Original Article :

Telemedicine Practice and Perceived Skills Among Primary Healthcare Physicians in the Riyadh Second Health Cluster, Saudi Arabia.

Mohammed Awad Alrowaily[1], Sara Hassan Mustafa[1], Elsir Abdel Mutaal Mohammed[1], Salma Taha Makkawi[1], Kanagarajan Palani1

1. Preventive Medicine Residency Program, Riyadh Second Health Cluster

Received on June 30, 2023, accepted for publication on Jan 01, 2024, dx.doi.org/10.5455/mjhs.2024.02.010

Corresponding author:
Sara Hassan Mustafa
Preventive Medicine Residency Program, Riyadh Second Health Cluster
Email: hsarra@gmail.com

OPEN ACCESS Distributed under Creative Commons CC BY-NC-ND 4.0

Abstract

Background and Aims:
Telemedicine is increasingly being adopted by primary care professionals in Saudi Arabia, necessitating the development of new skills and approaches in this field. The aim of this study is to evaluate the utilization and perceived skills of primary care physicians in telemedicine within the Riyadh Second Health Cluster in Saudi Arabia.

Methods:
A cross-sectional study was conducted among physicians using a self-administered electronic questionnaire from April to October 2022. The questionnaire, developed by the research team, encompassed socio-demographic information, prior experience and future intentions regarding telemedicine, and perceived proficiency using a 5-point Likert scale. Descriptive statistics, frequencies, percentages, and statistical tests (Chi-square and Fisher's exact tests) were employed for data analysis, with a significance level of $p<0.05$.

Results:
A total of 130 valid responses were received, with an average age of 40.6. Most participants reported prior experience with telemedicine (74.6%), with Sehhaty (36.2%) and Anat (23.8%) being the most frequently utilized applications, while telephone and email (4.6%) were used the least. The intention to adopt telemedicine in the future was high, at 86.2%. The perceived confidence in utilizing telemedicine skills was generally high among the surveyed physicians.

Conclusions:
The study revealed that primary care physicians possessed a high level of telemedicine practice and confidence in their teleconsultation abilities. This presents an opportunity to advance care delivery models based on telemedicine technology. The widespread use of Sehhaty and Anat indicates increasing acceptance of telemedicine among the population, underscoring the need for expert support to meet the expected demand.

Keywords:
Telemedicine, Primary Health Care, Saudi Arabia, Perceived Skills.

Introduction

Telemedicine is remote medical practice using electronic means of information and communication technology (ICT) [1]. It is currently used by health practitioners in Saudi Arabia (KSA) for a variety of purposes, including teleconsultation, tele-expertise, and continuing medical education[2]. The popularity of telemedicine has increased rapidly during the COVID-19 pandemic. The reduction in face-to-face visits due to COVID-19 was met by a rapid expansion in telemedicine, with many practitioners starting to use telemedicine for the first time during the pandemic [3]. This expansion was matched by an increase in the use of telemedicine by populations of all ages and conditions, including old age and chronic conditions [4]. Evidence suggests that well-designed, fully functioning telehealth programs can reduce unplanned hospital admissions by 40% or more, and may result in large annual savings with significant improvements in patients' lives [5].

The interest among health professionals in KSA in adopting telemedicine is increasing [6]. Most of the physicians in KSA regard telemedicine as a viable tool for service delivery in the future that can improve quality and access to care and save time and money [7]. More than half of the licensed doctors in KSA used a form of telemedicine before and during the COVID-19 pandemic [2,8]. Healthcare professionals, patients, and the general population all perceive telemedicine as beneficial in making the care process easier and quicker [7, 9, 10]. Physicians in KSA think telemedicine is useful in monitoring patients with chronic diseases, reducing waiting times and visits, and improving the quality of care 8. The majority of patients who used telemedicine in KSA thought it made their episode of care easier 9. Healthcare providers in varying contexts expressed their belief that telemedicine will soon become part of their normal day-to-day work lives[3].

