The Academic Journal of Contemporary Commercial Research
Vol. 5, No. 2, 2025
Faculty of Commerce, Cairo University, Egypt

Egypt's Situation with Telemedicine Usage: Dream or Reality

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Abstract

Telemedicine is emerging as a vital strategy for maintaining continuity of care during public-health crises, yet its adoption in Egypt has been uneven. This study combines a narrative literature review with a nationwide survey of 382 physicians, pharmacists and nurses to assess readiness, perceived benefits and implementation barriers. Results show that 74 % of respondents recognise telemedicine's potential to expand access, but only 28 % use it routinely—largely because of limited training, unclear reimbursement and medico-legal uncertainty. Infrastructure constraints (poor bandwidth and device availability) and patient-side digital illiteracy also impede uptake. The study proposes a three-pillar roadmap—policy reform, workforce development and technology investment—to accelerate safe, equitable telehealth deployment beyond the COVID-19 era.

Keywords

Telemedicine, Egypt, COVID-19, Digital Health, Technology Adoption

Article history

Received: *25 February 2024* · **Accepted:** *09 August 2024*

1. Introduction

Novel processes in healthcare have evolved as a result of changes in population demographics, an increase in patients with chronic diseases, and the loss of long-term follow-up care. Information and communication technology (ICT), for example, has presented significant opportunities to enhance the provision of healthcare. Telemedicine, often referred to as e-Health, involves the use of ICT to support remote patient care by maintaining health information and providing patients with expert assistance (Alboraie et al., 2021).

Although telemedicine appears promising and beneficial, it still encounters many obstacles, particularly in developing nations. These include the inadequate infrastructure in the majority of healthcare facilities, the lack of technological awareness and proficiency among many individuals, the geographic and cultural barriers, especially in rural areas, and the high costs associated with implementing these services in all hospitals (Alboraie et al., 2022). Large-scale telemedicine deployment of advanced healthcare services has not been fully realized. Furthermore, it is common practice for medical professionals to use social media platforms and smartphones for responding to personal health-related inquiries from patients and the general public. Due to the lack of research and the absence of a clear definition for this approach, clinicians must navigate a 'transformation gap' or grey area in order to remain aligned with the current level of innovation (El Kheire et al., 2022). Despite the fact that telemedicine has become a useful technology with diverse applications in diagnosis and treatment, there is a lack of knowledge regarding its prevalence and public perception in developing countries such as Egypt (Alboraie et al., 2021).

2. Research Methodology

According to Okoli and Schabram (2010, p. 2), a standalone literature review is a "journal-length article whose sole purpose is to review the literature in a field, without any primary data collected or analyzed." These evaluations are conducted for a variety of reasons, including synthesizing current information on a specific subject, aiding in the formulation of theories, consolidating the body of existing research in well-established and explored fields, and identifying research areas that require further study (Webster & Watson, 2002; King & He, 2005; Okoli & Schabram, 2010). Authorial critique can be valuable in all types of literature reviews, although some may solely aim to provide a critical assessment of previous research (Cooper, 1988). All forms of reviews can benefit, to varying degrees, from authorial critique.

In conclusion, well-established stand-alone reviews offer a reliable and insightful summary of prior research that can assist future researchers seeking ideas and guidance in framing their own investigations. Previous studies have demonstrated that review papers frequently serve as a field's 'core' or 'milestone' publications (Garfield, 1982; Paré et al., 2015; Rowe, 2014). Moreover, review papers are crucial in developing disciplines, representing essential sources of information. They also serve as a

significant source of information for researchers outside the discipline as well as for new academics and PhD candidates entering the field.

As a source of inspiration and guidance for future research, stand-alone literature reviews are crucial for assessing a field of study (Webster & Watson, 2002). Thus, review articles frequently become 'core' or 'milestone' publications within a specific topic (Garfield, 1982; Paré et al., 2012; Templier & Paré , 2015).

2.1. Literature Search Strategy

A thorough search was conducted using the following electronic databases: PubMed, Scopus, Web of Science, and Google Scholar in order to find pertinent literature for our study. Only English-language articles released between 2006 and 2023 were included in the search. The subsequent terms were utilized, either individually or in combination: 'Applications of Telemedicine', 'Telehealth Services', 'Infrastructure for Telemedicine', 'Electronic Health Records', 'Remote Cognitive Behavior Therapy', 'Tele-audiology,' and 'Electronic Mental Health'. To identify additional references, the reference lists of the included studies and relevant review articles has been manually reviewed.

