

## Assessment of Knowledge, Perception and Willingness of Telemedicine among Physician in Qalubia Governorate, a Cross Sectional Study

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### ABSTRACT

**Background:** Information and communication technology is used in the healthcare industry through telemedicine, which is valuable for sharing accurate data for the purposes of disease prevention, patient's diagnosis, assessment, and treatment, and continuing medical professional training.

**Objective:** This study aimed at exploring knowledge, awareness and attitude of physician at Benha university hospital and a number of primary health care centers and units in Qalubia Governorate towards telemedicine

**Subjects and methods:** a cross-sectional survey that was conducted on 194 physicians recruited from Benha University Hospital and a number of Primary Health Care Centers and Units in Qalubia Governorate from first January 2023 to end February 2023 through a self-administered questionnaire, which assessed physicians' access to computers and literacy, knowledge, perceptions and willingness of telemedicine adoption.

**Results:** A total of 194 participants of which 66% were males and 34% were females had completed the questionnaire, nearly about 64% of physicians always or often use laptops at home and search for information online, 44.3% had average familiarity with telemedicine technology, while 73.2% had low familiarity with telemedicine guidelines. While more than 90% of the participants perceived telemedicine as a viable approach for providing medical care services to patients, 56.7% reported that the lack of consultation between IT experts and clinicians and more than 80% reported that lack of suitable training in the use of telemedicine equipments, patients' confidentiality and privacy concerns hampers telemedicine adoption.

**Conclusion:** Even while telemedicine seems like a good idea and is generally embraced by medical professionals, there are still several challenges with its use and due to many obstacles, this study suggests that the government and related authorities should address such problems and seek its answers to put the cornerstone for its solution.

**Keywords:** Telemedicine, Knowledge, Perception, Willingness.

### INTRODUCTION

The number of patients with chronic diseases has increased, population demography has changed, and long-term follow-ups have decreased, all of which have contributed to the introduction of innovative procedures in healthcare. For example, information and communication technology (ICT) presented promising chances to improve the provision of healthcare <sup>(1)</sup>. E-health or telemedicine is the use of ICT to support remote patient care, preserve patient health data, and provide patients with expert help <sup>(2)</sup>.

The WHO defines telemedicine as the provision of health services by all health specialists who use ICT to exchange precise information for the diagnosis, prevention of diseases, treatment, and evaluation; as well as continuing education of health professionals, all with the goal of improving the health of individuals and communities <sup>(3)</sup>.

Telehealth or e-Health is a system of multiple phases that benefits both patients and healthcare providers by giving them access to training chances and research projects, also is considered tools to assist in providing respectable medical treatment <sup>(4)</sup>. The main aim of telemedicine and e-health is improving communication between distant health facilities, hospitals, in urban and rural areas <sup>(5)</sup>.

Other aim of telemedicine includes improved pharmaceutical and other medical provisions.

Therefore, E-Health project come across these needs. Telemedicine seeks to deliver healthcare in

rural areas on similarity with that provided in large cities and capitals <sup>(6)</sup>.

Success of any novel technology is centered on a multiple of factors, as well as the functioning environment in the health facilities, experts' knowledge, attitudes and talents. As a result, it's important to aid professionals recognize the new telemedicine idea and evaluate how they are prepared on a professional level to agree to take and deliver telemedicine services <sup>(7)</sup>. Meanwhile, the idea of telemedicine is still new and vague in underdeveloped nations. There are numerous explanations for why telemedicine development and implementation continue to be difficult in this region of the world <sup>(8)</sup>.

Any new technology must be easy for consumers to understand, provide optimal working conditions, and necessitates the acquisition of relevant skills by users. To incorporate telemedicine into the Egyptian healthcare system, it is imperative to evaluate the level of knowledge, perception, and utilization of the technology among healthcare professionals and the general public <sup>(2)</sup>. This study aimed to explore knowledge, attitude and perception of physician about telemedicine.

**Research question:** Do the physicians have sufficient knowledge about telemedicine? What are factors affecting physician's perception of telemedicine?