Primary health care (PHC) is a major contributor to health care in KSA, serving more than a third of the patients needing outpatient care [11]. Telemedicine in PHC is known to improve access to remote areas, maintain the continuum of care, promote social distancing, and overcome the shortage of specialized personnel [7, 12]. Before the pandemic, the use of telemedicine in PHC was very low as compared to other specialties such as emergency medicine, radiology, and pathology [13, 14]. It was practiced mostly in Europe and America. Telemedicine in PHC was limited to using video, phone, and email consultations with adult patients for chronic disease management, monitoring, training, and empowering patients [14]. Challenges to using telemedicine

in PHC included; a lack of resources, low access to technology, resistance by care providers, patient confidentiality issues, and the anticipated change in the doctor-patient relationship [5,14]. The availability of experts to set up, operate, and manage telemedicine is another challenge. This highlights how important skill development is for establishing efficient telemedicine programs in PHC institutions.

The introduction of telehealth is expected to affect the roles and responsibilities of care providers, requiring the introduction of new skills and ways of working [5]. Training is essential to increase the skills of care providers and improve their perception, behavior, and confidence in practicing telemedicine [15]. Competencies such as clinical knowledge and communication skills are acquired in normal, face-to-face clinical practice. However, many competencies are specific to telemedicine and should be included in training programs where telemedicine is to be used. It is crucial to map the current competencies and skills of healthcare professionals to adapt the training to their needs to integrate efficient telemedicine programs into new models of care [15].

This study aims at providing insight into how PHC physicians in the Riyadh Second Health Cluster practice telemedicine and perceive their readiness to deliver teleconsultation. The results of this study will add to the scientific base for developing effective telemedicine programs in KSA and enable the tailoring of relevant skill-development and educational programs for primary care professionals. This study aims to assess the practice and measure the perceived skills of PHC physicians towards telemedicine in the Riyadh Second Health Cluster, KSA, in 2022.

Methodology

Study sample and design

This is a cross-sectional study conducted on physicians working in 40 government PHC facilities under the Riyadh Second Health Cluster from April to October 2022.

All of the 247 physicians were approached to fill out the questionnaire, using a sampling frame provided by the Community Health Department of the Riyadh Second Health Cluster. A convenient, non-randomized, voluntary response was taken. Resident doctors, general practitioners (GPs), specialists, and consultants were included in the study.

The online questionnaire and informed consent were sent by email to the physicians. Two data collectors visited the 40 health centers to introduce and further distribute the questionnaire. 130 complete responses were received and taken for

analysis. The study protocol was approved by King Fahad Medical City Institutional Review Board. All participants provided informed consent.

Study Tool

The structured online questionnaire was constructed by the research team based on a literature review 15. It was developed into English and Arabic versions in a Google form and pretested for validation. The first part of the questionnaire included 16 questions about the socio-demographic characteristics of respondents and their prior use of and intention to use telemedicine. The first part covered variables such as gender, age, specialty, duration of work or experience, and use of telemedicine and teleconsultation.

The second part of the questionnaire assessed the perceptions of physicians using a 5-point Likert scale (very confident, confident, neutral, unconfident, very unconfident). The Likert scale included ten questions to assess the perceived technological skills (I have basic computer and ICT skills, I can adjust a telemedicine camera, I feel confident in my ability to orient patients to the use of telemedicine equipment, I have confidence that telemedicine technology is easy to use, and I am open-minded to innovations in ICT and the doctor-patient encounter skills (I know how to assure patients about the privacy and confidentiality of the teleconsultation, I feel confident explaining to patients how teleconsultation is conducted, I can take a patient history via teleconsultation, I can conduct a remote clinical exam via teleconsultation and I can assess whether a teleconsultation is suited for the patient situation).

Data analysis

The data was cleaned, coded, and entered into SPSS for analysis. Descriptive statistics in the form of frequencies and percentages were used to represent socio-demographic data and the use of telemedicine. The perceived skills were divided into two sets (technological and doctor-patient encounter skills) and measured using a Likert scale. The Cronbach's alpha test was used to assess the Likert scale reliability and was found to be 0.827 for technology skills and 0.802 for doctor-patient encounter skills, indicating a good internal consistency. The mean for each of the two skill sets was calculated and changed into a categorical variable for two groups: unconfident (1-2.6) and confident (2.7–5). Chi-square and Fisher's exact tests were used when appropriate to compare differences in proportions between groups. A p-value less than 0.05 was considered statistically significant.

