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Increasing Opportunities for Healthcare through Telemedicine in Thailand

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Abstract

Telemedicine is a rapidly advancing field revolutionizing the delivery and accessibility of healthcare services with the advent of digital communication technology. Medical personnel can diagnose, treat, and monitor patients remotely, thus reducing inequalities in access to medical services caused by geographical barriers. Telemedicine is reshaping the healthcare landscape. This article explores the concept, benefits, challenges, and potentials of telemedicine in transforming the future of healthcare services by studying documents and academic works related to past research and analyzing their content.

Keywords: Telemedicine, Public health, Healthcare

Introduction

Telemedicine has become a transformative force in healthcare, providing convenient and continuous access to public health services, as well as offering convenience to patients [1]. Simultaneously, it helps medical personnel expand their reach and deliver quality care remotely [2]. As technology continually advances, telemedicine possesses the potential to reshape healthcare services, bridging healthcare inequalities and enhancing patient outcomes [3]. The application of technology in healthcare can help forge an accessible, efficient, and patient-centered healthcare system by embracing telemedicine and addressing challenges.

However, while telemedicine presents many opportunities, it also faces numerous challenges. These include maintaining patient privacy and data security [4], maintaining the quality of remote assessments, managing technical limitations, and navigating regulatory and legal frameworks. All of these are important considerations for the successful operation of telemedicine in healthcare.

In addition, challenges exist regarding digital inequality, disparities in Internet access, and literacy [5]**.** Technology also poses challenges to the equitable adoption of telemedicine, which requires proactive measures to bridge these gaps. This study delves into the concept of telemedicine, drawing from related documents and academic works. It also examines the application of the telemedicine concept from various research studies to analyze the content and present it in this article.

The Definition of "Telemedicine"

"Telemedicine" is a term derived from the Greek word "Tele," meaning "distance," and "Medicine," which comes from the Latin word "Mederi," meaning "to heal." In Thai, it is often referred to as "clinic online" [2] that patients can get primary diagnosis online without going to hospital. The World Health Organization (WHO) defines "telemedicine" as the delivery of healthcare services using information technologies to communicate and exchange valid information for diagnosis, treatment, and prevention of diseases, as well as for the continuing education of medical personnel.

Notification issued by The Medical Council of Thailand defines "telemedicine" as "the transmission

or communication of data on modern medicine from a medical practitioner, including from a health facility, in the public and/or private sector, from one place to another place by electronic means to provide advice, recommendations to other medical practitioners, or any other person, for a medical procedure within the scope of the medical profession."

In summary, "Telemedicine" refers to the provision of medical services or activities from one location to another using information technology, electronic devices, or multimedia tools to facilitate remote communication and the exchange of valid information for the treatment, diagnosis, or even treatment consultation and monitoring of patients' symptoms. Currently, telecommunication systems and communication technologies are advancing rapidly every day, making today's communication tools more advanced than in the past.

"Telemedicine" began to gain acceptance and widespread use due to the severe pandemic of COVID-19 virus, which caused countless numbers of infections globally. There was a need to adhere to social distancing guidelines to prevent infections and the spread of the disease. Gatherings and group activities were discouraged, and people were advised to quarantine and stay home. Consequently, numerous activities, whether work or study-related, transitioned to online formats to adapt to the pandemic situation. The pandemic thus catalyzed the adoption of the telemedicine concept, which uses medical communication to care for patients at a time when the number of infections surged. It is also another measure to prevent the spread and transmission of infections during medical visits [6].

Types of Telemedicine

Telemedicine can be applied in two types, which are classified according to the distance of transmission and the interaction between the people involved, whether between health professionals (Health Professional - Health Professional) or between a health professional and a patient (Health Professional - Patient), as follows: The first type is the storage and transmission of medical data among doctors (store-and-forward telemedicine or asynchronous telemedicine). This involves exchanging recorded information between two or more people at different times, such as for requesting diagnostic advice between doctors. This type of telemedicine does not involve doctors directly communicating or collecting patients' medical history [2]. The second type involves immediate interaction between patients and doctors, enabling real-time responses (real-time interactive telemedicine or synchronous telemedicine), such as communication through phone or video-conferencing. This method allows the doctor to communicate and collect medical records from the patient directly.

