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Primary care Physicians, Perception and Acceptance of Telehealth in Buraidah, Saudi Arabia

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ABSTRACT

Introduction: Telehealth is the use of information and communication technology for the exchange of information for the diagnosis and treatment of diseases. In Saudi Arabia, the use of telehealth is met by obstacles particularly, patients and physician's resistance to accept this reform due to the lack of knowledge about this concept.

Aim: This study aimed to assess primary care physicians, perception, and acceptance of telehealth in Buraidah, Saudi Arabia.

Materials and methods: This are a cross-sectional study targeting all primary care physicians who work in primary care centres in Buraidah, Saudi Arabia. A self-administered questionnaire has been distributed to the targeted physicians using google forms. The questionnaire includes socio demographic characteristics and the modified technology acceptance model for health professionals' questionnaire. All data analyses were carried out using SPSS version 26.

Results: A total of 100 primary care physicians were recruited. The most encountered age group was 25-35 years (45%) with predominantly higher number of males compared to females (66% vs 34%). Attitude (mean=6.03) and perceived usefulness (mean=6.03) were the important factors for accepting telehealth while physician habit was the least important factor (mean=5.47). The perception of oldest age group (>45 years) was significantly less likely to be influenced by perceived usefulness, perceived ease of use, attitude, compatibility, facilitators, and intention domains ($p<0.05$).

Conclusion: Primary care physicians' perception to accept telehealth was greatly influenced by the perceived usefulness and their attitude about it. Furthermore, the perception and acceptance of family physicians of telehealth was higher than that of general practitioners.

Key words: Telehealth, Modified technology acceptance model, Primary care physicians

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INTRODUCTION

There has been a great advancement in information technology in the past few decades that revolutionized all aspects of human life including health and medical industry. the applications of new technology in the medical field include the use of health applications on smartphones. introduction of electronic medical records and virtual clinics. According to world health organization (WHO), telehealth is the delivery of health care services, where patients and providers are separated by distance by using information communication technology for the exchange of information for the diagnosis and treatment of diseases, and for the continuing education of health professionals. Telehealth provides access to good quality cost-effective health services to patients wherever they are. The services provided by telehealth are useful especially for the elderly and patients in rural areas [1,2].

In Saudi Arabia the concept of telehealth is somewhat new. It was introduced and supported by the ministry of health (MOH) as a part of the e-health strategy to provide access to health care for a larger population especially those in rural areas [3]. However, this change is not easy it is met by obstacles particularly patients and physicians' resistance to accept this reform. this resistance is because patients and physicians alike lack knowledge about this concept [4]. There are few publications that discuss the physician's perception and willingness to accept this technology in their daily practice. Most of those studies discuss physicians' perception and willingness in tertiary hospitals [4,5]. To what we know there is no study that assesses physicians' perception and willingness to adopt this technology in primary care sitting in Buraidah.

Rationale

The strike of COVID-19 greatly impacted all health systems around the world., most of the nonurgent cases had to be postponed and all the physicians who tested COVID-19 positive are quarantined at home and cannot go to work.

this led to even more difficulty managing the pandemic. These days in-person consultation could be risky both for patients and physicians. because of this, the use of telehealth will be a good solution to overcome this situation. It offers a suitable alternative for patients who are afraid to go to the health facility and for doctors who are quarantined [6].

MATERIALS AND METHODS

The study was targeting all Primary health care physicians working in Primary health care centres in Buraidah.

The sample size was calculated using the formula: n = $z^2p(1-p)\backslash d^2$ with 90% confidence level and 5% margin of error. Where n= sample size, z= 1.65 p= 0.5, d=0.05. The estimated number of PHC physicians that meet the Inclusion criteria is 150, the inclusion criteria are being a general practitioner, family physician (consultant, specialist, resident), internist or intern whose working in primary health care in Buraidah. The exclusion criteria are those who refuse to participate or unavailable at time of data collection, all nurses, dentists and pharmacists.