Results

Socio-demographic characteristics

The Socio-demographic characteristics of the respondents are shown in Table 1. There were 130 valid responses to the questionnaire. The mean age of the respondents was 40.6, ranging from 25 to 61. The majority of participants belong to the age group of 41–50 years. More than half of the respondents (54.6%) were females, and 45.4% were males. GPs represented 50.0% of the sample, family physicians 36.2%, and 13.8% were other specialties (internal medicine, pediatrics, preventive medicine). More than half of the participants (53.8%) had work experience spanning more than 10 years.

Table1: Socio-demographic characteristics

Variables	%
Age categories (in years)	
20 -30	13.8
31-40	34.6
41-50	38.5
51 -60	12.3
61-70	0.8
Gender	
Male	45.4
Female	54.6
Nationality	
Saudi	45.4
Non-Saudi	54.6
Specialty	
General practitioner	50.0
Family medicine specialist	36.2
Another specialty	13.8
SCHS classification	
GP	50.0
Registrar	36.2
Senior registrar	13.8
Consultant	6.2
Resident	14.6
Years of experience	
0-4	13.8
5-10	32.3
More than 10	53.8

Telemedicine experience

The telemedicine experience is shown in Figure 1. Most of the participants (74.6%) had prior experience with any form of telemedicine. Sehhaty (36.2%) and Anat (23.8%) applications were the most frequently used telemedicine applications. About 7.7% of the respondents used Zoom or Microsoft Teams. Only 4.6% used the telephone or email to communicate with their patients. About 56.9% of respondents used teleconsultation to provide treatment for cases (46.2%), follow-up (43.1%), and health education or counseling (43.1%). The intention to use telemedicine in the future was expressed by 86.2% of the respondents.

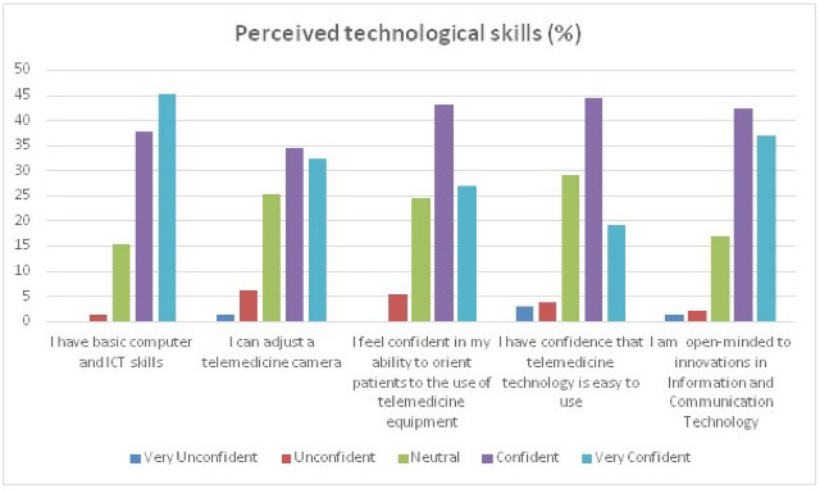


Figure 1. Telemedicine experience among PHC physicians Perceived telemedicine skills

The level of perceived confidence in using telemedicine was high for almost all of the explored telemedicine skills. (Fig. 2. and Fig. 3). Overall, 85.4% of the respondents were confident in having the necessary technological skills to use teleconsultation, while 74.6% felt confident in their ability to handle the doctor-patient teleconsultation encounter. The perceived skills for using telemedicine were significantly associated with prior use of telemedicine, the type of specialty, the Saudi Commission for Health Specialties (SCFHS) classification, and the intention to use telemedicine in the future. Family physicians experienced the highest level of confidence (95.7%) and GPs the lowest (78.5%). There were no significant differences in the level of confidence in telemedicine skills across genders, nationalities, age categories, and years of experience (Table 2).