Forms of Telemedicine Found Today

1. Consultation System: Doctors or specialists will offer advice and diagnose health conditions by discussing and inquiring about a patient's symptoms through video cameras to aid in medical diagnosis and decision-making.
2. Remote Monitoring System: The nature of this system is to monitor a patient's health at home by installing various vital sign devices at their home. If any vital sign value is abnormal, it alerts the patient to seek treatment promptly.
3. Health Information System: This system provides services for inquiring about health or seeking advice on diseases with specialists via the Internet.
4. Medical Learning System: This serves as both a source of learning and a means for disseminating knowledge for doctors or specialists. They can search for information or disseminate knowledge for educational purposes. In addition, doctors can request diagnostic advice and exchange knowledge with peers [2].

Various Situations in Thailand Impacting the Current Health System

Various situations within the country can negatively impact Thailand's health system, either directly or indirectly. Consequently, this can lead to challenges for individuals when it comes to accessing healthcare services. Examining the different situations that affect the healthcare system can help recognize the problem and discover solutions to address them.

1. Political and Administrative Situation: Conflicts and corruption within the political sphere directly impact the country's public health system, leading to delays and diminished quality of various community services. This results in a loss of opportunity to develop the quality of life for people in the

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community. It has been found that currently, tasks associated with the decentralization of authority to local administrative organizations can be transferred in accordance with the 'Determining Plans and Process of Decentralization to Local Government Organization Act, B.E. 2542 (1999).' Local community units are granted the allocation of only 150 tasks from the total of 244 designated tasks, and these tasks are related to the improvement of individuals' quality of life within the community.

2.Economic Situation: Thailand faces significant inequality and gaps among its people. Economic inequality leads to disparities in various aspects, including public health. Within the healthcare system, providing access to disadvantaged individuals, those living in remote areas, and marginalized community groups remains a significant challenge.

3. Demographic and Social Situation: The diminishing rate of resources impacts both the number and age distribution of the population. The young population is expected to decrease while the elderly population is projected to expand, leading to a rising dependency ratio. Consequently, it is necessary to have plans in place to address age-related illnesses among the elderly. Furthermore, advancements in the transportation system nowadays facilitate transnational mobility, which may lead to the spread of localized infections in the country.

4. Technological Situation: As we enter the era of globalization, the world becomes more interconnected. Communication has become easier, allowing people easy access to information. Various technologies now play a more role in our lives, with widespread access to both technology and information. In public health, numerous technologies have been adopted to enhance services. Additionally, new technologies are being imported for disease treatment and prevention.

5. Health System Situation: Although the primary health system has improved compared to the past, inequality persists in the allocation of the government budget to the health insurance system. The planning and distribution of medical personnel are not systematically addressed. Moreover, there remains a lack of consideration for the balanced and appropriate allocation of personnel [14].

Benefits of "Telemedicine"

The telemedicine system is introduced to enhance the medical field due to its various potentials and strengths that align well with today's society.

1. The telemedicine system can enhance patients' convenience in accessing healthcare services. Patients can consult with doctors without the need to travel to a hospital, whether by driving, walking, or enduring lengthy waits while feeling unwell and weak. They can consult their doctors anywhere, whether at home or in the office. These advantages allow patients to consult with doctors regardless of the circumstances, such as those who have responsibilities or even patients with childcare duties. The incorporation of telemedicine to enhance healthcare services offers various benefits, including rapid access to medical experts and convenience for patients in terms of time and travel [1].

2. Telemedicine can help prevent the spread of infections such as the flu, various contagious diseases, as well as the most common at present: COVID-19. Doctors can communicate with patients for preliminary diagnoses through electronic communication tools, which helps reduce the exposure of medical personnel to infections, mitigating the spread of infections and even lowering the transmission of infections in patients, who are vulnerable at that time due to not having to travel to the hospital. During the previous COVID-19 pandemic outbreak, telemedicine was introduced in certain medical contexts to screen patients before their arrival at the hospital and to prevent the contracting or transmission of the disease to both patients and their families [8].

