepharmacy consultation was to establish a long-distance connection between physicians and pharmacists. This finding indicates that the pharmacists were more interested in providing teleconsultation services to physicians and other pharmacists rather than communicating with pharmaceutical technicians.

Keywords

telepharmacy, prioritization, telemedicine, relationships, 2-person discussions barrier, benefits

Background

Ensuring appropriate and effective relationships between health care providers and patients is central to the progress of medical treatments.[1,2] In recent decades, with the advancement of information technology and the rapid, easy access to a considerable amount of data on the internet, a new form of communication has arisen among health care providers and patients via numerous technology-based health care services.[1,2] Previous studies indicate that 83% of internet users employ medical information resources to search for health care or health-related information, while 66% of the performed searches address special medical cases or medical complications.[3] Furthermore, 45% of searches focus on finding information about over-the-counter and other prescription drugs, while 35% seek substitutable treatment procedures or medicine.[3] The use of information and communication technology to access health care services led to the establishment of the concept of telemedicine.

Telemedicine refers to transferring medical information from one place to another and providing and supporting clinical care by using electronic communication methods.[2,4] Telemedicine can be as simple as a telephone call that provides information about a patient or a call through which a medical consultation is provided between physicians and patients. However, it can also be very complicated, such as robotic surgery with the help of satellite technology, or videoconferencing equipment to enable consultation between the health care providers of organizations in 2 different states or 2 different countries.[2,4] The goal of telemedicine is to improve patient care, provide further access to and medical treatment for rural and deprived areas, increase the

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accessibility of physicians for consultation, ensure that the required equipment is available to physicians so they can conduct their automated examinations, reduce medical treatment costs, transfer and hospitalize patients at health care centers, provide access to medical care services (at a broader geographic and population level), decrease patients' transfer to health care centers, and create a manageable caring atmosphere in hospitals and health centers.[2,4,5] The potential benefits of telemedicine render it attractive and preferable in different areas of health. Accordingly, novel therapeutic techniques and health care services have emerged, such as telepharmacy, teleconsultation, long-distance education, teleradiology, telepathology, telecardiology, remote home care services, remote emergency services, and remote surgery.[2,4,5]

Telepharmacy is one of the practical aspects of telemedicine that refers to providing pharmaceutical services within the scope of the pharmacist's responsibilities, with a temporal and spatial distance between patients, users of health services (clients), and providers of health care. Telepharmacy is used when a pharmacist is needed, yet cannot be present in person.[4,6] Providing appropriate medical services to patients and consulting with other health care providers play a significant role in decreasing arbitrary use of medicines, reducing adverse effects and drug interactions, increasing the effectiveness of medications, and reducing costs.

Iran is a vast country with remote rural areas, and the distance between cities and rural areas has always been a major challenge for the health care sector because of a lack of qualified pharmacists in rural and remote areas.[6-8] Thus, providing pharmacy services via a pharmacy technician under the supervision of a pharmacist in remote areas can compensate for the absence of pharmacists in deprived areas.[6-8]

Previous studies have indicated that using telepharmacy can increase the quality of health care–pharmaceutical services; reduce health care–pharmaceutical errors; increase patients' access to health care–pharmaceutical services; reduce the costs of health care–pharmaceutical services; increase the satisfaction of pharmacists, physicians, and nurses; enable recognition of the unknown adverse effects of medicines; and increase the quality of pharmacists' education.[4-8] A telepharmacy system can be implemented to connect an experienced pharmacist to a physician, or to an inexperienced pharmacist working in a distance, or to a pharmacy technician working in a remote area. We use the term "2-persons discussions" for each of aforementioned probable person-to-person communications. However, despite these benefits of telepharmacy, its implementation is hindered by several barriers and limitations. One of the important challenges in telepharmacy is identifying the priorities for 2-person discussions between involved parties in telepharmacy services particularly when time and budget are limited, and we are obliged to choose the most important 2-person discussion as a priority. In other words, there are many possibilities in terms of selecting the people who should be involved in the 2 sides of a telepharmacy consultation, and deciding who should participate in telepharmacy is important. For example, it is important to consider whether a telepharmacy consultation should occur between a pharmacist and general physician, or between one experienced pharmacist and another inexperienced pharmacist working in a remote area, and so on. The main question is what is the most effective and important use of telepharmacy in the real clinical context. In addition, in remote pharmaceutical services, it is important to examine which communication is most important and effective in the time of the possibility of communication and consultation between healthcare providers.