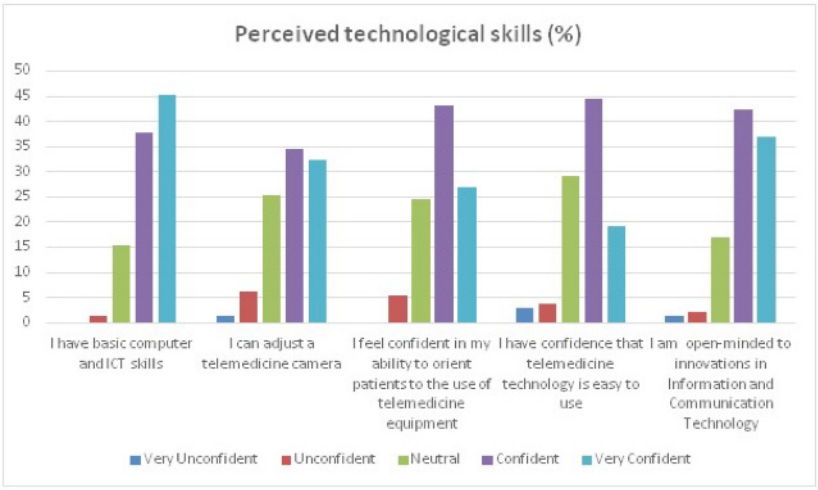


Figure 2. Perceived technological skills among PHC physicians

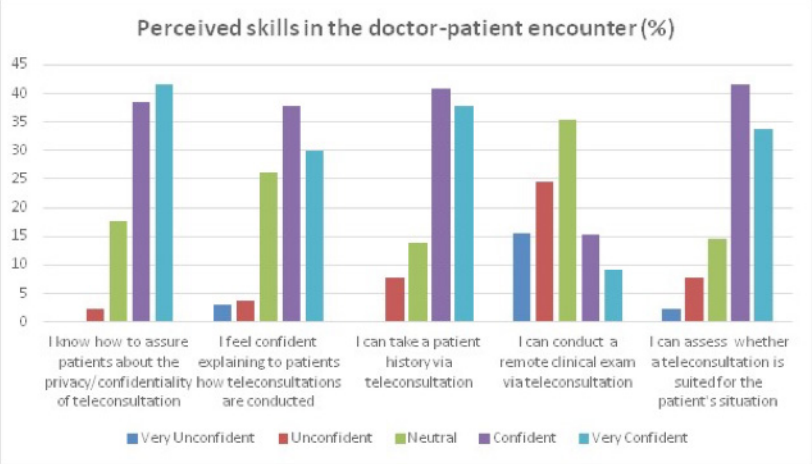


Figure 3. Perceived skills in the doctor-patient encounter

Table 2: Factors influencing the perceived telemedicine skills of PHC physicians

Characteristic	Perceived technological skills			Perceived skills in the doctor-patient encounter		
	Confident	Not confident	p-value	Confident	Not confident	p-value
Overall	111(85.4%)	19 (14.6%)		97 (74.6%)	33 (25.4%)	
Male	49 (83.1%)	10 (16.9%)	0.330	43 (72.9%)	16 (27.1%)	0.415
Female	62 (87.3%)	9 (12.7%)		54 (76.1%)	17 (23.9%)	
Saudi	49 (83.1%)	10 (16.9%)	0.330	42 (71.2%)	17 (28.8%)	0.268
Non-Saudi	62 (87.3%)	9 (12.7%)		55 (77.5%)	16 (22.5%)	
Specialty						
General practitioner	51 (78.5%)	14 (21.5%)	0.037	42 (64.6%)	23 (35.4%)	0.024
Family medicine	45(95.7%)	2 (4.3%)		41 (87.2%)	6 (12.8%)	
Another specialty	15(83.3%)	3 (16.7%)		14 (77.8%)	4 (22.2%)	
SCHS classification						
Resident	12 (63.2%)	7 (36.8%)	0.039	9 (47.4%)	10 (52.6%)	0.029
GP	54(87.1%)	8 (12.9%)		48 (77.4%)	14 (22.6%)	
Registrar	32 (91.4%)	3 (8.6%)		27 (77.1%)	8 (22.9%)	
Senior registrar	5 (83.3%)	1(16.7%)		5 (83.3%)	1 (16.7%)	
Consultant	8 (100.0%)	0 (0.0%)		8 (100.0%)	0 (0.0%)	

