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Perceptions Towards Using Telemedicine Services: A Cross-Sectional Study in Saudi Arabia

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Abstract

Background: This study set out to assess the population perceptions towards using telemedicine in KSA in terms of privacy and security when discussing sensitive and personal information, diagnosis, treatment, and follow-ups as well as how the use of this service was affected by certain demographic factors and the patients' physical health condition.

Methods: A cross-sectional study was designed using an online questionnaire containing statements measuring the participants' perceptions towards telemedicine. The participants were asked to indicate how comfortable they were when using telemedicine on a 4-point Likert scale starting from 'extremely uncomfortable' = 1 to 'extremely comfortable' = 4. A convenience sampling was used. The data were analyzed using descriptive and logistic regression to compare groups and to make inferences about the population.

Results: A total of 400 individuals completed the questionnaire. The majority of respondents (64%) had positive perceptions towards using telemedicine. The highest ranked statement was "Undergoing an initial clinic visit with a provider in the presence of my established physician" with a mean score of 3.66 out of 4 (0.664), followed by "Completing post-operative follow-up" with a mean score of 3.5 out of 4 (0.769). The logistic regression analysis showed that the participants who reported having better physical condition were more likely to be comfortable with using telemedicine (P-value < 0.05). However, other variables such as age, gender, nationality, occupation, level of education, transportation method, chronic disease, and type of chronic disease did not have a significant impact on the participants' likelihood to be comfortable with using telemedicine.

Conclusion: This study provided evidence that the majority of the citizens in KSA had positive perceptions using telemedicine and that their physical health condition appeared to influence the participants' comfort using telemedicine as they were the ones more likely to be comfortable using the virtual clinics. On the other hand, demographic variables did not seem to influence their level of comfort using telemedicine. Further studies should investigate the uses of telemedicine among patients with acute and chronic diseases/conditions as well as to explore barriers to and motivators for using this approach to medical services.

Keywords: telemedicine; telehealth; mHealth; e-Health; e-consultations; health care delivery; comfort; satisfaction; privacy; patients; Saudi Arabia

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1. Introduction

Healthcare systems around the world are evolving rapidly as they move towards the adoption of advanced technologies to improve the quality and accessibility of healthcare services [1–11]. In recent years, telemedicine has become increasingly recognized for its role in this especially for those living in remote or underserved areas [12–15]. The World Health Organization defines telemedicine as "the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interest of advancing the health of individuals and their communities" [16]. Globally, the benefits of virtual consultations in terms of enhancing access to care have been well documented [17–25]. Several health systems around the world have started providing healthcare directly to patients through virtual clinics, such as, American Well, Teladoc, and Doctor on Demand in the USA, and GP at Hand in the U.K. A virtual clinic, sometimes called electronic consultations, or e-consultations, is a communication technology that permits remote and simultaneous communication between patients and physicians through video calls for examination, medical assessment, and diagnosis [26]. In the Kingdom of Saudi Arabia (KSA), telemedicine is considered a key transformational factor for high-quality and patient-centric care [27]. The Ministry of Health has launched the SEHA Virtual Hospital (SVH), the world's largest, as part of the country's mission to transform the healthcare sector [28]. In addition, virtual clinic visits have been used as an alternative to the traditional clinic in many public and private hospitals in KSA [29–32]. The use of virtual clinics has accelerated due to the COVID-19 pandemic, as numerous healthcare systems turned to telemedicine to provide care as a mitigation strategy to control the spread of the disease [33,34]. However, despite its potential benefits in reducing the time, cost, and the amount of effort required to provide care for patients [35], telemedicine might pose some challenges. Previous research cited some of these relative to ensuring the comfort and privacy of the patients as well as the security of their information when using telecommunication technologies [36–41].

This study set out to assess the perceptions of the patients towards telemedicine in the KSA in terms of their privacy and security when discussing sensitive and personal information, diagnosis, treatment, and follow-ups. The study explored the effect of certain demographic factors and the physical health condition of the patients on their perceptions when using telemedicine. The results of this study could provide valuable insights for policymakers when designing and developing telemedicine applications. In addition, with the ever-increasing adoption of telemedicine around the world, this study could have significant implications for similar health systems in the Middle East and developing countries.