2.2. Study Selection Process

After duplicates were eliminated, the articles were reviewed according to their titles and abstracts. Studies were then incorporated into the final analysis after papers that had undergone full-text examination were selected.

2.3. Data Extraction and Synthesis

Due to the heterogeneity of the included studies, a narrative synthesis of the findings was conducted and arranged according to the identified barriers and challenges to telemedicine utilization in Egypt in order to present a comprehensive overview of the telemedicine landscape. The data extracted from the studies included: author, publication year, and key findings.

2.4. Inclusion and Exclusion Criteria

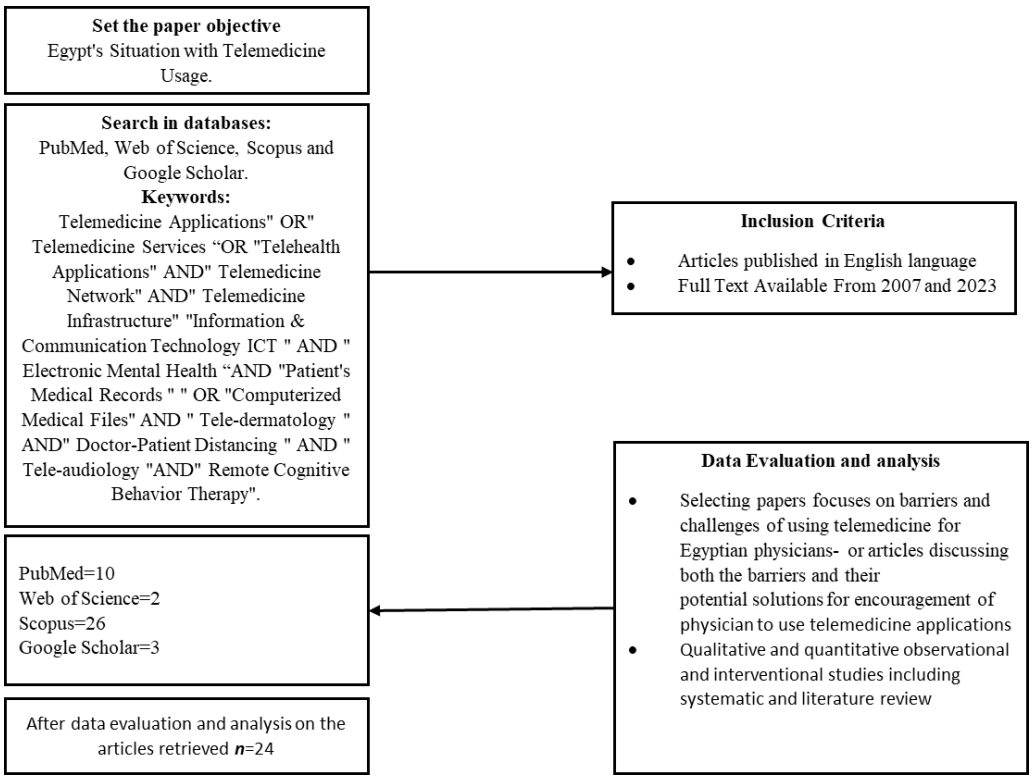
Studies were incorporated in this review based on three criteria: (1) providing original research findings; (2) being conducted in Egypt; and (3) assessing the actual state of telemedicine application utilization. Studies that (1) focused on telemedicine tools, (2) were case reports or editorials, or (3) lacked pertinent outcome data were excluded.

Limitations

This review has several limitations. First, the search was restricted to English-language publications; pertinent research written in other languages may have been overlooked. Second, by including only peer-reviewed articles, the review may be

subject to publication bias due to the under-representation of research that report null or negative findings. Finally, the inability to perform a meta-analysis due to the heterogeneity of the included studies limited the capacity to measure the aggregate impact.

Figure 1. Research methodology process.



3. Articles' overview

Table 1. Inclusion and Exclusion Criteria.

Criteria	Inclusion Criteria	Exclusion Criteria
Language of publication	Articles published in English language	Articles published in non-English languages
Databases	PubMed, Web of Science, Scopus, Cochrane Library, and Google Scholar	Other databases
Criteria overview	Articles focusing on the barriers and challenges encountered by Egyptian physicians in using telemedicine, or articles discussing both the barriers and potential solutions for encouraging physician to use telemedicine applications	Any study that does not address the research question(s)
Research type	Qualitative and quantitative observational and interventional studies including systematic and other types of literature reviews	Articles that were not peer-reviewed, and books that were not relevant
Date of publication	Articles published between 2007 and 2023	Publications before 2006