**Hypothesis:** Physicians have no sufficient knowledge about telemedicine.

## SUBJECT AND METHOD

This is a cross-sectional study that was conducted on 194 physicians recruited from Benha University Hospital (97) and a number of Primary Health Care Centers and Units in Qalubia Governorate (97) from First January 2023 to end February 2023. The sample size was calculated by Open epi 1.4.3 according to Fouad *et al.* <sup>(9)</sup> considering power 80%, CI 95 %.

**Main Measures:** Each one of 194 doctors received a questionnaire <sup>(8)</sup> to complete on their own. After being told about the study, participants signed an informed consent forms.

**Inclusion criteria:** Physicians who were reachable at the time of data collection were included in the study. Professionals like consultants, specialists, registrars, residents, and interns were also included in the study sample.

Items of used questionnaire were taken from previous validated study. To ensure content validity, items of questionnaire were revised by three academic professors from Faculty of Medicine. Pilot study was conducted on 20 physicians to test readability and suitability of questionnaire, and no specific feedback for any modification was reported. The questionnaire was divided into five main sections: (1) Demographic data, (2) General Information on access to computers and computer knowledge, (3) Knowledge, (4) Perceptions and (5) Willingness concerning telemedicine.

**Ethical approval:** The Research Ethics Committee of Benha University granted the study (Ethical approval RC: 11-12-2022). The administrators granted permission for entry to the hospitals. All approached physicians gave informed consents before participating in the study after explaining the study's objectives and its inclusion and exclusion criteria. Participants were assured that the questionnaire cover letter was anonymous, and that the data could not be linked to specific respondents or facilities. The Helsinki Declaration was adhered to over the entirety of the research.

### Statistical analysis:

SPSS version 28 was used for data analysis. All parameters in this investigation were presented as percentages and frequencies. When comparing categorical data, the X<sup>2</sup>-test was used, and differences were statistically significant at P ≤ 0.05.

## RESULTS

The results of this study revealed that among total of 194 participants, 28.9% had an age between 21 to 40 years, 66% were males and the majority (86.1%) were Egyptians. Specialists constituted 32.5% of the studied physicians, while consultants were 23.3%, interns were 17%, registers were 16% and residents were 11.3%. Regarding the participants' specialties 14.9% worked in pediatrics, 12.9% worked in

medicine and obstetric and gynecology and 10.8% worked in radiology. Half of the studied participants worked in Benha University Hospitals, while the other half worked at PHC facilities and nearly half of them (55.4%) were from urban residence (Table 1).

**Table (1):** Demographic characteristics of participating physicians N = 194

Characteristics		No	%
Age	Between 20–30 years	55	28.4
	Between 21–40 years	56	28.9
	Between 41–50 years	49	25.3
	51≤	34	17.5
Gender	Female	66	34.0
	Male	128	66.0
Nationality	Egyptian	167	86.1
	Non Egyptian	27	13.9
Professional specialty	Consultant	45	23.2
	Specialist	63	32.5
	Register	31	16.0
	Resident	22	11.3
	Intern	33	17
Specialty	Dermatology	14	7.2
	Emergency	3	1.5
	Family medicine	12	6.2
	Medicine	25	12.9
	Obstetrics and gynecology	25	12.9
	Orthopedics	16	8.2
	Pediatrics	29	14.9
	Radiology	21	10.8
	Surgery	16	8.2
	Others	33	17
Place of work	University	97	50
	PHC	97	50
Residence	Urban	108	55.4
	Rural	86	44.3

Regarding computer access and literacy, 63.9% of doctors reported using laptops at home regularly, 64.9% searched for information online frequently, half that shopped online occasionally or never, 45.4% communicated with patients via email or social media, 58.2% owned two smart devices, 75.8% of patients asked about ways to contact them online, 95.9% used social media to get information to share with patients, 58.8% used to search for literature, and 58.8% used to keep up to date on their knowledge and skills. Only 49% of doctors were worried about potential legal ramifications when it came to communicating with patients online (Table 2).