Methods for data collection

A validated self-admitted questionnaires using an electronic survey app "google form". Which was designed after reviewing questionnaires of similar studies [4,5,7-11] was handed to participants during their work hours or sent to them on their personal phones. The estimated time for questionnaire completion is 10 min.

List of variables

- Physician gender.
- Physician age.
- Professional rank/specialty.
- Experience years.
- Physician perceived usefulness.
- Physician perceived ease of use.

Research instrument (Questionnaire) & its validation

We used the Modified Technology Acceptance Model to Evaluate Healthcare Professionals developed by Gagnon M, Orruño E, Asua J, Abdeljelil A, Emparanza J (2012) which is based on the Technology Acceptance Model (TAM) developed by Davis (1989). The TAM is a model based on the intention to use a new technology. This model is a validated instrument that has been extensively studied. It assesses the following dimensions: perceived usefulness, perceived ease of use, intention to use, and the attitude of the user towards the new technology. To prevent bias in this questionnaire we mixed the statements that belong to different domains.

The questionnaire has 2 sections:

Physician personal profile and the Modified Technology Acceptance Model which consist of 33 questions in the following domains.

- Domain: Questions sequential numbers in the attached questionnaire.
- Physician habit: 1, 19, and 33.
- Perceived usefulness: 2, 7, 11, 15, 21, and 27.
- Perceived ease of use: 3, 8, 12, 16, 24, and 30.
- Attitude: 4, 17, 23, and 31.
- Compatibility: 6, 13, 22, and 29.
- Subjective norm: 9, 14, 20, and 26.
- Facilitators: 10, 25, and 32.
- Intention: 5, 18, and 28.

Statistical analysis

Descriptive statistics are presented using numbers, percentages, mean, standard deviation and median (IQR), whenever appropriate. The domain scores of the modified TAM were compared to the socio demographic characteristics by using independent sample t-test or one-way Anova test as applied. Correlation procedures were also performed to determine the linear relationship between each TAM domain. Two-tailed analysis with $p<0.05$ was used as the cutoff for statistical significance while $p<0.01$ was considered highly statistically significant. All data analyses were performed using the statistical package for social sciences, version 26 (SPSS, Armonk, NY: IBM Corp, USA). Please determine where variables were dichotomous or continuous variables and hence statistical tests applied and this depend on the methods. Please write methods and send back for verification.

RESULTS

This study recruited 100 primary care physicians. As described in Table 1, the most common age group was 25 – 35 years (45%) with two-third of them (66%) were males and nearly half (47%) were general practitioners. With regards to years in practice, 42% had 5-15 years of working experience and 31% had less than 5 years.

The descriptive statistics of modified TAM was given at Table 2. It can be observed that perceived usefulness (mean: 6.03) and attitude (mean: 6.03) were the highest mean scores, followed by intention (mean:5.88) and facilitators (mean: 5.72) while physician habit domain was the least (mean: 5.47).

Pearson correlation coefficient has been performed at Table 3, to determine the linear agreement between each domain of modified TAM. It was revealed that correlation between each domain was positively highly statistically significant ($p<0.01$) with strong correlation noted between attitude and perceived ease of use ($r=0.720$) as well as intention versus perceived ease of use ($r=0.707$).

When measuring the difference in the score of each domain of the modified TAM in relation to age, it was found that the mean score of more than 45 years old group in perceived usefulness ($F=5.747$; $p=0.004$), perceived ease of use ($F=6.627$; $p=0.002$), attitude ($F=4.994$; $p=0.009$), compatibility ($F=4.867$; $p=0.010$), facilitators ($F=6.109$; $p=0.003$) and intention ($F=3.917$; $p=0.023$) were statistically significantly lower (Table 4).

In Table 5, the mean score of gender in physician habit, perceived usefulness, perceived ease of use, attitude, compatibility, subjective norm, facilitators and intention were not statistically significant (p>0.05).