Characteristic	Perceived technological skills			Perceived skills in the doctor-patient encounter		
	Confident	Not confident	p-value	Confident	Not confident	p-value
Telemedicine training						
Yes	99 (88.4%)	13 (11.6%)	0.026	87 (77.7%)	25 (22.3%)	0.048
No	12 (66.7%)	6 (33.3%)		10 (55.6%)	8 (44.4%)	
Years of experience						
0-4	16 (88.9%)	2 (11.1%)	0.603	11 (61.1%)	7 (38.9%)	0.313
5-10	34 (81.0%)	8 (19.0%)		31 (73.8%)	11 (26.2%)	
11-40	61 (87.1%)	9 (12.9%)		55 (78.6%)	15 (21.4%)	
Ever used telemedicine						
Yes	89 (91.8%)	8 (8.2%)	0.001	81 (83.5%)	16 (16.5%)	<0.001
No	22 (66.7%)	11 (33.3%)		16 (48.5%)	17 (51.5%)	

Discussion

In the post-COVID-19 era, it is anticipated that the use of telemedicine in PHC will continue to grow, with an expected impact on the patient-doctor relationship and their interactions due to rapid implementation [12, 16]. To address this transformation, new care models, training programs, and the development of skills and competencies for telemedicine delivery are required [5]. This study, conducted among PHC doctors in Riyadh's second health cluster, aimed to assess their telemedicine practices and measure perceived telemedicine skills.

The findings revealed that 74.6% of the respondents had prior experience with telemedicine, consistent with a cross-sectional study of Riyadh hospital physicians, reporting 67.4% telemedicine use before COVID-19 [6]. The increase in telemedicine utilization observed in our study can be attributed to the impact of the pandemic on healthcare delivery [17, 18, 19]. In a cross-sectional study in KSA, physicians' use of telemedicine increased from 36% before COVID-19 to 64% during the pandemic [17]. A comprehensive review discussed the potential applications of telemedicine during the COVID-19 pandemic, with reports of 58.1% to 100% of physicians actively incorporating telemedicine into their practice [18]. Another study showed a remarkable increase in the adoption of telemedicine among urologists, with 72.4% of those who had never used it before initiating its use [20].

Physicians in KSA, regardless of their

specialties, express their intention to continue using telemedicine post-pandemic [6]. This study's respondents demonstrated this intention, with 86.2% expressing a desire to use telemedicine in the future. The agreement among physicians, as reported in a small-scale study involving 25 physicians in Taif, is that telemedicine enhances the quality of care and should be continued in KSA after the pandemic [17]. This growing interest in telemedicine presents an opportunity for policymakers to increase its use, but it also poses challenges in meeting doctors' support requirements.

The two most frequently used telemedicine platforms in this study were the Sehhaty (36.2%) and Anat (23.8%) applications, both released by the Saudi Ministry of Health (MOH) as part of the 2030 eHealth vision [10]. The Sehhaty application provides complimentary telemedicine consultation services to both citizens and residents, enabling individuals to seek consultations with MOH physicians up to three times each month [21]. The Saudi Government's rapid adoption of telehealth during the COVID-19 pandemic, primarily through the Sehhaty and Anat applications, contributed to their increased usage [10]. An evaluation of the Sehhaty application revealed room for improvement in its design, particularly regarding its user interface, to enhance the overall user experience [21].