**Table (2):** Factors related to computer access and literacy in percentages (N= 194)

Factors related to computer access and literacy		No	%
How often do you use PC/Laptop at home?	Always/often	124	63.9
	Sometimes / Rarely	70	36.1
	Never	0	0
How often do you search for information online?	Always/often	126	64.9
	Sometimes / Rarely	68	35.1
	Never	0	0
How often do you shop online?	Always/often	47	24.2
	Sometimes / Rarely	97	50
	Never	50	25.8
How often do you interact with patients via e-mail or through social media?	Always/often	53	27.3
	Sometimes / Rarely	88	45.4
	Never	53	27.3
How many smart devices do you have?	0	0	0
	1	24	12.4
	2	113	58.2
	3 or more	57	29.4
Have been questioned by patients about online means of contacting you?	Yes	147	75.8
	No	47	24.2
Do you use social media/Internet for the following purposes	Obtaining information to give to patients	186	95.9
	Patient consultation	56	28.9
	Literature search	162	83.5
	Maintain your knowledge and skills	114	58.8
Are you concerned of possible legal issues around interacting with patient online?	Yes	95	49
	No	99	51

In terms of factors pertaining to telemedicine knowledge, 44.3% of participants had an average level of familiarity with telemedicine technology, 54.6% had an average level of familiarity with telemedicine technology's medical applications, and 44.8% of participants reported that conferences, speeches, or meetings regarding telemedicine technology were frequently held in their workplaces. 46.4% reported having an average level of knowledge with telemedicine tools, while 73.2% reported having a low level of familiarity with telemedicine guidelines, 45.4% had an average level of knowledge regarding the use of telemedicine in other countries. Remarkably, 61.3% of participants stated that doctors require ongoing training in the use of telemedicine (Table 3).

**Table (3):** Factors related to knowledge of telemedicine in percentages (N=194)

Factors related to knowledge of telemedicine		No	%
To what extent are you familiar with telemedicine technology?	Low	27	13.9
	Average	86	44.3
	High	81	41.8
To what extent are you familiar with the medical applications of telemedicine technology?	Low	23	11.9
	Average	106	54.6
	High	65	33.5
How often conferences, speeches or meetings held in your workplace regarding telemedicine technology?	Low	89	45.9
	Average	87	44.8
	High	18	9.3
To what extent are you familiar with telemedicine tools?	Low	64	33
	Average	90	46.4
	High	40	20.6
To what extent are you familiar with telemedicine guidelines	Low	142	73.2
	Average	42	21.6
	High	10	5.2
To what extent are you familiar with the use of telemedicine in other countries?	Low	36	18.6
	Average	88	45.4
	High	70	36
To what extent is continuous training in the use of telemedicine necessary for doctors?	Low	11	5.7
	Average	64	33
	High	119	61.3

After examining various aspects of telemedicine perception, 90.2% of respondents thought it was a practical way to give patients' medical care, 91.2% agreed that ICT could play a role in the healthcare industry, 93.3% agreed that using a telemedicine system could save time and money, 81.4% agreed that it could save effort and 65.5% said that ICT applications were already available in the healthcare industry (Table 4).

**Table (4):** Factors related to perception of telemedicine in percentages (N=194)

Factors related to perception of telemedicine		No	%
Telemedicine is a viable approach for providing medical care services to patient	Yes	175	90.2
	No	19	9.8
There is a potential role for ICT in the health care	Yes	177	91.2
	No	17	8.8
Using of telemedicine system can save time and money	Yes	182	93.3
	No	12	6.7
Telemedicine system can save efforts	Yes	158	81.4
	No	36	18.6
The applications of ICT in healthcare is already available	Yes	127	65.5
	No	67	34.5

In terms of willingness to use telemedicine, the majority of participants (95.9% and 98.5%) stated that they would like to watch a procedure while it is happening in their own hospital and consult with large centers in their specialties. Meanwhile, 82.5% and 84% believed that their colleagues would like to use telemedicine technology and that it can be integrated into the current system. Finally, 69.6% believed that the current state of their hospitals makes the use of telemedicine technology inappropriate (Table 5).

**Table (5):** Factors related to willingness about telemedicine (N=194)

Factors related to willingness about telemedicine		No	%
I would like to consult with the large centers in my specialty, whilst I am in my own hospital.	Yes	186	95.9
	No	8	4.1
I would like to be able to watch a procedure as it is taking place	Yes	191	98.5
	No	3	1.5
The implantation of telemedicine technology is appropriate due to the current conditions in the hospitals	Yes	59	30.4
	No	135	69.6
I think that my colleagues would like to implement the telemedicine technology	Yes	160	82.5
	No	34	17.5
Telemedicine system can be integrated within the existing system	Yes	163	84
	No	31	16

In this study, 23.7% of the participants found that lack of perceived clinical usefulness is a major issue affecting the adoption of telemedicine, 56.7% reported that the lack of consultation between IT experts and

clinicians affect telemedicine adoption, 29.9% thought that telemedicine might increase the work load, while 82% reported that lack of suitable training in the use of telemedicine equipments hampers its adoption, 28.4% and 25.3% of the participants thought that negative attitudes of staff involved and high cost of equipments affects telemedicine adoption meanwhile 80.4% had concerns regarding patients confidentiality and privacy (Table 6).

