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A Review on Telepharmacy on Asthmatic Patients in Asia

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Abstract

Telepharmacy is regarded as a method of providing pharmaceutical treatments and care via telecommunication to various individuals. In this manner, patients can receive their medications and other pharmaceutical care products in the convenience of their own homes. Like other telehealth services, it can help make healthcare more accessible to those who live in rural or isolated communities and makes pharmacy services more readily available and convenient for those with limited mobility, time, or transportation options. The use of telepharmacy on asthmatic patients is a research topic that has been widely published globally. However, in Asia, there is limited research on the application of telepharmacy services for asthmatic patients. Hence, this article review aims to analyze articles regarding the application of telepharmacy specifically on aiding the asthmatic patients within Asia and its effects, impacts, and its importance on the quality of life, management of asthma and mitigating the issues – medication adherence and insufficient knowledge on inhaler usage techniques which stems from poor patient counselling, respectively. This review gathered various literature and articles through the usage of online journal databases: PubMed, Medline, Cochrane Library, Google Scholar, Elsevier, Scopus, and more, utilizing keywords for specificity. Hand-searching pertinent publications on the research topic was used to guarantee that all necessary, existing literature/articles were included. This review concludes that the telepharmacy services specific to asthmatic patients in Asia increases the quality of life, has positively impacted the improvement of the management of asthma in regulating their symptoms, and is significant in providing quality care and patient counselling to asthmatic patients. Further, it is evident in this literature review the continual lack of studies regarding telepharmacy services to asthmatic patients in Asia.

Keywords: Telepharmacy, asthma, asthmatic patients, Asia

1. Introduction

About 50% of patients worldwide seldom take their prescribed therapeutic medication, hence the full benefits are overlooked; in spite of the drug's efficacy [1]. Poor patient counselling led to the hampering of patient compliance [2]. Moreover, according to Albekairy (2015) mentioned lack of knowledge, interest and partial consciousness are seen as common barriers towards patient counselling [3]. A study in both Korea and Australia showed that time constraints hindered the counselling progress [4,5]. Asthma, which is an LTC because it is chronic and affects an estimated 235 million people worldwide, is a problem for public health according to the World Health Organization (2018) [6]. However, excellent and innovative medication compliance is related to better patient counselling, which encourages a decrease in mortality, morbidity, and pharmacotherapy costs [7]. Moreover, in the survey of the National Review of Asthma Deaths in 2017, 67% of asthma deaths were caused by patients not taking their prescribed asthma medication [8].

The practice of registered pharmacists and pharmacies providing pharmaceutical-related services to patients at a distance via telecommunications technology is known as telepharmacy [9]. Since 2001, telepharmacy has been adopted and widely practiced globally, particularly in North America (USA, Canada) [10,11,12,13], Europe (Spain) [14,15], Oceania (Australia) [16]. However, in Asia, there are very few studies pertaining to telepharmacy services specific to asthmatic patients. The use of telepharmacy in healthcare services is still relatively new in Vietnam [17]. The objective of this article review is to unravel and examine the effects of Telepharmacy in improving the Quality of Life of asthmatic patients, impact of Telepharmacy and patient counselling to asthmatic patients, and the importance of Telepharmacy in the management of asthma in Asia.

2. Methods

2.1 Search strategy

This study utilized a systematic search of existing literature, including articles on the effects, impacts and importance of Telepharmacy and patient counselling on asthmatic patients in Asia, using the following databases: Pubmed, Medline, Cochrane Library, Google Scholar, Elsevier, Scopus and more. Hand-searching relevant articles on the research topic were employed to help ensure the confinement of all necessary existing literature or articles. The search was specified to research articles published from 2010 to October 20, 2022 using related search terms, which are the following but not limited

to “telepharmacy”, “asthma”, “asthmatic patients”, “Asia” and even names of each country belonging to the said continent. The bibliographies of all papers thus located were searched for further relevant articles. The study inclusion was limited to within Asia continent and English as the basis of the language. The search was conducted independently by 6 investigators (Cuizon, Macarona, Narciso, Requita, Saito, Tandingan) who retrieved relevant studies accordingly.