The choice of telemedicine platforms depends on various factors, including healthcare settings, patient characteristics, and the type of disease or condition [14]. While only 7.7% of the respondents in this study used Zoom or Microsoft Teams, and 4.6% used messaging, 33.4% used Zoom in previous studies in KSA [8]. The lower utilization of Zoom and Microsoft Teams in this study may be attributed to the widespread adoption of MOH telehealth mobile applications (Sehhaty and Anat) during the pandemic [10]. Messaging (17.7%) ranked as the third most-used telemedicine form, followed by 937 call centers (16.2%). In contrast, a study of 392 physicians in KSA showed messaging was the most commonly used method during the pandemic (53%) [8]. Notably, 41.5% of board-certified urologists in KSA primarily used phone calls for telemedicine, followed by 32.7% using Zoom, while fewer than 20% reported using the Sehhaty application [20]. The increased global use of messaging and phone calls during the pandemic aligns with reports of a 122% increase in the use of phone consultations in some settings [19]. In many countries, regulatory authorities temporarily allowed the use of platforms that did not meet the usual standards of practice during the pandemic [20].

Approximately 56.9% of the respondents in this study used teleconsultation for

treatment, follow-up, health education, or counseling. Teleconsultation, with its real-time communication capability, is a preferred mode for delivering telemedicine services, compensating for the lack of physical presence in clinical interactions [14]. A multicenter cross-sectional study across six tertiary care hospitals in Saudi Arabia analyzed 22,620 patients who used telemedicine services, with 29.7% seeking family medicine, 0.1% infectious disease consultations, and 2.8% cardiology consultations [22].

With the introduction of telemedicine, PHC physicians need to acquire new skills related to basic IT and doctor-patient communication skills for remote clinical decision-making, non-face-to-face interactions, and teleconferencing [5]. A study in KSA reported a low level of telemedicine knowledge among physicians in all specialties [2, 7]. Insufficient training to conduct teleconsultations is a concern, with many healthcare providers seeking additional training [2, 7, 23]. Approximately 23.1% of the respondents in this study received telemedicine training, slightly higher than the 13.9% training rate among PHC physicians in other studies in Riyadh [23]. These low knowledge and training rates are concerning, as inadequate training may lead Saudi physicians to seek telemedicine knowledge from media and colleagues [2]. Furthermore, the increased risk of litigation associated with telemedicine practice without proper training is a concern. Lack of awareness of local telemedicine policies and regulations was reported by two-thirds of the participants, indicating the need for clear guidelines to promote telemedicine adoption [12, 23].

This study found a high level of perceived confidence in using telemedicine for various abilities. Most participants expressed confidence in their technological skills (85.4%), doctor-patient e-consultations (74.6%), and ease of using telemedicine technology (63.8%). This is crucial, as perceived ease of use is strongly correlated with the intention to use telehealth [24]. Those who expressed willingness to use telemedicine in the future (88.4%) had higher confidence levels in their abilities than those who did not (66.7%). There evidence that the intention to use telemedicine is closely linked to the attitude and perceived ease of use of telemedicine technology [24]. In the study conducted among board-certified urologists in KSA, those using telemedicine both before and during the pandemic had a notably high agreement regarding the simplicity and ease of learning to use telemedicine [20].

The perceived skills in utilizing telemedicine was found to be significantly associated with both the physicians' specialties

and the classification set by the SCFHS. Among the healthcare providers, family physicians displayed the highest level of confidence at 95.7%, while GPs exhibited the lowest confidence level at 78.5%. This observation aligns with the findings of other studies conducted in KSA, which reported a lower utilization rate of telemedicine among GPs and resident doctors [17, 24], consistent with our research. In a cross-sectional study that focused on PHC physicians working in primary care centers in Buraidah, KSA, it was noted that family physicians displayed more favorable perceptions and acceptance of telehealth compared to GPs [24]. The reluctance of GPs and resident doctors to embrace telemedicine in PHC settings needs further investigation to better understand the underlying factors.

This study is subject to the limitations of using a cross-sectional design. Using an online questionnaire may have lowered the response rate. The results of this study cannot be generalized to the medical community given the small sample size. We recommend that future studies investigate the perceptions and skills of PHC physicians regarding telehealth and telemedicine in greater depth.