3. For certain types of patients, such as those with chronic conditions, it is essential to have regular consultations with doctors. Telemedicine offers an alternative for monitoring patients' symptoms or even receiving initial self-care advice, reducing both the risk of mortality and hospital visits [9]. For example, tuberculosis is caused by a type of bacteria. It is contagious but can be cured if treated promptly and consistently. A long duration of treatment is necessary, and according to an analysis of 405 participating tuberculosis patients, there is a high chance of recurrence. In each study group, a very high treatment success rate was observed (96.1% with VDOT (video directly observed therapy) vs.

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94.6% with DOT (directly observed therapy). It was noted that there was no statistical difference between the two methods, and both methods were successful (Telemedicine Technologies and Tuberculosis Management: A Randomized Controlled Trial [3].

4. Currently, family members can seek advice from specialists in primary care through telemedicine, such as on home remedies or the health of a family member. They can use applications like the Bumrungrad application from Bumrungrad Hospital that has functions to provide health services such as engaging in telemedicine consultations, making doctor appointments, inquiring about information, and viewing their treatment history at the hospital. Another example is the Mor Prom application, developed during the COVID-19 outbreak, which has functions related to COVID-19 certificates, digital health certificates, finding a medical service unit, and scheduling a medical consultation. Numerous other applications have also been developed in recent times [10].

5. The telemedicine system can help reduce the cost of accessing medical treatment, as it is an online system that enables patients to receive services at home or at a convenient location. This reduces expenses, such as travel costs to hospitals. In addition to medical expenses, it also minimizes costs associated with purchasing goods and services while traveling for treatment and mitigates the loss of income due to taking time off work [11] .

6. In remote rural areas where reaching treatment centers involves substantial travel time, telemedicine allows patients to quickly consult with doctors and receive advice. Patients with mental health conditions require regular follow-ups with their doctors for symptom monitoring and ongoing therapy [12]. During the recent COVID-19 outbreak, telemedicine aided the continuation of treatment. Mental disorders, such as depression, bipolar disorder, schizophrenia, anxiety, and panic disorder, are mental health conditions that arise from irregular brain function that affects thought processes, emotions, and behaviors. Patients require continuous treatment and therapy [13]. Currently, a telemedicine system known as ‘telepsychiatry,’ launched by the Department of Mental Health of the Ministry of Public Health in Thailand, is being used to assist in patient care via the DMS Telemedicine application, in conjunction with affiliated hospitals [14]. This approach was adopted because it was found that many patients with mental disorders were missing appointments due to travel constraints and remote living locations. Online medical consultations allow these patients to have consistent access to follow-up services and doctor visits. Hospitals such as Bumrungrad Hospital enable patients to make appointments to see a doctor immediately as needed [10].

7. The telemedicine system helps reduce congestion in hospitals by enabling chronic patients to consult with doctors online or receive medication by mail. This results in a decrease in the number of patients who physically visit the hospital, thereby reducing hospital congestion [15].

8. Telemedicine is employed in emergency medical situations, particularly within emergency medicine. This encompasses a form of telemedicine that prepares medical professionals, including doctors and nurses, for immediate treatment. This preparation involves actions such as configuring medical equipment before patients arrive at a hospital, facilitating prompt treatment upon their arrival, and thereby enhancing survival rates. The telegraphic system encompasses various types of patient vital signs and signals indicating the location of the service vehicle. These systems continuously update information, aiding doctors in diagnosis and increasing the chances of survival for emergency patients by offering preventive measures when doctors are not present on-site to provide emergency care or when patients are being transferred from one hospital to another [6]. For example, Maharat Nakhon Ratchasima Hospital has introduced a telegraphic medicine system to care for critical patients before their arrival at the hospital [17].

Challenges in the Operation of the “Telemedicine” System

The adoption of telemedicine in Thailand requires several components that must be in place, such as infrastructure, and individuals involved must have technological literacy skills. As for patients, service users must have access to a device and be technologically literate. Therefore, the challenges of adopting telemedicine are as follows:

1. Unfamiliarity with online services and the use of communication technology. Additionally, procuring

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medical personnel to be on duty for advice is challenging, as all medical personnel already have substantial obligations. Moreover, not all personnel possess the same level of expertise in all aspects of medicine, so a single doctor may not be able to answer all questions and diagnose every condition [5].