Another challenge is to recognize the barriers and limitations to the implementation of telepharmacy. According to prior studies, there are a wide variety of barriers to the implementation of telepharmacy, including the following:

- Lack of technical infrastructure
- Lack of software
- Lack of appropriate hardware equipment
- The negative attitudes of health care providers
- Lack of appropriate advertisements
- Limitations in the technical knowledge of managers and policymakers
- Concerns about safety, reliability, privacy, and confidentiality[9-14]

The solutions to some of these limitations are both time-consuming and expensive; however, some can be overcome via appropriate measures and planning. Investigating the opinions of all key user groups is important prior to implementing new technologies in organizations because the resistance of any user group can hamper the successful implementation of this method and postpone the overall acceptance of the technology.[15,16]

The answers to these challenges may vary depending on the country and region of the service and the type of drug delivery system. Therefore, this study sought to answer 2 questions from the pharmacist's perspective as a main group of stakeholders in a health care system.

1. What is the priority of key relationships (2-person discussions) between involved parties in remote pharmaceutical services (telepharmacy) from the perspective of pharmacists in Iran?
2. What are the barriers and potential benefits of implementing telepharmacy?

Answering these questions in the context of Iran will assist health managers to make suitable decisions and plans with regard to telepharmacy systems, thereby leading to optimal policies and investment for health care in the field of telepharmacy systems.

Methods

This descriptive-analytical study was undertaken in 2019 with a population of pharmacists working in pharmacies in Kerman—the largest city in southeast Iran. Kerman has a total of 124 pharmacies (both private pharmacies and hospital pharmacies), and 40 of these pharmacies were randomly selected from the Kerman pharmacy list. A questionnaire designed by the researchers was used for the data collection. The questionnaire was designed based on previous studies,[5,9-14] with input from medical and pharmaceutical experts. The content validity of the questionnaire was affirmed via the opinions of 2 medical informatics and 2 pharmacists. In terms of the reliability of the questionnaires, based on the questionnaires filled out by all participants, the Cronbach's α coefficient was calculated as .94.

The first part of the questionnaire included 5 demographic questions, with the goal of acquiring the participants' professional-demographic information (gender, age, professional background, job position, and education). The second part of the questionnaire included 3 sections. The first section asked 1 question about prioritizing the most important 2-person discussions in the implementation of telepharmacy system. The second section involved 20 questions that were concerned with telepharmacy implementation challenges. The third section presented 10 questions that measured the participants' attitudes toward the benefits of telepharmacy implementation. Moreover, an open-ended question at the end of each section asked for other important issues from the participants' point of view. The questions in the second part of the questionnaire were answered using a 5-point Likert-type scale, ranging from very low to very high. The data were collected through in-person visits to the selected pharmacies.

After data collection, the data were analyzed in the Statistical Package for the Social Sciences (SPSS), version 24. To analyze the data, the responses to each item were scored from 1 (very low) to 5 (very high). The mean and standard deviation of the scores assigned by the participants to each question were calculated. Each question with the highest mean was identified as the most important factor in each section (relationships, barriers, and potential benefits). To determine the relationship between the second part of the questionnaire and the professional-demographic information of the participants, an independent *t* test and 1-way analysis of variance were used.

Results

Professional-Demographic Information

Table 1 displays the participants' professional-demographic data. The greatest number of participants were in the age range of 20 to 29 years (62.5%), and the majority of participants were female (62.5%). Moreover, the majority of participants were pharmacists (47.5%). Of the 40 participants, 35 held a PhD qualification in general pharmacology (Table 1).