Conclusion And Recommendations

In this study, it was discovered that PHC doctors had a high level of telemedicine practice and confidence in their teleconsultation abilities. Given that telemedicine has shown effective results, this should be seen as a chance to expand care delivery models based on telemedicine. Additionally, this study discovered that PHC doctors frequently use the Sehhaty and Anat MOH mobile applications. This demonstrates the growing acceptance of telehealth by physicians and the population and the need to offer expert assistance to meet the expected demand.

Despite the widespread use of telemedicine, PHC doctors reported inadequate levels of training and a lack of clarity in telemedicine policies and regulations, which raises the possibility of misinformation and litigation. It is crucial to institutionalize telemedicine training for medical professionals and make educational materials and technical support accessible.

Acknowledgment

We are grateful to Dr. Ali Alshehri who contributed to the design, Mr. Ahmed Ogail Alanezi, Mr. Nawaf Sayah Alanezi, and Mr. Abdulla Ali Alqahtani who significantly contributed to the data collection. We thank the PHC physicians who participated by filling out the questionnaire.

Ethical statement

The proposal for this study was reviewed and approved by King Fahad Med-

ical City Institutional Review Board. All participants provided informed consent.

Disclosure

The authors have no conflicts of interest to declare.

Funding

No funding.

References

1. Alajmi, D. et al. (2016) "The role and use of telemedicine by physicians in developing countries," E-Health and Telemedicine, pp. 946–960. Available at: https://doi.org/10.4018/978-1-4666-8756-1.ch048.
2. Mohamed Khalifa D, Nasria Zakaria A, Ashraf El-Metwally S, Mowafa Househ M. Chapter 13- The Role and Use of Telemedicine by Physicians in Developing Countries: A Case Report from Saudi Arabia. The Role and Use of Telemedicine by Physicians in Developing Countries. IGI Global; 2015.
3. Mann D, Chen J, Chunara R, Testa P, Nov O. COVID-19 transforms health care through telemedicine: Evidence from the field. Journal of the American Medical Informatics Association. 2020;27(7):1132-1135.
4. Chu C, Cram P, Pang A, Stamenova V, Tadrous M, Bhatia R. Rural Telemedicine Use Before and During the COVID-19 Pandemic: Repeated Cross-sectional Study. J Med Internet Res. 2021;23(4):e26960
5. Cruickshank J, Beer G, Winpenny E, Manning J. Healthcare without Walls: A Framework for Delivering Telehealth at Scale. Amazon.com.au; 2023. Available from: https://www.amazon.com.au/Healthcare-without-Walls-Delivering-Telehealth/dp/1907635122.
6. Idriss, S. et al. (2021) "Physicians' perceptions of telemedicine use during the COVID-19 pandemic in Riyadh, Saudi Arabia: Cross-sectional study (preprint)." Available at: https://doi.org/10.2196/preprints.36029.
7. Albarrak A, Mohammed R, Almarshoud N, Almujalli L, Aljaeed R, Altuwaijiri S, et al. Assessment of physician's knowledge, perception, and willingness of telemedicine in Riyadh region, Saudi Arabia. Journal of Infection and Public Health. 2021;14(1):97-102.
8. Kaliyadan F, A. Al Ameer M, Al Ameer A, Al Alwan Q. Telemedicine Practice in Saudi Arabia During the COVID-19 Pandemic. Cureus. 2020;.
9. Abdel Nasser A, Mohammed Alzahrani R, Al-falah C, Muwafak Jreash D,

Talea Almouled N, Salem Bakula D, et al. Measuring the Patients' Satisfaction About Telemedicine Used in Saudi Arabia During COVID-19 Pandemic. Cureus. 2021;.

10. Alghamdi, S.M., Alqahtani, J.S. and Aldhahir, A.M. (2020) "Current status of telehealth in Saudi Arabia during COVID-19," Journal of Family and Community Medicine, 27(3), p. 208. Available at: https://doi.org/10.4103/jfcm.jfcm_295_20.

11. Ministry of Health. The Global Health Survey Saudi Arabia -Utilization of Health Services and Health System Response. Riyadh; 2021.