Keywords	Telemedicine, Telehealth Services, Applications, Telemedicine Infrastructure, Electronic Medical Records, Electronic Mental Health, Tele-audiology, Remote Cognitive Behavioral Therapy.	Irrelevant keywords such as 'Telemedicine Tools' and 'Telemedicine History'

3.1. The Concept of Telemedicine and Its Utilization

Telemedicine (TM) refers to the use of telecommunication technology to develop, advance, or accelerate healthcare provision. This general term encompasses the utilization of communication and information technology, enabling doctors or healthcare providers to offer TM services without requiring regular doctor-patient interactions. The transmission of text, images, videos, audio, or transformed electronic signals is necessary for this service. Many facets of telemedicine are denoted by the term 'telemedicine.' TM's primary goals include the use of electronic medical equipment, clinical service automation, information transmission via electronic communication, and counseling. Telemedicine describes the use of telecommunication technology in the delivery and exchange of medical information. It can range from two doctors discussing a patient's case over the phone to the challenges of using satellite technology for other purposes (Jafarzadeh et al., 2022).

3.2. Primary Uses of Telemedicine

Telemedicine provides remote health counseling via phone, fax, email, or online chats, reaching people all over the world. It includes services such as teleconsultation, remote psychotherapy, remote diagnostic imaging, telepathology, and teledermatology. It facilitates the diagnosis and treatment of mental health disorders and the management of skin conditions; however, there is a possibility of transmitting false information.

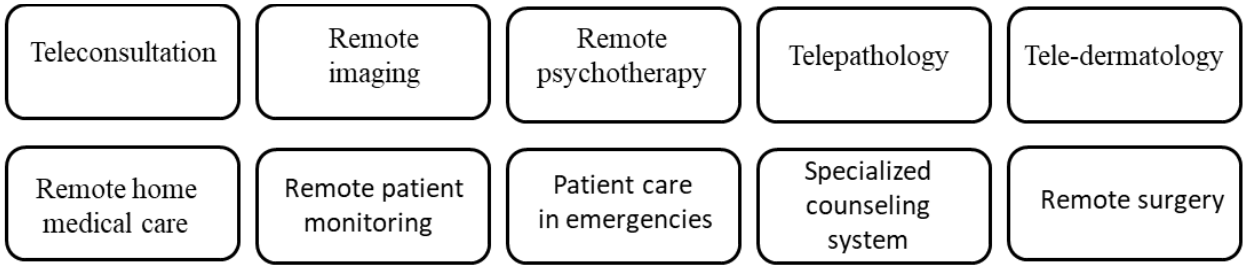
Telemedicine leverages advanced technologies such as ultrasonic scanners and digital processing algorithms. For many conditions, real-time communication is not always necessary. Overall, telemedicine offers a practical and efficient means for delivering medical treatments remotely (Jafarzadeh et al., 2022).

Through utilizing video communication and vital sign recorders, telemedicine reduces hospitalization costs by presenting remote home medical care to seniors with chronic respiratory and cardiovascular disorders (Habukawa et al., 2021; Jafarzadeh et al., 2022).

In addition to transferring data to cardiologists for specialized care, it permits remote patient monitoring, which replaces the traditional Holter monitoring (Malasinghe et al., 2019; Jafarzadeh et al., 2022). Telemedicine also connects patients and physicians in an emergency situation, enabling prompt treatment options and continuous monitoring (Ward et al., 2015; Jafarzadeh et al., 2022). It assists primary care physicians in identifying and treating common conditions such as colds and hypertension (Jain et al., 2018; Jafarzadeh et al., 2022). Furthermore, access to

specialized medical care is improved through specialized counselling systems, which facilitate communication between patients, general practitioners, and specialists.

Figure 2. Primary Uses of Telemedicine.



3.3. Egypt's Awareness and Adoption of Telemedicine

Egypt's public health system is experiencing a physician shortage as a result of doctors leaving the country in search of better employment opportunities (El-Fiki, 2010). The growing frequency of coronavirus infections among healthcare workers highlighted the crisis, exacerbating the scarcity (Ashry & Alsawy, 2020).

The patient-to-doctor ratio, including general practitioners and specialists, across Africa is notably high, with approximately 1,900 in Egypt (EuroRSCG, 2007). In both governmental and private sectors, underpayment was the most frequently reported factor that led doctors to seek emigration (El Mazahy et al., 2023). Moreover, in order to provide effective primary health care, the number of patients assigned to each doctor, nurse, or midwife should not exceed 400 patients (WHO, 2006). Due to the increased rate of infection among medical staff and the surge in COVID-19 patients during the pandemic, this shortage was exacerbated, particularly in the early stages when the health authorities decided to isolate all COVID-19-positive cases, including mild or asymptomatic cases, in the hospitals (Ashry et al., 2020).