Table 1. The Participants' Professional-Demographic Information.

Professional-demographic information	Frequency (%)
Age, years	
20-29	27 (67.5)
30-39	4 (10.0)
40-49	5 (12.5)
50-59	4 (10.0)
Gender	
Female	25 (62.5)
Male	15 (37.5)
Job position	
Pharmacist	19 (47.5)
Hospital pharmacist	2 (5.0)
Technical director	11 (27.5)
Technical director deputy	3 (7.5)
Pharmaceutical supervisor	2 (5.0)
Faculty member	1 (2.5)
Pharmacy founder	2 (5.0)
Education degree	
PhD	1 (2.5)
Doctor of pharmacy	35 (87.5)
Student of general pharmacy	4 (10)
Professional background	
Less than a year	8 (20)
1-5 years	18 (45)
6-10 years	3 (7.5)
More than 10 years	11 (27.5)

Relationships (2-Person Discussions)

Table 2 displays the "2-person discussions" prioritization in providing telepharmacy services. According to the pharmacists working in pharmacies, the most important 2-sided relationships or 2-person discussions are the physician-pharmacist relationship ($\bar{x} = 3.88$, SD = 1.11), pharmacist-hospital ward relationship ($\bar{x} = 3.73$, SD = 1.13), and pharmacist-pharmacist relationship ($\bar{x} = 3.65$, SD = 1.14), respectively. No significant relationship was observed between the participants' professional-demographic information and telepharmacy services. Age, gender, professional background, educational degree, and job position had no influence on relationship preferences in telepharmacy service delivery ($P < .05$).

Barriers

The most important barriers to telepharmacy implementation identified by the participants were problems regarding

Table 2. The Relationship Prioritization in Providing Telepharmacy Services.

Relationship	Mean (SD)
Physician-pharmacist	3.88 (1.11)
Pharmacist-hospital wards	3.73 (1.13)
Pharmacist-pharmacist	3.65 (1.14)
Pharmacist-patient	3.47 (1.32)
Relationships between urban hospitals	3.37 (1.12)
Pharmacist-pharmaceutical technician	3.25 (1.29)
Pharmacist-rural health center	2.97 (1.18)
Pharmacist-health house	2.70 (1.18)
Pharmaceutical technician-patient	1.97 (1.20)

payment (insurance and reimbursement; $\bar{x} = 4.17$, SD = 0.81), lack of access to information technology infrastructure (such as high-speed internet and high bandwidths; $\bar{x} = 4.15$, SD = 0.94), and lack of coordination between different health sectors ($\bar{x} = 3.97$, SD = 0.94), respectively (Table 3). No significant relationship was observed between the participants' professional-demographic information and the barriers to telepharmacy implementation ($P > .05$).

Potential Benefit

Table 4 shows telepharmacy implementation benefits. The most important benefits of telepharmacy identified by the participants encompassed the efficient training of physicians, pharmacists, and patients ($\bar{x} = 3.90$, SD = 0.87); assistance in decision making and the diagnosis of drug interactions ($\bar{x} = 3.82$, SD = 0.81); and prevention of unnecessary trips by clients to access medical-pharmaceutical services ($\bar{x} = 3.77$, SD = 0.99; Table 4). No significant relationship was observed between the participants' professional-demographic information and the telepharmacy implementation benefits ($P > .05$).