12. Breton, M. et al. (2021) "Telehealth in primary healthcare: A portrait of its rapid implementation during the COVID-19 pandemic," Healthcare Policy | Politiques de Santé, 17(1), pp. 73–90. Available at: https://doi.org/10.12927/hcpol.2021.26576.

13. Kane, C.K. and Gillis, K. (2018) "The use of telemedicine by physicians: Still the exception rather than the rule," Health Affairs, 37(12), pp. 1923–1930. Available at: https://doi.org/10.1377/hlthaff.2018.05077.

14. M; B.L.K.L.R.D.L.F. (no date) Telehealth in primary health care: A scoping review of the literature, Perspectives in health information management. U.S. National Library of Medicine. Available at: https://pubmed.ncbi.nlm.nih.gov/35440933/ (Accessed: January 24, 2023).

15. Wong R, Ng P, Spinnato T, Taub E, Kaushal A, Lerman M, et al. Expanding Telehealth Competencies in Primary Care: A Longitudinal Interdisciplinary Simulation to Train Internal Medicine Residents in Complex Patient Care. Journal of Graduate Medical Education. 2020;12(6):745-752.

16. Gomez, T. et al. (2021) "A qualitative study of primary care physicians' experiences with telemedicine during COVID-19," The Journal of the American Board of Family Medicine, 34(Supplement). Available at: https://doi.org/10.3122/jabfm.2021.s1.200517.

17. Mubaraki, A.A. et al. (2021) "Advantages and disadvantages of telemedicine during the COVID-19 pandemic era among physicians in Taif, Saudi Arabia," Saudi Medical Journal, 42(1), pp. 110–115. Available at: https://doi.org/10.15537/smj.2021.1.25610.

18. Al-Hazmi AM, Sheerah HA, Arafa A. Perspectives on Telemedicine during the Era of COVID-19; What Can Saudi Arabia Do? Int J Environ Res Public

Health. 2021;18(20):10617. https://doi.org/10.3390/ijerph182010617.

19. Johnson, C. et al. (2021) "Changes to telehealth practices in primary care in New Brunswick (Canada): A comparative study pre and during the COVID-19 pandemic," PLOS ONE, 16(11). Available at: https://doi.org/10.1371/journal.pone.0258839.

20. Almannie R, Almuhaideb M, Alzahrani M, Binsaleh S, Alyami F. "Tele-urology": Is the COVID-19 pandemic a wake-up call? Urol Ann. 2021 Apr-Jun;13(2):89-94. doi: 10.4103/UA.UA_133_20. Epub 2021 Mar 4. PMID: 34194131; PMCID: PMC8210714.

21. Aldekhyyel RN, Almulhem JA, Binkheder S. Usability of Telemedicine Mobile Applications during COVID-19 in Saudi Arabia: A Heuristic Evaluation of Patient User Interfaces. Healthcare. 2021;9(11):1574. https://doi.org/10.3390/healthcare9111574.

22. Alghamdi, S.M. et al. (2022) "Healthcare providers' perception and barriers concerning the use of telehealth applications in Saudi Arabia: A cross-sectional study," Healthcare, 10(8), p. 1527. Available at: https://doi.org/10.3390/healthcare10081527.

23. B et al. (2022) Status of telemedicine use and physician satisfaction at public health care centers at King Abdulaziz Medical Center, Riyadh, International Journal of Medical Research & Health Sciences. International Journal of Medical Research & Health Sciences. Available at: https://www.ijmrhs.com/abstract/status-of-telemedicine-use-and-physician-satisfaction-at-public-health-care-centers-at-king-abdulaziz-medical-center-riy-93370.html (Accessed: January 24, 2023).

24. Almutairi A, Alharbi FS. Journal [Internet]. jrmds. Primary care Physicians' Perception and Acceptance of Telehealth in Buraidah, Saudi Arabia. Journal of Research in Medical and Dental Science. 2021;9(9):154-159. [cited 2023Jan24]. Available from: https://www.jrmds.in/abstract/primary-care-physicians-perception-and-acceptance-of-telehealth-in-buraidah-saudi-arabia-83989.html