2. The unpreparedness of the system and equipment poses a challenge for telemedicine, which requires an efficient system and quality equipment. However, some remote areas do not have access to signal and internet services, making these services unavailable. Additionally, accessing and installing various pieces of equipment involves high costs [4] .

3. When treatment services occur online, the relationship between the patient and the healthcare provider can become distant. This can happen whether the patient is seeing a regular doctor or consulting with a doctor they have never met before. The relationship between the patient and healthcare provider can significantly impact treatment effectiveness, as supported by research [18]. For certain conditions, such as depression, the relationship between the patient and the doctor is essential for building trust [1].

4. In diagnosing certain cases or symptoms, it is necessary to observe the patient from a close range or have physical contact with the patient. This includes conducting specific examinations that require sending a medical technical team.

5. Taking patient and family history, past illnesses, previous allergic reactions to medications, and current symptoms are vital and impact diagnosis and treatment. Online history-taking can lead to discrepancies due to unstable communication. This lack of clarity, along with the inability to observe the patient's body language, can make it difficult to determine the accuracy of the information, potentially resulting in incorrect treatment and diagnosis [4].

6. Some patients, such as the elderly, may not know how to use modern communication devices. There is a need for close supervision and care, and physical conditions, like hearing loss in older individuals, may affect communication.

7. Online systems are at risk of invasion of privacy, or there may be malicious people who falsify or steal information of patients and doctors without permission [4].

Telemedicine in Various Countries

Nowadays, telemedicine has been widely adopted and is beginning to play a significant role in the healthcare systems of various countries. Each country has different experiences with the implementation of telemedicine. To develop the Thai system, studying the experiences of other countries is essential.

1. Telemedicine in India: This initiative began with the Telemedicine Pilot Project in 2001. Since then, telemedicine has been incorporated into various tasks and systems related to the medical field, such as The National Medical College Network and many others. However, telemedicine in India was also deployed in smaller units and remained relatively unknown until the COVID-19 pandemic, when it was reintroduced into the healthcare system. On August 9, 2022, the Government of India announced telemedicine as part of its “Digital India" program during the COVID-19 pandemic, employing video conferencing formats for diagnosing and treating patients with distance and location restrictions. The system operates in two forms: Doctor-to-Doctor for consultation and treatment education and Patient-to-Doctor. These services are part of a massive project by the Government of India. Non-communicable diseases account for 60% of all deaths in India. This issue can be addressed through the structure of the telemedicine system, linking large hospitals with smaller health centers in remote areas, thereby enhancing access to healthcare services. Large government hospitals in the states act as ‘hubs’ to provide teleconsultation services to primary health centers (a “hub-and-spoke” model). India uses this model to provide essential, non-COVID healthcare services. As of March 17, 2021, there have been approximately 3 million consultations on the eSanjeevani platform [18].

2. Telemedicine in Japan: This has proven especially beneficial during the COVID-19 pandemic. The Japanese government, in response, has supported and promoted the use of telemedicine for medical services via mobile phones or video conferences. This allows services to be provided without time and place restrictions and helps to reduce the spread of

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infectious diseases. Due to the outbreak of COVID-19, the Japanese government announced temporary permission for telemedicine use in 2020. However, due to the severe outbreak situation in 2021, this permission was made permanent. From the examination conducted in January 2021, the number of medical institutions that adopted telemedicine after government approval increased from 10,812 (9.7% of all institutions in Japan) in April 2020 to 16,095 (14.5%) in June [74]. However, this number remained relatively constant for the rest of the year [19] .

3. Telemedicine in Singapore: The COVID-19 pandemic has resulted in significant changes in health services in Singapore. People have increasingly turned to telemedicine service systems as the pandemic has led to increased demand for health services. For instance, MyDoc, a telemedicine service channel in Singapore, has experienced a 160% increase in user account registrations since its launch in 2020. In addition, there are also several online health recommendation channels available, such as “Mask Go Where” and “Flu Go Where,” among others [20] .