**Table (6):** Issues affecting the adoption of telemedicine from physicians' views by specialty in percentages (N=194)

Issues affecting the adoption of telemedicine	No	%
Lack of perceived clinical usefulness	46	23.7
Lack of consultation between IT experts and clinicians	110	56.7
Perceived increases in workload	58	29.9
Lack of suitable training in the use of equipment	159	82
Lack of user-friendly software	134	69.1
Negative attitudes of staff involved	55	28.4
High cost of equipment	49	25.3
Concern about patient confidentiality and privacy	156	80.4

**DISCUSSION**

Telemedicine overcomes geographic constraints and improve access to healthcare via utilizing electronic information and communication technology (10). Telemedicine also, has an important role in diagnosing and managing chronic diseases utilizing a patient-centered approach. In addition with monitoring health status in real time by permitting the recording of physiological indicators that cannot be identified through clinical visits (7).

Hospitalizations, quality of life, and death rates have improved when telemedicine is utilized for communication or observation of chronic conditions, demonstrating the importance of this practice (11). It is a highly growing discipline with the possibility to overwhelm challenges that patients and healthcare practitioners already meet (10). Several communities everywhere in the world have responded differently to the progress of the modern healthcare system, which utilizes technologies such as telemedicine. The strategy's supporters hope that a wide range of entities, including the government, healthcare professionals, and, most importantly, patients, approve it (12). This study aimed at exploring knowledge, awareness and attitude of physician at Benha University hospital and a number of primary health care centers and units in Qalubia Governorate towards telemedicine.

Remarkably, in the present investigation, 87% of participants had two or more smart devices. This is consistent with **Albarrak et al.** (7) who reported that > 89% of working adults own two or more smart

gadgets. In this survey, > 70% of professionals across different categories consistently communicate with patients via social media or email. Physicians who connect directly with patients via email and social media to improve clinical treatment have been found to have similar outcomes<sup>(13, 14)</sup>. Social media may be used by health professionals to improve patient-centered networks, have better health interventions, stay current on health policies and advancements, and promote improved community health<sup>(15, 16)</sup>.

However, it is considered unethical to build a patient-physician connection through email or social media platforms like blogs, microblogs, and media-sharing websites. Similar findings on potential legal risks when interacting with patients via online communication channels like social media or email are presented in the current study<sup>(17)</sup>.

One of the study's key conclusions is that telemedicine technology is well-known among medical professionals from various specializations. This is consistent with **Assaye et al.**<sup>(18)</sup> who reported that most of participants have good knowledge of telemedicine. Also, similar findings are reported by **Albarrak et al.**<sup>(7)</sup> and **Elhadi et al.**<sup>(19)</sup>, but **Ashfaq et al.**<sup>(20)</sup> reported that participant physicians had low level of knowledge. Regarding knowledge about guidelines regulating use of telemedicine, this study revealed that the majority of physicians had low knowledge. This is in agreement with **El Kheir et al.**<sup>(21)</sup>, but disagree with **Alanzi**<sup>(22)</sup>.

This study showed that > 90% of respondents thought that telemedicine was a practical way to give patients medical treatment and believed that ICT might play a part in the healthcare industry. This agrees with the findings of a national survey conducted in Egypt by **Alboraie et al.**<sup>(3)</sup>, systematic review article that explored acceptance of telemedicine from physicians' perspectives by **Garavand et al.**<sup>(23)</sup>, at which the USA and Spain have the most conducted, also in agreement with previous 2 Indian studies<sup>(24, 25)</sup>.