2. Subjects and Methods

2.1 Study design

This is a descriptive cross-sectional study. An online questionnaire was developed using Google Form and then distributed to the study population via WhatsApp and other social media, and emails, in March-April 2023. The questionnaire was adopted from previously validated research [42–45]. The questionnaire contained two sections with the first containing demographic questions about age, gender, education level as well as about the participants' physical health condition, and them having any chronic diseases. The second section contained eight statements aimed at measuring the participants' perceptions towards various aspects of telemedicine. The statements were scored based on a 4-point Likert scale starting from 'extremely uncomfortable' = 1 to 'extremely comfortable' = 4.

2.2 Study population and sample

The study population consisted of general population in the KSA aged 18 years or older. According to the report by the Ministry of Health (MOH), the number of telemedicine users in KSA was approximately 1.3 million [46]. The sample size was calculated using a margin of error of ±5%, a confidence error of 95%, a 50% response distribution and a population size of 1.3 million to arrive at the minimum required sample size of at least 385 participants. However, a convenience sampling method was used to collect the study sample from the study population, of which 400 responded.

2.3 Data Analysis

The collected data were analyzed using SPSS version 28.0. Descriptive statistics such as measures of central tendency (mean and median) and measure of variability (standard deviation) were calculated for the data for quick summarization and to identify any patterns or trends. Then, a logistic regression analysis was applied to compare groups and make inferences about the population. A p-value <0.05 was considered to be statistically significant.

3. Results

As shown in Table 1, a total of 400 individuals completed the questionnaire with 43% being between 26 and 35 years old, 57.5% were females, and the majority (87.5%) were Saudis. More than half of the participants were employees (54.5%), with 60% reported having their own method of transportation. As many as 64.3% reported as being fully active without restrictions while only 29% stated that they had a chronic disease. Table 1 highlights the prevalence of different types of chronic diseases among participants, with diabetes being the most common among the highest age groups (41.4%). This was followed by 29.7% of participants with hypertension (HTN), 14.1% with asthma, 3.1% with heart disease, and 11.7% having other types of chronic diseases.

Table (1) Characteristics of the study sample

Variable	N	Percentage
Age		
18 to 25 years	89	22.25%
26 to 35 years	172	43%
36 to 50	96	24%
More than 50 years	43	10.75%
Sex		
Male	170	42.5%
Female	230	57.5%
Nationality		
Saudi	348	87.0%
Non-Saudi	52	13.0%
Occupation		
Employee	218	54.5%
Retired	43	10.8%
Unemployed	64	16.0%
Student	75	18.8%
Level of education		
High school	120	30.0%
University	213	53.3%
Postgraduate	67	16.8%
Transportation do you usually use		
I have my own transportation method	243	60.8%
I hire a transportation method (Taxi, Uber)	60	15.0%
I got driven by family/friend	95	23.8%
Other	2	0.5%
Best describes your physical status		
My health makes it impossible for me to engage in most activities	16	4.0%
My health makes it impossible for me to engage in some activities	16	4.0%
My health makes it difficult for me to engage in some activities	42	10.5%
I am able to go about my daily activities with minimal difficulty	69	17.3%
Fully active without restrictions	257	64.3%
Chronic disease		
Yes	116	29.0%
No	284	71.0%
Type of chronic disease		
Diabetes	53	13.25%
HTN	38	9.5%
Heart disease	4	1%
Asthma	18	4.5%
Other	15	3.75%

Table 2 details the mean score for the statements measuring the participants' perceptions towards various aspects of telemedicine. The participants were asked to indicate how comfortable they were when using telemedicine on a 4-point Likert scale starting from 'extremely uncomfortable' = 1 to 'extremely comfortable' = 4. The highest ranked statement was "Undergoing an initial clinic visit with a provider in the presence of my established physician" with a mean score of 3.66 (0.664), followed by "Completing post-operative follow-up" with a mean score of 3.5 (0.769). On the other hand, the lowest ranked statement was "Discussing sensitive and personal information" with a mean score of 2.69 (1.093), followed by

“Discussing new symptoms and concerns" with a mean score of 2.94 (0.998). The complete ranking of the statements regarding comfort with using telemedicine is found in Table 2.

Table (2) The mean scores for the statements measuring the participants’ perceptions towards various aspects of telemedicine.