2.2 Study Selection

The inclusion criteria for this literature review were as follows:

1. Articles about the effect of telepharmacy in improving the quality of life of asthmatic patients
2. Articles about the impact of telepharmacy and patient counselling to asthma patients
3. Articles about importance of telepharmacy in the management of asthma

The exclusion criteria included the following:

1. Articles that do not focus on telepharmacy specific to asthmatic patients or are articles that relate to other diseases or illnesses aside from asthma.
2. Articles about telepharmacy that are conducted outside Asian countries.
3. Articles about telepharmacy that are published before 2010.

3. Results and Discussion

3.1. Literature Search

The search yielded 6 articles from various databases and each article was screened for a full-text assessment. In this literature review, all 6 articles were utilized.

Table 1. *Effect of Telepharmacy in improving the Quality of Life of Asthmatic patients*

Author, Year, Country	**Study Description**	**Findings/Conclusion**
Raimi *et al.* (2022) - **Malaysia**	The purpose of this study is to evaluate the effect of health education delivered through mobile application in asthmatic students in urban Malaysian during COVID-19. This study utilized a quasi-experimental, pre- and post-intervention design with a total of 214 students randomly assigned to two groups. The control group received face-to-face health education while the experimental group received health education through a mobile application.	The effect of health education via a mobile application showed a statistically significant improvement in the mean quality of life score from pre- to post-intervention ($F1,288 = 57.46$, $P < .01$). As recommended, the use of mobile technology in health education improved the quality of life of asthmatic students as compared with the traditional methods of a face-to-face lecture and/or a handbook. Thus, educational modules using mobile applications do improve quality of life [18].
Lv *et al.* (2012) - **China**	150 outpatients with asthma were divided into the control, traditional, and SMS groups at random. The Global Initiative for Asthma was the basis for verbal education given to patients in all groups. Patients in the traditional group received an individual asthma action plan for self-management that included peak expiratory flow monitoring and asthma diary recording, whereas patients in the SMS group received daily SMS reminders on their mobile devices. The Standard Asthma-Specific Quality of Life [AQLQ(S)], the six-item Perceived Control of Asthma Questionnaire (PCAQ-6), spirometry, blood and induced sputum cell count, follow-up compliance rate, medication compliance rate, and emergency department (ED) visits data were collected at the initial visit and 12 weeks later.	The analysis-ready trial was completed by 71 participants in total. Patients' PCAQ-6 scores rose considerably in both the SMS and traditional groups after 12 weeks (p0.001), with the SMS group experiencing a higher increase than the traditional group (p=0.018). The greatest AQLQ(S) score and follow-up rate were seen in the SMS group of patients. A correlation of 0.442 was found between the change in PCAQ-6 score and the change in AQLQ(S) score. Despite no significant differences between the three groups in the alterations of FEV1%, blood and induced sputum eosinophil and neutrophil counts, patients in all groups had better forced expiratory volume in 1 second (FEV1%) and fewer visits to the emergency department (ED). Therefore, SMS can enhance PCA and is superior to traditional programs in terms of follow-up rates and quality of life specifically related to asthma [19].

Discussion

Uncontrolled asthma was found to be significantly influenced by medication non-adherence in a cross-sectional survey of 4125 adult asthma patients in China [20]. Inadequate asthma control, poor quality of life, and increased use of emergency and non-emergency health services are caused by underdosage of controller drugs, overdosage of rescue medications, and improper use of inhalers [21,22]. Studies conducted by Juniper and co - researchers have revealed a strong correlation between asthma patients' Health Related Quality of Life (HRQoL) scores and their asthma control levels [23]. Asthma can be controlled when proper information and encouragement are added to clinical care to improve the patient's ability to manage their asthma on their own. Improved self-management has a positive influence on the health-related quality of life (HRQoL), similar to many other chronic health disorders [24].