4. Telemedicine in European Countries: Internet penetration rates in European countries are increasing. 85% of the EU population has access to the Internet, and this number is growing continuously. People are turning to the Internet to search for health information and services or even to schedule medical appointments. In 2016, more than 15 member countries began using electronic medical records, which contain patients' information and medical histories that hospitals can access to aid treatment. In 2021, 22 member countries have begun exchanging electronic medical records. In addition to this, various telemedicine collaborations [21], such as Teleradiology, Teledermatology, and Teleneurology, have been introduced to aid medical development. Through the cooperation of EU member countries, the 'Digital Healthcare Service' and 'Trans-European Network' projects are developing rapidly.

5. Telemedicine in China: China is facing issues with access to healthcare for its rural population due to the insufficient number of personnel. In 2020, this was calculated to be 1.56 doctors and assistants per 1,000 rural people [19]. There is also a trend of declining personnel due to retirement and more attractive job opportunities in the city area. This trend contrasts with the increasing development of telecommunication systems. Telemedicine has proven to be a valuable solution to solve healthcare service issues in rural areas. The COVID-19 pandemic has also further stimulated the development and adoption of telemedicine as a means to provide digital health services. This is aimed at improving access to healthcare for people in communities, as well as for underprivileged individuals in remote areas. During the COVID-19 pandemic, many hospitals in China rapidly adopted telemedicine systems to aid in monitoring patients' conditions. From February 1 to April 1, 2020, the monthly average of patients receiving online follow-up care increased nearly fivefold from 3,400 to 16,338. The situations in hospitals and various diseases across China are very similar. From an examination conducted on 148 doctors from 57 hospitals in 16 provinces across China, it was found that 94.6% of them used telemedicine systems during the pandemic to monitor their patients' symptoms [22].

Telemedicine in Thailand

Thailand has been promoting the development of telemedicine according to a specific framework since the past, along with the advancement of the country's communication system. In 1993, Thailand launched its first satellite, Thaicom. Since then, the government has been encouraging the development and utilization of telemedicine to facilitate clinical communication from specialty hospitals to district hospitals through video conferencing as a channel for doctor-to-doctor communication [23].

Currently, telemedicine is being widely used in Thailand. In addition to addressing challenges related to the COVID-19 pandemic, telemedicine is being employed to alleviate various issues such as hospital congestion, improve access to medical treatment for people in remote areas, reduce inequality in receiving healthcare services, and prepare for the aging society. Telemedicine also helps to minimize exposure and the spread of infections while reducing vulnerable patients' exposure to diseases. It enhances convenience for patients, saves time, and reduces travel costs. Many government hospitals, such as Nongkhai Hospital, are now offering follow-up appointments using telemedicine video conferences

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through the MorProm application or the DMS Telemedicine system, in addition to providing postal medication delivery services, enabling patients to continue their treatment without interruption or a shortage of medications. It also includes the development of service units for integration with the hospital's telemedicine system, as well as promoting sub district health through the installation of various vital sign monitoring devices, blood glucose meters, and heart rate monitors. These systems automatically send the information to the hospital, allowing doctors to monitor patients' symptoms and prescribe medications, thus eliminating the need for patients to travel to the hospital. This approach allows for the monitoring of patients, such as those with chronic non-communicable diseases [24], who are at high risk of infection or may have difficulty traveling. Many of these patients are elderly and require continuous monitoring and regular medication. An example of this initiative is the community health checkup center in Nong Khaen Subdistrict, Mukdahan Province [25], which has installed automatic vital sign monitors and is planning to develop a link with the hospital's telemedicine system, enabling people to measure their pulse at a health facility near their homes.

Conclusion

Telemedicine is a valuable tool that possesses substantial potential to enhance Thailand's public health system. It can address various issues commonly found in Thailand's public health landscape, that can be found in the public health system of Thailand, including hospital congestion. It broadens the options for receiving medical treatment as patients' conditions can be monitored and appointments can be conducted online, reducing the need for travel and associated costs. Patients can access effective medical care even in remote areas. However, telemedicine is best suited for certain conditions or types of symptoms. For diseases requiring frequent in-person visits, traditional appointments remain necessary. Telemedicine may also be less suitable for first-time patients who are not familiar with their conditions and symptoms. Establishing telemedicine units in community areas is particularly beneficial and vital for patients unfamiliar with the technology or those requiring assistance while using the service.

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