The COVID-19 incident has underscored Egypt's gradual transition toward a digital economy, accelerating the adoption of telemedicine. Both patients and physicians perceived themselves as more prepared and secure to experience TM during the pandemic. One of the most pressing challenges facing the Egyptian society is the absence of adequate health care in rural areas. Telemedicine is regarded as one of the most significant alternatives that could reduce the accumulating difficulties caused by the shortage of skilled doctors in both urban and rural areas across Egypt.

Despite the limited resources and underserved rural areas, the adoption of information and communication technology (ICT)-based solutions could be considered to ensure that all citizens have equal access to adequate health care. Among these solutions is the telemedicine portal, an application that enables complete database connectivity via the internet, through which the doctor assesses the patient's health and determines the appropriate radiography and analyses when the patient books an appointment online and reserves a designated time. The telemedicine system consists of two key components: the patient side and the physician side. Both the patient and the doctor must register in the system to access the patient's medical records, receive

the most recent medical news, post questions or comments, or schedule an appointment with their preferred physician.

However, the adoption of telemedicine in Egypt relies on primary factors such as acceptance, financing, organization, policy, legal frameworks, in addition to technology, training, usability, and quality aspects. This paper focuses on reviewing studies on Egyptian physicians' usage of telemedicine applications, as well as adoption barriers and expectations, aiming to gain a thorough understanding of the factors that may encourage or deter physicians from using telemedicine applications in Egypt. Thus, the primary objective is to comprehensively analyze the literature on Egyptian physicians' perceptions and demands regarding both the utilization and rejection of telemedicine applications in order to highlight the active research areas and identify the gaps in the current literature. This could be beneficial for academics as well as healthcare decision-makers.

3.4. Telemedicine as Perceived by Egypt's Medical Community

The potential of telemedicine in Egypt can be illustrated by evidence showing that 90% of medical professionals considered the audio and visual quality of their telemedicine encounters acceptable. Similarly, an equal percentage supported expanding its use following the epidemic (Ashry & Alsawy, 2020). The doctors' understanding of the country's regulations regarding the use of telemedicine for clinical services was examined, revealing that more than half of the participating doctors and medical students (58.9%) were aware of the related regulations included in the Egyptian Medical Syndicate, while the remaining participants were unaware of these regulations (Ebrahem et al., 2022). Moreover, a comparative analysis evaluating physicians' knowledge and attitudes toward telemedicine, as well as ethical and medical-legal considerations, was conducted between physicians in Alexandria (Egypt) and Punjab (India). Based on the finding, most participants expressed a desire to continue using telemedicine post COVID-19, with improvements (Ghitani et al., 2023).

Telemedicine provides doctors with the following benefits (Ghitani et al., 2023):

- additional cash streams
- reduced risk of contracting infectious diseases
- occasional increased enjoyment from satisfied patients

A designed online questionnaire revealed that patients who receive telemedicine services spend less time (23.6%), money (14.9%), and effort (13.6%). Additionally, telemedicine assists in reducing infection transmission rates (8.6%) during epidemics. It also facilitates follow-up for mild, stable cases with known medical histories and prior clinical examinations (23.2%), as well as for laboratory and imaging data (12.5%), saving physicians' time (23.6%) (El-Mazahy et al., 2023).

Telemedicine employs modern communication technology, particularly interactive ones such as video conferencing (4.3%), and aids in the dissemination of

general medical advice and health education (2.8%), enabling patients to learn from experts rather than relying on unverified sources (4.1%) (El-Mazahy et al., 2023). Healthcare workers identified several benefits of telemedicine, including the ability to assist patients in remote locations, follow up on chronic diseases, reach a large number of patients, and reduce patient travel (Yassa et al., 2022).

Almost all participants, (147/155, 94.8%), agreed that electronic medical health records would be beneficial for patient care, and (118/155, 76.2%) supported integrating electronic mental health (EMH) into the current healthcare system. The highest-rated utility of web-based solutions was documentation, followed by psychoeducation and communication with professionals. The main advantages encompassed improved access to care and its convenience in rural areas (Kamal et al., 2020).