Discussion

The findings of this study indicated that, from the pharmacists' perspective, the relationships between physicians and pharmacists, pharmacists and hospital medical wards, and pharmacists and pharmacists are the most important relationships in providing telepharmacy services. Numerous studies have indicated that the relationship between physicians and pharmacists is vitally important for managing chronic diseases, such as hypertension and diabetes.[17,18] Given the increasing number of patients with chronic clinical conditions, pharmacists' worldwide involvement in telepharmacy models, improvement of monitoring, and encouragement of drug compliance can reduce the risk of drug errors, adverse drug adverse effects, drug costs, and the probability of medical treatment failure.[6]

In the present study, the relationship between pharmacists and hospital medical wards was another important relationship in telepharmacy services. In their review study, Niznik et al[19] examined the effect of telepharmacy on outpatient settings in hospitals, and found that pharmacists were often in contact with outpatient and emergency wards of hospitals via telephone, which positively affected the clinical management of diseases, disease self-management, and adherence to the treatment of chronic diseases. Schneider[20] also investigated the effect of telepharmacy services on pharmacists' participation in medication order counseling when the hospital pharmacy was closed. Schneider's study[20] indicated that offering this range of telepharmacy services reduced the number of drug adverse effects. In most hospitals, patients' prescribed drugs are delivered directly to nurses via a pharmacy technician. Telepharmacy technology is necessary to provide physicians and nurses with on-site and 24-hour access to pharmacists.[21]

The relationship between pharmacist and pharmacist was identified as another important relationship in providing telepharmacy services. Previous studies have demonstrated that, concurrent with advances in medicine and pharmacy, pharmacists need to maintain contact with each other and stay abreast of new drugs, including their scientific and trade names and their potential drug adverse effects. Accordingly, telepharmacy can assist pharmacists as an educational and communication method.[21] The results of this study indicated that, contrary to expectations, pharmacists placed more importance on communication with the medical team and the pharmacist than with pharmaceutical technicians.

Based on the Global Human Resources for Health Strategy, mid-level medical staff, such as pharmaceutical technicians, play an important role in compensating for the shortage of pharmacists and health care system development because of their availability, short-duration education course, and low-cost academic education.[22] For example, in Iran, pharmaceutical technicians who work in remote areas are permitted to deliver medication to patients based on the doctor's instructions and explain to the patient the correct use of the medicine. Contrary to the emphasis on the employing of pharmaceutical technicians, we see in our study that the role of pharmaceutical technicians in developing countries is not very important from pharmacists' points of view. Therefore, before implementing telepharmacy technology, it is necessary to change the perspective of pharmacists to employ pharmaceutical technicians to provide remote pharmaceutical services, and pharmaceutical technicians must receive better training to help compensate for the shortage of pharmacists.

Moreover, the results of this study indicated that these pharmacists believed that the pharmacist-hospital ward relationship was more important than the relationship with

Table 3. Prioritization of Barriers to Telepharmacy Implementation From the Participants' Viewpoint.

Number	Barriers	Mean (SD)
1	Problems in payments (insurance and repayments)	4.17 (0.81)
2	Lack of access to information technology (IT) infrastructure (such as, high-speed internet, high bandwidths)	4.15 (0.94)
3	Lack of coordination between different health sectors	3.97 (0.94)
4	Inability to integrate telecommunication pharmacy systems with pharmacy information system and other hospital information systems	3.87 (0.93)
5	Medical staff resistance to use this system	3.85 (1.16)
6	The government's lack of knowledge about the technology and its benefits	3.82 (1.08)
7	Insufficient training of medical staff, pharmacists, and patients regarding the use of this system	3.80 (0.88)
8	Lack of awareness of the technology and its benefits within the society and among patients	3.70 (1.15)
9	The complexity of using this technology for patients	3.65 (1.02)
10	Complexity of using this technology for nonpharmacists (technicians, nurses, rural pharmacy staff)	3.62 (1.0)
11	The complexity of health service delivery processes	3.52 (0.87)
12	Problems with telepharmacy license	3.52 (0.84)
13	Time limits and lack of time to use this technology	3.50 (1.01)
14	High maintenance cost of this system	3.32 (0.97)
15	Lack of pharmacist-technical staff to provide telepharmacy services	3.30 (1.15)
16	The high cost of equipment and hardware needed for telepharmacy	3.22 (0.99)
17	Privacy and confidentiality issues	3.20 (1.20)
18	Pharmacists' resistance to use this system	3.07 (1.22)
19	Patients' resistance to use this system	3.07 (0.94)
20	The complexity of using this technology for pharmacists	2.60 (0.90)

health centers and health houses. This result may have arisen for 2 reasons: (1) because the pharmacists in this study were more inclined to contact the team of physicians and pharmacists and (2) the highest number of referrals to pharmacies was from hospitals; thus, equipping hospitals with telepharmacy technology is a priority over equipping health centers and health houses.