Numerous studies have demonstrated the value of telehealth, particularly telemedicine and telepharmacy, in enhancing asthma results [25,26]. As more families have access to the internet , telemedicine has emerged as a financially and geographically feasible method of monitoring asthmatic children. This may help asthmatic patients avoid unplanned clinic visits, trips to the emergency room, and hospitalizations for asthma [27]. It has become a viable way of pharmacy service for patients in disadvantaged areas [28].

In this article review, a study conducted by Raimi *et al.* (2017) proves that the use of mobile technology in delivering health education has improved the quality of life of asthmatic patients in Malaysia. It has been discovered that mobile technology is more effective than conventional face-to-face teaching methods like lectures or handbooks at imparting health information to students who suffer from asthma and improving their knowledge of the condition. Therefore, it is recommended that mobile applications should be introduced to educational modules that seek to enhance knowledge [18]. Similarly, in a study conducted by Lv *et al.* (2012), asthmatic outpatients in China receiving daily SMS reminders on their mobile phones have shown higher quality of life and follow-up rate due to enhanced perceived control of asthma. This method allows for daily monitoring which helps increase patient's adherence to treatment regimens [19]. Thus, telepharmacy improves the quality of life of asthmatic patients in Asia.

Table 2. *Impact of Telepharmacy and Patient counselling on Asthmatic Patients*

Author, Year, Country	**Study Description**	**Findings/Conclusion**
Mahdi & Anwer (2021) - **Karbala, Iraq**	This study is the first prospective educational interventional research for children with asthma in Karbala, Iraq. The goal of this patient-focused study is to determine how pharmacist counselling affects children's asthma control by raising awareness of asthma-related knowledge such as definition, causes, triggers, signs and symptoms, types of medications, and the right use of inhalers. With their consent, 105 participants in the study attended a face-to-face interview where they were asked questions regarding their usage of inhalers and advice on managing their asthma. There remain 92 qualified participants. At the initial appointment, their CACT was noted. The patients were checked on once a week for a month by phone or in person to assess the patients' asthma control, rescue drug use, signs and symptoms, inhaler use, and other asthma-related problems. CACT was measured and compared to the first reading before intervention in the fourth week.	Following the interventional pharmacist's weekly follow-up visits either by phone or face-to-face and the provision of asthma counselling, there was a significant increase in ACT/C-ACT. It will be easier for children with asthma to regulate their symptoms if pharmacists are included in their care plan to offer asthma counselling and instruction on how to use inhalers properly. The patient's quality of life will increase as a result of asthma counselling provided by a pharmacist in a patient-centered setting. This will make managing symptoms easier. This will support the medical professional's diagnosis and medication recommendation. [29]

Discussion

Shabogdahi *et al.* in 2022 has analyzed 102 published articles that showed that over time, more researchers in the field of asthma adopted e-health interventions. The top technologies employed by researchers to carry out the intervention were web-based apps, text messaging technologies, mobile applications, voice call technologies, and reminder systems, in that order. The most interventions were made in the area of managing asthma, followed by patient monitoring, medication adherence, and self-care [30]. Accordingly, Elliott *et al.* states that telemedicine as a form of e-health is beneficial to improve patient-physician communication. It provides educational possibilities, promotes access to care, enhances health outcomes, lowers medical expenses, and makes better use of resources [31].

According to a study by Mahdi and Anwer (2021), education may be the key to managing asthma 90% of the time and medication is only 10%. If healthcare providers, parents of children with asthma, and children with asthma are encouraged to share their concerns about asthma and drug usage, it will be simpler to communicate and break down barriers [29]. The role of a pharmacist in pharmaceutical care is to help people use their prescriptions as effectively as possible [32]. The impact of pharmacist involvement was further seen in the number of orders reviewed, modified, discontinued, or cancelled by a remote pharmacist, reduced order processing time, and saving money [33]. By serving as the first and most accessible interface for patients

and as a member of the healthcare team, pharmacists can contribute significantly by providing advice and educating patients on correct inhaler technique leading to improved asthma management [34,35].