In Table 6, the mean scores of family physician in perceived ease of use (F=2.672; p=0.009), attitude (F=2.159; p=0.033) and intention were statistically significantly higher. Other domains of modified TAM were not significantly different across the group including physician habit, perceived usefulness, compatibility, subjective norm, and facilitators (p>0.05).

In Table 7, the mean scores of those working more than 15 years were statistically significantly lower in perceived usefulness (F=8.670; p<0.001), perceived ease of use (F=3.674; p=0.029), attitude (F=5.804; p=0.004) and facilitators (F=4.087; p=0.020) while the mean score subjective norm domain was statistically significantly higher for those working for 5-15 years (F=3.789; p=0.026).

Table 1: Basic demographic data of the primary care physicians (n=100).

Study data	N (%)
Age group	
25-35 years	45 (45.0%)
36-45 years	31 (31.0%)
>45 years	24 (24.0%)
Gender	
Male	66 (66.0%)
Female	34 (34.0%)
Position	
Family consultant	09 (09.0%)
Family specialist	24 (24.0%)
Family resident	16 (16.0%)
GP	47 (47.0%)
Internist	04 (04.0%)
Years in practice	
<5 years	31 (31.0%)
5-15 years	42 (42.0%)
>15 years	27 (27.0%)

Table 2: Descriptive statistics of modified technology acceptance model (TAM) (n=100).

TAM Domains	Mean ± SD
Physician habit	5.47 ± 0.90
Perceived usefulness	6.03 ± 0.92
Perceived ease of use	5.71 ± 0.92
Attitude	6.03 ± 0.71
Compatibility	5.90 ± 0.84
Subjective Norm	5.66 ± 0.78
Facilitators	5.72 ± 0.96
Intention	5.88 ± 1.02

Table 3: Correlation (Pearson-r) between TAM domains (n=100).

TAM	PH	PU	PEU	ATT	COM	SN	FAC	INT
PH	1							
PU	0.488 **	1						
PEU	0.443 **	0.527 **	1					
ATT	0.514 **	0.592 **	0.720 **	1				
COM	0.372 **	0.527 **	0.391 **	0.405 **	1			
SN	0.464 **	0.588 **	0.528 **	0.486 **	0.532 **	1		
FAC	0.506 **	0.559 **	0.673 **	0.550 **	0.394 **	0.631 **	1	
INT	0.513 **	0.533 **	0.707 **	0.630 **	0.379 **	0.443 **	0.652 **	1
PH-Physician Habit								
PU-Perceived Usefulness								
PEU-Perceived ease of use								
ATT-Attitude								
COM-Compatibility								
SN-Subjective Norm								
FAC-Facilitators								
INT-Intention								
**Correlation is significant at the 0.01 level (2-tailed)								

Table 4: Difference in TAM scores among age group (n=100).

TAM Domains	Age group			F-test	P-value §
	25–35 years	36–45 years	>45 years		
	Mean ± SD	Mean ± SD	Mean ± SD		
Physician habit	5.50 ± 0.98	5.54 ± 0.83	5.32 ± 0.86	0.45	0.639
Perceived usefulness	6.14 ± 0.54	6.12 ± 0.52	5.70 ± 0.57	5.747	0.004 **
Perceived ease of use	5.93 ± 0.71	5.82 ± 0.76	5.15 ± 1.21	6.627	0.002 **
Attitude	6.19 ± 0.52	6.09 ± 0.72	5.66 ± 0.88	4.994	0.009 **
Compatibility	6.09 ± 0.64	5.97 ± 0.98	5.46 ± 0.87	4.867	0.010 **
Subjective Norm	5.65 ± 0.83	5.86 ± 0.64	5.39 ± 0.78	2.523	0.085
Facilitators	5.89 ± 0.88	5.90 ± 0.84	5.15 ± 1.04	6.109	0.003 **
Intention	5.96 ± 1.04	6.13 ± 0.64	5.40 ± 1.25	3.917	0.023 **
§ P-value has been calculated using One-way Anova test					
**Significant at p<0.05 level					

Table 5: Difference in TAM scores among males and females (n=100).