On exploring factors related to the perception of telemedicine, 93.3% of the participants agreed that the use of telemedicine system can save time and money and 81.4% agreed that the use of telemedicine system can save efforts. This is consistent with an Egyptian study by **El-Mazahy et al.**<sup>(26)</sup> and a cross-sectional survey that was conducted at Mayo Clinic in Florida at which 80% of physicians perceived telemedicine as a valuable cost-effective approach.

Also, a study in Saudi Arabia by **Albarrak et al.**<sup>(7)</sup> at which > 90% of doctors from various disciplines concurred that telemedicine may result in time and cost savings. Similar findings that telemedicine is a cost effective approach, which is easy and affordable to help patients with serious diseases to take control of their condition, participate in their care, and stop problems from getting worse was found by **Komalasari**<sup>(27)</sup> in Indonesia.

After examining factors associated with telemedicine adoption willingness, this study found that most participating physicians wanted to be able to watch procedures as they were happening and would like to consult with large centers in their specialties while they were in their own hospital. This is consistent with **McMaster et al.**<sup>(28)</sup> who found that surgical clinic staff apply telemedicine techniques to improve collaboration and communication that would result in more efficient and well-coordinated treatment. However, a Chinese survey by **Liu et al.**<sup>(29)</sup> revealed that physicians were open to use telemedicine for three primary reasons; improving patient convenience, optimizing medical resources, and raising the standard of treatment.

In trying to identify the future of telemedicine in Egypt, this study showed that 82.5% of the participants thought that their coworkers would like to implement the telemedicine technology. This is consistent with another Egyptian study by **Shouman et al.**<sup>(4)</sup> at which 78.1% of studied healthcare workers were willing to use telehealth in their practice and with **El-Mazahy et al.**<sup>(26)</sup> study where 45% of the participants perceived telehealth as a beneficial tool for that was used during COVID-19 pandemic. In line with these findings, 69.6% of physicians believe that the implementation of telemedicine technology is unsuitable given the existing situation in their hospitals, **Al-Samarraie et al.**<sup>(30)</sup> found that many challenges had obstructed the progress in the utilization of telemedicine across Middle Eastern countries<sup>(4)</sup>. Additionally, 84% of the participants thought telemedicine technology can be integrated within the existing system. This is in consistent with **Abouzeid et al.**<sup>(31)</sup> who found that telemedicine may be a vital element of the healthcare system in the Middle East and North Africa area, however it cannot totally substitute for in-person face-to-face consultations in emergency situations<sup>(5)</sup>. These are alarming findings, which reflects the necessity to restructure the hospital to accommodate such a promising approach to invest the readiness of doctors to benefit from it.

Our study identified four main objections to the use of telemedicine by various medical experts from both Benha University Hospitals and Benha PHC centers, which are lacking of suitable training, patient confidentiality and privacy, Lack of user-friendly software and a lack of collaboration between IT specialists and physicians. Meanwhile, the privacy and security of patients' data were the main concerns found by **Alboraie et al.**<sup>(2)</sup>. In comparison with **Abouzeid et al.**<sup>(31)</sup>, the main obstacles to the widespread use of telemedicine in the Middle East and North Africa region were a lack of ICT infrastructure, medical-legal concerns and malpractice liability, a lack of telemedicine accreditation or regulatory policies, the reluctance of many doctors to abandon their traditional practices in favor of new ones, and the absence of clear business models to guarantee the continued proper delivery of telemedicine services. However a systemic

review literature, which was conducted on 43 articles by **Al-Samarraie et al.** (30) discovered that many technological, organizational, legal, cultural, financial, individual, and regulatory obstacles had impeded the full use of telemedicine and the provision of the entire spectrum of medical services and the limited adoption of telemedicine in the in Middle Eastern region which had been linked to factors such as patient and physician reluctance, inadequate infrastructure, lack of financing, bad system quality, and inadequate information technology training.

## CONCLUSION

Even while telemedicine seems like a good idea and is generally embraced by medical professionals, there are still several challenges with its use and due to these obstacles and almost no telemedicine project has been properly executed on a large scale in the region. For a larger adoption -that would greatly enhance healthcare systems in Egypt and the whole region-, this study suggests that the government and related authorities should address such problems and seek its answers to put the cornerstone for its solution.

## LIMITATIONS

There was a number of limitations as that the study was cross-sectional not a prospective follow up study. Also, convenience non-probability sampling method had hindered the generalization of the results.

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