In addition to identifying the most effective relationships in providing telepharmacy services, this study also identified the major barriers to the implementation of telepharmacy. The most significant barriers to successful telepharmacy implementation included problems with payments (insurance and repayments), lack of high-speed internet access and high bandwidth, and lack of coordination between various sectors of the health system. In line with the findings of this study, several previous studies have also focused on problems regarding insurance and reimbursement as important barriers that may cause failure when implementing telemedicine projects in different health sectors.[4,9,13,23] Kane-Gill and Rincon[4] identified the factors of costs (of launching and maintaining the technology), legal issues, confidentiality concerns, refunds, and government licensing issues as barriers to the successful implementation and use of telepharmacy. Weinstein et al[9] also investigated the barriers to telemedicine. Based on the results of their study, the major barriers to telemedicine implementation were licensing issues for physicians, accountability, and reimbursement limitations.[9] Although implementing and maintaining remote pharmaceutical service systems is costly, future health trends—including the increasing elderly population and consequent chronic diseases—will cause an increase in drug use, which places individuals at risk of drug complications. As such, effective interventions are essential to provide the required pharmaceutical advice and monitor the correct and timely use of drugs with maximum availability. This can be achieved through the development of technology infrastructure and cooperation between insurance organizations and the government.

In this study, a lack of high-speed internet access and high bandwidth were identified as the second most important barrier to the implementation of telepharmacy. In line with this finding, Rogove et al[13] also identified technological and internet connectivity problems as barriers to telemedicine implementation, as measured from the viewpoint of physicians and nurses. Moffatt and Eley[23] also indicated that limited internet access, limited facilities (such as hardware), and lack of interest in computer learning were the major barriers to the implementation of telemedicine services. However, while the current study identified a lack of high-speed internet access as a barrier, drug counseling can also be undertaken via a telephone call, text message, or voice call through mobile applications.

Today, given the growing number of internet users and high penetration rate of smartphones, the communication space has changed and mobile communications are increasing. According to a World Health Organization report, there

Table 4. The Prioritization of Telepharmacy Implementation Benefits From the Participants' Viewpoint.

Number	Benefits	Mean (SD)
1	The impact of telepharmacy on efficient training of physicians, pharmacists, and patients (medicine usage, drug-drug interactions, and adverse effects)	3.90 (0.87)
2	Effect of telemedicine on helping the decision-making and diagnosis of drug interactions	3.82 (0.81)
3	The impact of telepharmacy on preventing unnecessary trips to access pharmacy services	3.77 (0.99)
4	The effect of telepharmacy on assisting medical services and prevention of diseases	3.62 (0.97)
5	The effect of telepharmacy on reducing medical errors	3.61 (1.18)
6	The impact of telepharmacy on fair distribution and availability of health services	3.47 (0.84)
7	The effect of telepharmacy on improving the quality of health services	3.47 (0.84)
8	The effect of telepharmacy on health service cost reduction	3.25 (1.0)
9	The effect of telepharmacy on chronic disease control	3.12 (0.91)
10	The effect of telepharmacy on increasing satisfaction of pharmacists, physicians and nurses	3.02 (1.04)

are more than 5 billion wireless internet subscribers worldwide, more than 70% of whom live in low- and middle-income countries.[24] In this situation, given the development of internet infrastructure and progress in remote consulting equipment, it seems that technical issues are not the main obstacle to the development of telemedicine systems. Probably legal issues, security, and privacy related to telemedicine seem more important, particularly because, in many developing countries, there is no legislation regarding the use of telemedicine.