3.5. Shortcomings of Egypt Telemedicine

In Egypt, many medical professionals use smartphones in their regular practice, often requesting that patients send images of their injuries and radiological data for consultation. Although they are considered a useful tool, smartphones do not comply with security standards, and there is a potential risk that patients' private information could be compromised (Obasheri et al., 2015). Miscommunication between healthcare providers, hostile behavior from patients or their families, and unfavorable media representations of doctors are the main factors contributing to the challenges encountered in the implementation of telemedicine. Additionally, no fines or government-run aid programs exist. A study conducted by Kumari et al. (2020), which focused on the obstacles faced by physicians during telemedicine usage, revealed that a large majority of the doctors (67.7%) identified multiple risks: ethical, professional, legal, and personal, associated with providing the healthcare services through this process. Smaller percentages identified only one type of risk. The most frequently expressed risks for physicians included professional risks (23.2%), ethical risks (11.8%), personal risks (8.7%), and legal risks (6.7%) (Ebrahem et al., 2022). A comparative analysis between Egyptian and Indian doctors demonstrated significant ethical violations, involving instances of waiving patient consent.

Most Egyptian physicians lack training or certification in telemedicine. Among those who use it, 81.8% experienced privacy intrusions, 18.3% encountered related inconveniences, such as time-consuming procedures, absence of physician fees, legal threats, defamation, and hate speech, and 50.3% reported that they felt humiliated. Telemedicine is considered appropriate for only general medical conditions (5.8%) and a limited range of medical specializations (3.7%) (Ghitani et al., 2023). According to 54 experts, telemedicine in Egypt must be practiced within a legal framework that ensures the licensing of medical personnel and user authentication, through software that manages time and payment procedures, and integrates services offered by physicians, laboratories, and imaging centers (El- Mazahy et al., 2023). In contrast, 27% of the participants highlighted the dissolution of the doctor-patient relationship

and the inability to conduct a physical examination as the two most frequently cited drawbacks of telemedicine in the current study (27%) (El- Mazahy et al., 2023).

Despite recognizing the benefits of telemedicine, the majority of doctors refuse to use it. Among the drawbacks of telemedicine, as reported by doctors who reject telemedicine, are the inability to reach a diagnosis (71.8%), perform an examination (77.3%), engage in effective patient communication (52.3%), address language and culture considerations (36.4%), or conduct minor maneuvers (60.4%) (Yassa et al., 2022).

3.6. Telemedicine's Role in Disease Prevention and Management in Egypt

At the conclusion of the virtual meeting, the three anticipated outcomes were as follows: 1) The patient was asked to contact the doctor if they had further questions or concerns after it was decided that no additional consultation was necessary. 2) A fresh appointment would be scheduled if another virtual meeting was needed. 3) In the final case, the telemedicine team determined that an in-person visit was required, and scheduled a consultation at the outpatient clinic (Ashry & Alsawy, 2020).

Table 2. The Role of Telemedicine in Egypt.

Publishing Year	Sector	Importance	Reference
2016	**Dermatology** "Can tele-dermatology be a useful diagnostic tool in the dermatology practice in remote areas? An Egyptian experience with 600 patients"	The implementation of tele-diagnostic procedures such as dermoscopy and skin biopsy, particularly in remote locations lacking adequate dermatological services, offer advantages including ease of use and price affordability.	**(Saleh et al., 2017).**
2019	**Psychiatry** "Remote cognitive behavior therapy (CBT) for obsessive-compulsive disorder (OCD) in Egypt: A randomized trial"	Delivering CBT remotely to OCD patients in Egypt appears to be effective in reducing symptoms and enhancing quality of life.	**(Aly, 2017).**
2020	**Neurosurgery** "Doctor-patient distancing: An early experience of telemedicine for postoperative neurosurgical care in the time of COVID-19"	Telemedicine visits were used to assess and treat a variety of conditions, including hydrocephalus, pain, seizures, wound infections, and	**(Ashry & Alsawy, 2020).**

		hydrops. Overall satisfaction was reported by 90% of patients and 95% of physicians.	
	Gastroenterology "COVID-19 in Egypt: Through crisis to adaptation: A gastroenterologist's perspective"	A standard follow-up protocol was modified to delay unnecessary investigations and, when feasible, rely on phone and telemedicine communication. These modifications impacted the management of gastroenterological malignancies, regarding the treatment of colorectal cancer.	**(El Kassas et al., 2020).**
	Dermatology "Dermatological consultations in the COVID-19 era: Is teledermatology the key to social distancing? An Egyptian experience"	The risk of COVID-19 exposure for healthcare staff and patients was reduced as a result of the effectiveness of teledermatology in triaging and treating patients, proving successful in the private sector.	**(Mostafa & Hegazy, 2022).**
	Ophthalmology "Telemedicine and ophthalmology practice in the COVID-19 era"	Telemedicine is particularly intriguing in ophthalmology, as it is one of the specialties that is 'visually intensive.' In routine medical practice, 46% of doctors used telemedicine for ophthalmology.	**(Mahmoud & Abd El-Badie, 2020).**
2021	**Cardiology** "Telemedicine assistance for cardiac patients in Egypt during the COVID-19 pandemic"	It facilitates faster treatment for cardiac emergencies, improved follow-up, self-management of the illness, and quality of life	**(Ghaleb et al., 2021).**