A pharmacist can actively participate in the provision of pharmacy services in any telepharmacy paradigm. The pharmacist who participates in telepharmacy models guarantees the community receives high quality care, especially in areas like medication reviews and patient counselling [36]. In a study conducted by Mahdi and Anwer (2021), results show that the management of symptoms will be easier for children with asthma if pharmacists are included in their care plan to offer asthma counselling and instruction on how to use inhalers properly [29]. Similarly, Saeed *et al*. discovered that consistent counselling sessions enhance therapeutic results in the control of obstructive lung diseases. By assessing lung function and using the Asthma Control Test, it is possible to determine how counselling affects asthma control (ACT) [37].

Furthermore, a study on telepharmacy-related services and outcomes in the USA found that using webcam-enabled telepharmacy services is recommended by pharmacists since it offers better privacy and longer counselling sessions [38] . Hence, telepharmacy ensures that patients are more satisfied with the pharmacy counselling and the time needed to obtain medication [39].

Table 3. *Importance of Telepharmacy in the Management of Asthma*

Author, Year, Country	**Study Description**	**Findings/Conclusion**
Li *et al.* (2021) - **China**	The study aims to establish and launch a telepharmacy framework to implement pharmaceutical care during the COVID-19 pandemic. To establish a remote pharmacy service model based on a medication consultation service platform under the official account of the "Beijing Pharmacists Association" on the social software WeChat app, obtain the medication consultation records from February 28 to April 27, 2020, during the worst period of the epidemic in China, and to perform a statistical analysis of the information about the patients seeking consultation, consultation process, content and follow-up results.	Female patients preferred online consultation and the majority of them had inquiries about their health or drug issues. Patients are mostly interested in drug efficacy, side effects, and chronic illness management, and they are more likely to ask questions about prescription and over-the-counter pharmaceuticals than queries regarding botanical and nutritional supplements. The patients can communicate with their pharmacists via Telepharmacy services. The study or research conducted suggests that the timely and interactive consultation platform aids in the administration of medication management for patients with chronic illnesses, enhances patient medication adherence, boosts medical quality, and can help to spread awareness of safe pharmaceutical practices [40].
Kim *et al.* (2016) - **Korea**	The purpose of this study is to assess the viability of an all-encompassing healthcare system for the treatment of asthma utilizing a smartphone application (snuCare) based on a self-management action plan or guideline. The Seoul National University Bundang Hospital received a total of 44 patients between December 2011 and February 2012, including asthmatics with weakened immune systems. They were divided into groups of 22 users and 22 non-users of the application. The researchers included patient adherence to treatment programs together with clinical factors including asthma control and the Quality of Life Questionnaire for Adult Korean Asthmatics.	The two groups' baseline characteristics were comparable, with the exception of those who had taken a short-term systemic steroid or an increased dose in the eight weeks prior (user vs. nonuser: 31.8% vs. 4.5%, p = 0.020). In eight weeks, 2,226 signals, five of which were critical states, were generated. According to the highest satisfaction ratings (4.3 0.56), after eight weeks, the program was simple to use (mean standard deviation, 4.3 0.56). 73% of asthma sufferers said the app was useful. Scores on adherence increased (p = 0.017). As a result, the widespread healthcare system utilizing a smartphone application (snuCare) based on the self-management guideline or action plan may be useful in the monitoring and control of asthma [41].
Uysal *et al.* (2013) - **Turkey**	This research compares the paper-and-pencil and web-based texting forms of the Turkish version of the ACT and assesses the consistency of these ACT scores with GINA-based physician assessments of asthma control. 431 asthma patients from Turkish outpatient clinics participated in this multicenter prospective study. The patients were randomly divided into two groups: text messaging (n = 211) and paper and pencil (n = 220). To establish the validity and responsiveness of the test, patients took the ACT at Visit 1, after 10 days, and at 5 weeks. Physicians evaluated the patients' levels of asthma control at each visit.	An internal consistency of 0.82 was found on the ACT given via text. For the texting group, researchers discovered a strong connection between the ACT and physician assessments at Visit 1 (r ¼ 0.60, p50.001). AUC was 0.87, sensitivity was 78.0%, specificity was 77.5%, and the screening result for "uncontrolled" asthma in the texting group was a score of 19. This study showed a strong correlation between the ACT scores achieved in Turkey using the paper-and-pencil and web-based texting formats and the physician evaluations of asthma control. Additionally, a patient's asthma control level could be improved upon using the texting version. This research