The third hurdle in implementing telepharmacy identified in this study was the lack of coordination between the various parts of the health system. This finding indicates that pharmacists are concerned about other units of the health sector involved in the telepharmacy system. Based on Table 3, the pharmacists considered that there was a low level of resistance to telepharmacy systems among themselves, yet assumed there was a high probability of resistance among physicians.

This study indicated that among the most important benefits of implementing telepharmacy is the effect of telepharmacy on the efficient training of physicians, pharmacists, and patients with regard to medicine usage, drug-drug interactions, and adverse effects. McFarland's study[21] also showed that the successful implementation of telepharmacy is a timely approach to train health care providers in delivering high-quality medication-related advice and services. Pharmacists have the duty of identifying and documenting drug adverse effects and patients' medical background.[25] Furthermore, discharge counseling is provided by pharmacists, which improves drug adherence and patient knowledge.[25] As a result, pharmacists' performance in health care organizations promotes drug safety and treatment outcomes among patients.

The current study also demonstrated the important effect of telepharmacy on decision-making and diagnosis of drug interactions. This was the second most important advantage of telepharmacy implementation stated by the participants. In this regard, numerous studies have indicated that the use of technology in pharmacy can have a significant effect on clinical decision-making, reduction of medical errors, and drug interactions.[26,27] McGinnis et al[28] also discussed the effect of using telepharmacy services on identifying patients' medical history in emergency departments and reducing drug interactions. Therefore, according to the findings of previous studies and the results of this research, the use of telepharmacy can prevent inadvertent pharmaceutical problems and errors by pharmacists and physicians. It can also reduce the costs for patients and health service providers.

The results indicated that the third benefit of telepharmacy implementation is the prevention of unnecessary trips by patients to receive medical-pharmaceutical services. Peretti et al[29] also demonstrated that the use of telemedicine services can prevent unnecessary journeys, which can save patients' time and money, thereby increasing their life quality.[30]

Overall, several previous studies have investigated the various factors involved in the implementation and use of telemedicine services in different health care provider organizations.[9,14,28-30] This study prioritized the most important 2-person discussions and also identified barriers to, and benefits of telepharmacy services from pharmacists' perspectives. One limitation of this study was that it only examined the viewpoints of pharmacists working in Kerman pharmacies. Therefore, given the limited study population, generalization of the results should be undertaken with caution. However, this study was able to identify the most important relationships in telepharmacy by examining the perspectives of pharmacists. As far as the authors are aware, this research is the first of its kind to investigate pharmacists' views on telepharmacy implementation. The study focused on various dimensions of telepharmacy, such as the essential relationships involved in providing telepharmacy services, as well as this service's barriers and benefits. Previous studies have

highlighted numerous challenges facing telemedicine services,[9-14] and comparing the findings of this project with the findings of other similar projects reveals that almost all barriers mentioned in this study were also considered in previous studies. However, the order of priorities for the barriers differed in this study, which could be a result of differences in attitudes, health care mechanisms, and infrastructure level in prior studies.

Conclusions

In this study, in telepharmacy service provision, the findings indicated that the relationships between physician-pharmacist, pharmacist-hospital medical ward, and pharmacist-pharmacist were the most important relationships, while the relationship between pharmaceutical technician-patient was the least important. To access all the benefits of telepharmacy, all key relationships—especially the role of pharmaceutical technicians—must be considered when providing this technological service. Furthermore, devoting attention to the existing technological infrastructure and reimbursement guidelines can facilitate more extensive use of telepharmacy. Therefore, health policymakers and planners are advised to formulate and revise reimbursement guidelines and determine the role of insurers in the telepharmacy sphere, after identifying effective relationships for telepharmacy service provision. Then, by allocating funds and investing in the health sector, technology-based infrastructure could be established to provide the numerous benefits of telepharmacy.

Acknowledgments

The authors would like to thank all pharmacists who participated in this research.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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