Statements	Extremely Uncomfortable	Somewhat uncomfortable	Somewhat comfortable	Extremely comfortable	Mean (SD)	Rank
1. Discussing new symptoms and concerns	46 (11.5%)	73 (18.3%)	139 (34.8%)	142 (35.5%)	2.94 (0.998)	7
2. Discussing sensitive and personal information	80 (20.0%)	81 (20.3%)	124 (31.0%)	115 (28.8%)	2.69 (1.093)	8
3. Discussing diagnosis, treatment, and follow-up recommendations	23 (5.8%)	41 (10.3%)	130 (32.5%)	206 (51.5%)	3.3 (0.872)	4
4. Review imaging and laboratory tests	25 (6.3%)	46 (11.5%)	123 (30.8%)	206 (51.5%)	3.28 (0.898)	5
5. Undergoing an initial clinic visit with a new provider	24 (6.0%)	68 (17.0%)	200 (50.0%)	108 (27.0%)	2.98 (0.825)	6
6. Undergoing an initial clinic visit with a provider in the presence of my established physician	7 (1.8%)	22 (5.5%)	72 (18%)	299 (74.8%)	3.66 (0.664)	1
7. Completing post-operative follow-up	13 (3.3%)	29 (7.3%)	102 (25.5%)	256 (64.0%)	3.5 (0.769)	2
8. I am confident that communications using video calls are private and secure	23 (5.8%)	45 (11.3%)	80 (20%)	252 (63.0%)	3.4 (0.901)	3

As shown in Table 3, the average score for each participant was calculated and it was found that majority of respondents (64%) had a high score. The overall mean score for the statements measuring the participants’ perceptions towards various aspects of telemedicine was 3.22.

Table (3) statements overall mean score

Statements mean score	(N)	(%)
Low (1.00-2.00)	17	4.25%
Moderate (2.01-3.00)	127	31.75%
High (3.01-4.00)	256	64%
Overall mean (SD)	3.22 (0.58)	

To understand the effect of the participants’ demographics and health status or condition on the perceptions of the study participants, a logistic regression was used. As shown in Table 4, it was observed that participants who reported having a better physical condition were more likely to be comfortable with using telemedicine. Specifically, compared to those whose health makes it impossible for them to engage in most activities, participants who were more likely to be comfortable with using telemedicine were those being fully active without restrictions (OR = 4.413, 95% CI = 1.415-13.765, P = 0.011). This difference could be seen when compared to the scores for who were able to perform daily activities with minimal difficulty (OR = 4.773, 95% CI = 1.239-18.385, P = 0.023), and those whose health made it difficult for them to engage in some activities (OR = 5.909, 95% CI = 1.217-28.689, P = 0.028). Contrariwise, variables such as age, gender,

nationality, occupation, level of education, transportation method, chronic disease, and type of chronic disease did not have a significant impact on the participants' likelihood to be comfortable with using telemedicine.

Table (4) Logistic regression results

Factor	OR	95% CI	P-value
Age			
18 to 25 years	0.118	1.629	0.438
26 to 35 years	0.217	2.844	0.785
36 to 50 years	0.153	2.193	0.580
More than 50 years	Ref		
Sex			
Male	1.545	0.787-3.033	0.207
Female	Ref		
Nationality			
Saudi	1.545	0.787-3.033	0.207
Non-Saudi	Ref		
Occupation			
Employee	1.531	0.704-3.33	0.282
Retired	2.292	0.602-8.72	0.224
Unemployed	1.661	0.578-4.778	0.346
Student	Ref		
Level of education			
High school	Ref		
University	0.918	0.439-1.918	0.820
Postgraduate	0.952	0.356-2.548	0.923
Transportation do you usually use			
I have my own transportation method	0.712	0.303-1.676	0.437
I hire a transportation method (Taxi, Uber)	1.047	0.468-2.344	0.911
I got driven by family/friend	0.110	0.007-1.809	0.122
Other	Ref		
Best describes your physical state status			
My health makes it impossible for me to engage in most activities	Ref		
My health makes it impossible for me to engage in some activities	1.364	0.29-6.415	0.695
My health makes it difficult for me to engage in some activities	5.909	1.217-28.689	**0.028***
I am able to go about my daily activities with minimal difficulty	4.773	1.239-18.385	**0.023***
Fully active without restrictions	4.413	1.415-13.765	**0.011***
Chronic disease			
Yes	1.024	0.505-2.076	0.948
No	Ref		
If yes, what type of chronic disease you have			
Diabetes	0.686	0.074-6.365	0.740
HTN	0.833	0.08-8.707	0.879
Heart disease	0.214	0.01-4.477	0.321
Asthma	0.357	0.033-3.849	0.396
Other	Ref		