	Neurology "How the COVID-19 pandemic changed our management strategies for amyotrophic lateral sclerosis (ALS) patients: Egyptian study"	In order to monitor ALS patients during the pandemic without exposing them to risk of infection from close contact, telemedicine proved to be a useful technique	**(Rashed, 2021).**
	Psychiatry Telepsychiatry versus face-to-face consultation in the COVID-19 era from the patients' perspective"	The main benefits of online consultations included avoiding the embarrassment and stigma associated with visiting a mental health facility, reducing the COVID-19 infection, saving money and time on travel and transportation.	**(Sehlo et al., 2021).**
2022	**Audiology** "Tele-audiology practice during the COVID-19 pandemic in Egypt and Saudi Arabia	Tele-audiology can be crucial in addressing treatment gaps and maintaining communication with patients in order to address this problem during COVID-19.	**(Elbeltagy et al.2022).**
	Neurology Telemedicine and Multiple Sclerosis Management in the Era of COVID-19: Al-Azhar Experience**"**	This approach appears to have been protective and beneficial for patients with multiple sclerosis (MS), who were monitored and had their treatment discussed via phone calls during COVID-19.	**(Essmat, 2022).**
	Pregnancy "Pregnant Women's Knowledge Regarding Telemedicine as Antenatal Care Strategy during the COVID-19 Pandemic"	The knowledge of telemedicine was satisfactory for nearly half of the surveyed pregnant women	**(Abdelhady Hamed et al., 2022).**
	Hepatology and Gastroenterology	Facilitated knowledge sharing between experts and	**(Zaher, & Emara, 2022).**

	"Telemedicine in Hepatology and Gastroenterology Care: A Necessity or Novelty"	primary-care practitioners in the management of hepatitis C.	
	Hematology "Telemedicine in patients with hematological diseases during the COVID-19 pandemic: beneficial care or waste of time?"	Effective in monitoring patients with thalassemia experiencing chronic morbidity, particularly post-splenectomy, as these patients are more susceptible to severe infections.	**(Rawi et al., 2022).**
2023	**Hepatology and Gastroenterology** Hepatitis C Elimination: Opportunities and Challenges in 2023	The utilization of telemedicine and computerized medical records enhanced HCV management through improved detection, cost-effectiveness, availability, and accessibility.	**(Taha et al., 2023).**
	Neurology Applying the World Stroke Organization roadmap in planning a model for stroke service implementation in Matrouh Governorate-Egypt: A World Stroke Organization	Enabled virtual evaluation and decision-making regarding intravenous thrombolysis for patients with a stroke.	**(Tamer et al., 2023).**
2023	**Urology** Effect of Applying Telemedicine Follow-up versus Scheduled Clinic Follow-up on Renal Transplanted Patients' Satisfaction	Telemedicine proved to be more practical and cost-effective than traditional follow-up appointments, enhancing clinic productivity while reducing patients' wait times and kidney transplantation costs.	**(Engy, 2023).**

3.7. Factors in Egypt That May Influence Physicians' Adoption of Telemedicine Applications

Maintaining time limits and physician-patient boundaries, as well as requesting investigation results are considered examples of best telemedicine practices (Ebrahem et al., 2022). Access to comprehensive patient records enables doctors to make more precise decisions regarding clinical and medical care. Moreover, electronic health records (EHRs) support further data analysis, including medical research. Increased access to patients' health records also facilitates faster diagnosis (Stadelmann, 2012). However, doctors believe that telemedicine practice should only be permitted after receiving specific licensure (Ghitani et al., 2023).

3.8. Egypt's Telemedicine Scene: Barriers and Difficulties

Telemedicine has emerged as a promising solution to overcome geographical barriers and improve healthcare access in various countries, including Egypt. However, the majority of telemedicine initiatives in Egypt encounters significant challenges and difficulties that hinder their technical, financial, and human resource sustainability. Furthermore, the lack of comprehensive publications on telemedicine in Egypt further exacerbates the limited understanding of operational infrastructure, financial plans, success factors, and overall sustainability (Alboraie et al., 2021).