		demonstrates that administration of the ACT by texting is equivalent to the paper-and- pencil format and offers the ability to facilitate the evaluation of asthma control using a mobile phone. Before being used in real life, the utility of texting for measuring asthma control needs to be further investigated [42].

Discussion

The use of digital health technology in medicine has expanded to encompass a much broader set of scientific concepts and technologies, including genomics, artificial intelligence, analytics, wearables, mobile applications, and telemedicine [43]. It is being used in many more areas of medicine, such as diagnosis, treatment, clinical decision support, care management, and care delivery [44]. However, even though the digital health system is said to be convenient, it is not always available, especially for people who live in rural areas and may not know how to use such technology [45].

The importance of telepharmacy and patient counselling for asthmatic patients is very evident in the collected studies. There are a lot of asthmatic patients who are not knowledgeable about or have poor health education on the necessity of asthma-related interventions. The poor health awareness of patients might affect their medication adherence. Thus, involvement of pharmacists in patient counselling and health-related programs is very useful for asthma patients [46]. As drugs are prescribed for the treatment of asthma, proper intake and application of different asthma medications are also important to remember. Health awareness and education through the patient counselling of pharmacists are essential, for they will result in better asthma control management and medication adherence.

Telepharmacy can alleviate the queuing problem and reduce the cost of transportation for patients. One of the advantages is that healthcare professionals can efficiently monitor patients' indicators and provide suggestions at any time. In a study conducted by Li *et al.* in 2021, results demonstrate the value of telepharmacy in China and how it may be modified to enhance patient care both during and after the COVID-19 pandemic as it is both practical and backed by research. Therefore, this kind of telepharmacy can help patients communicate in any medical situation. This is a low-cost, convenient, and stable pharmacy service model that is not only suitable for emergencies but can also extend to unhealthy people, patients with chronic diseases, and healthy people who need pharmacy consultation in their daily lives [40].

Thus, telepharmacy was able to reduce the risks of medication-related problems by keeping constant contact with patients, involving them in decision-making, and giving advice on how to use an inhaler correctly and how to deal with outside factors like environmental triggers. This indicates how convenient and broad the scope of telepharmacy can be in terms of delivering care management, particularly to patients in need of assistance with their medications.

Conclusion

This article review provides an overview of the research on Telepharmacy for Asthmatic Patients in Asia. It illuminates the efficacy, impact, and significance of telepharmacy as a method of delivering pharmaceutical products and services via telecommunication. The various literatures that were gathered regarding the efficacy of telepharmacy on asthmatic patients in Asia summarize that there is a significant improvement on the issues that telepharmacy aims to reduce such as medication adherence and lack of knowledge on the application of inhaler techniques, particularly among children, which eventually leads to an increase in quality of life. Furthermore, the articles on the impact and importance of telepharmacy and patient counselling on proper inhaler use reveals that pharmacists play an important role in regulating the symptoms of asthmatic children. Health awareness and education through pharmacist patient counselling will result in better asthma control management and medication adherence as a result of this direct engagement with the pharmacist. The facts acquired from this article review will serve as a basis for upgrading the telepharmacy service for a more quality long-term treatment not just to asthmatic patients but also to whoever may apply on the usage of telepharmacy. However, it is also evident in this literature review the continual lack of studies regarding telepharmacy services to asthmatic patients in Asia.

Conflict of Interest

No potential conflicts of interest were disclosed by the authors regarding the research, writing, or publication of this paper.

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