4. Discussion

Telemedicine is largely considered a key enabler for transforming the delivery of healthcare services in KSA to make them become more patient-centric and of a higher quality. Despite its well-documented benefits in improving the health care experience for patients [35,47], telemedicine might pose some challenges. Previous research suggested issues related to comfort and privacy as well as the security of patient information when using telecommunication technologies [36–39]. This study aimed to estimate the population's perceptions regarding receiving care through virtual clinics in KSA and to determine the impact of demographic variables and health condition on the same. It was discovered that most participants were comfortable receiving care through the telemedicine services with the patients being mostly at ease with it in terms of undergoing their initial clinic visit with a provider in the presence of their established physician as well as completing post-operative follow-ups. This finding is consistent with other studies that reported that virtual clinic visits were well-accepted by patients [47–49]. These findings have implications for enhancing the health system in KSA in terms of increased accessibility especially for those living in remote areas and for improving convenience for the users as it eliminates their waiting time. Additionally, virtual post-operative visits can reduce health care cost for patients and also for the provider [50]. An added benefit is that telemedicine can play a crucial role in improving patient outcomes and reducing infection risks [51]. Therefore, further research is needed to fully assess the long-term impact of integrating virtual clinics into postoperative care in KSA.

The success of telemedicine could be challenged if significant privacy and security issues are not addressed [40]. This current study found that most participants trusted the technology in terms of the security and privacy of patients' information when receiving care through virtual visits. A study done in the eastern region of KSA also stated that the participants' trust in telemedicine was a key factor in their intention to use these services [52]. However, this present study discovered that the participants were less comfortable receiving care through virtual visits relative to discussing new symptoms and sensitive personal information. This is similar to previous research that reported that patients not being able to express their emotions through telemedicine was a barrier to using the service [53,54]. Further, an earlier study observed that people were concerned with virtual visits in terms of privacy, that is, with the possibility of co-workers overhearing their conversation with the treating physician [41]. Relative to the demographic factors, prior studies indicated that age, sex, and education actually affected the patients' level of comfort when using telemedicine [49,55,56]. However, in this current study, these and other demographic variables were found to have no impact on how comfortable people were receiving care through virtual clinics. In terms of having a chronic disease, contrary to an earlier study that found that

participants with chronic conditions were more likely to use telemedicine [57], this current study found no relationship between the likelihood of being comfortable with telemedicine and having a chronic disease. This result might be due to the small number of chronic patients in this the study sample which suggests that further studies need to focus on assessing chronic patients' uses of virtual clinics. Nevertheless, it was noticed that participants in a better physical condition were more likely to be comfortable receiving care through virtual visits than those in a poor physical state. This is consistent with another study which showed that patients with difficult health state were less motivated to use telemedicine [58].

This study had some limitations with the first being the sample size which though seen as suitable for this type of study, might still be regarded as small given the diversity of KSA's population. A bigger sample size would have produced more substantial and representative findings. Second, the convenience sampling approach used could have introduced bias due to the overrepresentation of those who were more accessible or ready to participate. This could also reduce the potential of the findings for application to a larger population. Third, the lack of information on the respondent's region (rural or urban) which might be an important predictor for using telemedicine. Finally, the study mainly focused on how telemedicine services were seen and accepted in KSA without offering a comparison analysis with conventional healthcare services or other methods of healthcare delivery. This might have limited the arrival at a better understanding of the advantages and disadvantages of telemedicine in the country.

5. Conclusion

This study provided evidence that the majority of citizens had positive perceptions regarding using telemedicine in KSA and that a person's physical health status appeared to influence their comfort using telemedicine as participants with better physical state were more likely to be comfortable using virtual clinics. On the other hand, demographic variables like age, sex, and education, among others, did not seem to influence their level of comfort when using telemedicine. For a better understanding of the population's perceptions of telemedicine services in KSA, future research is recommended using larger samples to explore the barriers to and the motivators for using telemedicine.

6. Declarations

6.1 Conflict of Interest Statement

The authors have no conflict of interests to declare.

6.2 Funding Disclosure

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

6.3 Authors' contributions:

Abeer Alharbi contributed to the research conceptualization, methodology, formal analysis, and writing – review & editing. Dalia Alomair contributed to the research conceptualization, methodology, formal analysis.

6.4 Ethical Considerations

Ethical approval was obtained from the Research Ethics Subcommittee No. KSU-HE-23-360 from King Saud University. The data were kept confidential, and participants were assured they would be used only for research purposes. The individuals were duly informed about them being willing participants in the study, and that at any stage and for any reason, they were free to leave it, if they so desired.

6.5 Acknowledgements

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6.6 Availability of data and materials:

Available upon request.

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