A study by Ebrahem et al. (2022) highlighted the physicians' best telemedicine practices, revealing their implementation of various techniques, such as maintaining boundaries between patients and doctors, setting time limits, and requesting investigation reports (79.5%, 67.6%, and 81.5%, respectively). Regarding the obstacles to gaining awareness of telemedicine services, the study found that approximately three-quarters of the sample of pregnant women cited a lack of direction, education, and training as obstacles, while almost one-third cited time constraints as a barrier. This finding may be related to a lack of training programs on telemedicine, which hinders individuals from using the service. Patients may encounter difficulties with downloading software, accessing necessary equipment, and other related challenges (Lukonga, 2020).

The use of telemedicine services can be complex and unappealing due to poor internet connectivity and the complexity of advanced web-based applications (Ashry & Alsawy, 2020). A survey conducted by Mahmoud and Abd El-Badie (2020) among ophthalmologists in Egypt indicated that patient awareness is the main barrier to using telemedicine (54.4%), followed by challenges with the technical infrastructure (44.6%) (Mahmoud &Abd El Badie, 2020).

Furthermore, Egypt is experiencing a shortage of mental health resources. Therefore, Egyptian psychiatrists believe that web-based platforms can contribute to the improvement of the country's mental healthcare system (Kamel et al., 2020).

Table 3 *Barriers to Telemedicine Applications in Egypt*

Barrier Type	Barrier Impact Description	References
Technological Barrier	The use of electronic health records (EHRs) by doctors may present some difficulties, as it can be time-consuming.	**(Wahba et al., 2019).**
	Ignorance, illiteracy, and/or lack of technology also represent significant challenges for the telemedicine network between Egypt and Africa. In Egypt, the technological illiteracy rate reaches approximately 25%.	**(Wahba et al., 2019).**
	For the telemedicine network between Egypt and Africa, the limited availability of network connectivity and electricity is another significant constraint, restricting expansion to specific geographic locations.	**(Wahba et al., 2019).**
	Inadequate telemedicine infrastructure and insufficient bandwidth.	**(Hussein, & Khalifa, 2012).**
	Internet access is limited to major cities.	**(Hussein, & Khalifa, 2012).**
	Systems' technical drawbacks.	**(Eldin et al., 2013).**
Legal & Regulatory Barriers	Waiving patient permission involved significant ethical transgressions, including blackmail, defamation, hate speech, court allegations, and invasion of privacy.	**(Ghitani et al., 2023).**
	None of the Egyptian doctors were aware of any explicit laws governing the use of telemedicine.	**(Ghitani et al., 2023).**
	Over half of the Egyptian physicians (54.3%) believed that the sanctions for telemedicine should be similar to those for traditional face-to-face practice, while 24% believed that they should be less severe.	**(Ghitani et al., 2023).**
	Security or privacy issues.	**(Eldin et al., 2013).**
Financial Barrier	For the telemedicine network between Egypt and Africa, the lack of adequate funds is a major barrier, as funding organizations prioritize covering operational costs over investing in infrastructure and equipment.	**(Wahba et al., 2019).**
	Costly telemedicine solutions, including those for supplies, travel, maintenance, and training.	**(Hussein, & Khalifa, 2012).**
	Inadequate abilities, resources, and knowledge.	**(Hussein, & Khalifa, 2012).**
	Initial financial outlays and recurring financial expenses.	**(Eldin et al., 2013).**
Cultural & Societal Barriers	Language differentiation, literacy level, traditional views, aversion to change, and social and religious constraints.	**(Al-Samarraie et al., 2020).**

Organizational Barrier	Inability to maintain projects' functionality due to lack of funding and legalization frameworks.	**(Hussein, & Khalifa, 2012).**
	Shortage of professionals and programmers to improve telemedicine capabilities.	**(Hussein, & Khalifa, 2012).**
	Lack of patient understanding and adoption of telemedicine networks and applications for receiving healthcare services.	**(Hussein, & Khalifa, 2012).**
	No plans for telemedicine implementation at a national level.	**(Hussein, & Khalifa, 2012).**
	Benchmarking or evaluation plans for telemedicine are lacking.	**(Hussein, & Khalifa, 2012).**
	No commitment to nationwide telemedicine deployment.	**(Hussein, & Khalifa, 2012).**
	Inconsistent industry norms.	**(Eldin et al., 2013).**
Individual or Human Resources Barrier	Lack of efforts to reengineer work processes to accommodate telemedicine applications and networks.	**(Hussein, & Khalifa, 2012).**
	No commitment from experts to join the telemedicine network.	**(Hussein, & Khalifa, 2012).**
	Loss of productivity and training. Lack of computer expertise.	**(Eldin et al., 2013).**

3.9. Aspects Hindering Egypt's Execution of Telemedicine

A cross-sectional study conducted by Arafa et al. in Egypt and Saudi Arabia revealed a correlation between sufficient income and greater usability scores, which could be attributed to the higher income and superior education of participants. Such correlation facilitated the use of mobile health (mHealth) applications. Moreover, wealthier participants may have been able to afford mHealth applications with higher usability and possess smartphones with advanced capabilities (Arafa et al., 2022).

The perception of the advantages of telemedicine was found to be significantly related to gender and medical specialty. Women were more likely than males to perceive the benefits of using telemedicine, which may have been influenced by professionals' technology-related abilities and expertise (El-Mazahy et al., 2023).

Telemedicine in Egypt: Prospects and Recommendations for the Future

According to a World Health Organization (WHO) research, less than 50% of survey respondents indicated that their nation had established particular national telehealth policies or included telehealth in national eHealth policies (GHO, 2016).

Health campaigns should concentrate on health promotion and education to raise public knowledge of the advantages of telemedicine services in the area (Al-Samarraie et al.2020). The development of awareness campaigns to increase women's knowledge of telemedicine services and the use of educational guidelines to healthcare professionals aimed to improve access to obstetric treatments via telemedicine post COVID-19. According to Youssef et al. (2022), resources and staff training are crucial elements to be considered in order to overcome obstacles to the use of telemedicine. (Yassa et al., 2022). Therefore, training sessions should be longer, more frequent, and

provide more hands-on experience (Lukonga , 2020). Additionally, it is preferable to conduct simulation exercises in hospital before patient discharge to ensure their utilization of the program without difficulty (Ashry & Alsawy, 2020).

Egypt requires a national digital ecosystem to realize the potential of digitalization, including widely accessible high-speed Internet, digital platforms, interoperable digital payment services, digital identities, and a legal and regulatory framework (Lukonga , 2020). In terms of regulating digital matters, an analysis of legislative and policy trends reveals that Egypt has adopted a reactive approach, responding to problems with considerable delays (WHO, 2020). Moreover, medical professionals emphasized the necessity of legalizing telemedicine in Egypt (El-Mazahy et al.2023).

It was highlighted that Egyptian psychiatrists considered using EMH as a supplement to the conventional system of care, since they believed that the current mental health care system was not adequately addressing their demand. A trustworthy web-based platform could leverage the widespread use of mobile devices and high internet penetration to expand access to psychiatric therapies across the nation, addressing the existing shortage of mental health services (Kamel et al., 2020).

A disconnect between ethical guidelines and practitioner viewpoints has been identified due to the diversity of international practices and the intricacy of patient-provider relationships. Yassa et al. (2022) confirmed that this discrepancy needs to be urgently addressed. Moreover, they noted both advantages and disadvantages of using telemedicine among Egyptian patients, concluding that the biggest disadvantage is the inability of doctors to examine patients in person or accurately diagnose their conditions (77.3%), perform surgeries or other procedures (60.4%), or have patients describe their symptoms through remote communications (59.1%), and that there are no communication facilities available.

4. Conclusion

This study has explored the use of telemedicine in Egypt, emphasizing its potential in mitigating the country's physician shortage and enhancing healthcare accessibility. However, telemedicine encounters numerous obstacles in Egypt. Considerable technological obstacles can be exemplified by inadequate infrastructure outside major cities and limited internet connectivity. The absence of telemedicine-specific legislation in Egypt has led to additional legal and regulatory concerns. Furthermore the lack of resources and financial limitations further obstruct the implementation of telemedicine.

In spite of these obstacles, telemedicine has proven beneficial in a number of medical specialties in Egypt, including dermatology, psychiatry, neurology, gastroenterology, and ophthalmology, particularly for patient follow-up. In addition to reducing infection risks and facilitating access to health care in isolated communities, telemedicine can assist in disease management.

However, the expansion of telemedicine is hindered by several issues, including three primary factors: insufficient training, excessive costs, and technological illiteracy. One major disadvantage, according to Egyptian physicians, is the inability to conduct in-person physical examinations. Moreover, there is a consensus that Egypt is required to develop laws and regulations to govern telemedicine.

In conclusion, despite the potential of telemedicine to enhance Egypt's healthcare system, its widespread utilization will rely on its ability to overcome obstacles such as inadequate funding, infrastructure, and regulatory frameworks.

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