TAM Domains	Gender		t-test	P-value §
	Male	Female		
	Mean ± SD	Mean ± SD		
Physician habit	5.45 ± 0.98	5.51 ± 0.73	-0.316	0.753
Perceived usefulness	6.01 ± 0.61	6.07 ± 0.48	-0.507	0.613
Perceived ease of use	5.65 ± 0.99	5.82 ± 0.74	-0.887	0.377
Attitude	5.97 ± 0.79	6.15 ± 0.52	-1.233	0.22
Compatibility	5.89 ± 0.86	5.92 ± 0.82	-0.162	0.872
Subjective Norm	5.65 ± 0.79	5.67 ± 0.75	-0.13	0.897
Facilitators	5.68 ± 1.01	5.79 ± 0.85	-0.553	0.581
Intention	5.87 ± 1.05	5.88 ± 0.98	-0.016	0.987
§ P-value has been calculated using independent sample t-test.				
** Significant at p<0.05 level				

Table 6: Difference in TAM scores among physicians' position (n=100).

TAM domains	Position		t-test	P-value §
	Family Physician	GP		
	Mean ± SD	Mean ± SD		
Physician habit	5.62 ± 0.88	5.30 ± 0.90	1.744	0.084
Perceived usefulness	6.07 ± 0.58	5.98 ± 0.56	0.821	0.414
Perceived ease of use	5.93 ± 0.68	5.46 ± 1.08	2.672	0.009 **
Attitude	6.17 ± 0.61	5.87 ± 0.79	2.159	0.033 **
Compatibility	5.83 ± 0.89	5.97 ± 0.79	-0.818	0.415
Subjective Norm	5.59 ± 0.72	5.72 ± 0.84	-0.763	0.447
Facilitators	5.77 ± 0.80	5.67 ± 1.11	0.522	0.603
Intention	6.08 ± 0.81	5.65 ± 1.18	2.138	0.035 **
§ P-value has been calculated using independent sample t-test.				
** Significant at p<0.05 level.				

Table 7: Difference in TAM scores among years in practice (n=100).

TAM Domains	Years in practice			F-test	P-value §
	<5 years	5 - 15 years	>15 years		
	Mean ± SD	Mean ± SD	Mean ± SD		
Physician habit	5.45 ± 1.05	5.54 ± 0.79	5.38 ± 0.89	0.255	0.775
Perceived usefulness	6.15 ± 0.61	6.17 ± 0.43	5.67 ± 0.56	8.67	<0.001**
Perceived ease of use	5.99 ± 0.76	5.73 ± 0.92	5.36 ± 0.99	3.674	0.029**
Attitude	6.27 ± 0.54	6.08 ± 0.65	5.68 ± 0.85	5.804	0.004**
Compatibility	5.98 ± 0.84	6.03 ± 0.79	5.60 ± 0.89	2.401	0.096
Subjective Norm	5.46 ± 0.96	5.89 ± 0.94	5.50 ± 0.78	3.789	0.026**
Facilitators	5.90 ± 0.89	5.87 ± 0.94	5.28 ± 0.96	4.087	0.020**
Intention	6.04 ± 0.99	5.95 ± 1.04	5.58 ± 0.99	1.691	0.19
§ P-value has been calculated using One-way Anova test.					
**Significant at p<0.05 level					

DISCUSSION

Due to the crippling effect of the COVID-19 pandemic, telemedicine in healthcare is becoming a very important tool among health care system. Since, primary care physician is the first medical practitioner being contacted by the patients, their perspective about telehealth is necessary to assess, specifically during this time of pandemic. In this study, we attempted to evaluate primary care physicians' perception and acceptance toward telehealth. The findings of this study revealed that primary care physicians are greatly influenced by the perceived usefulness and their attitude toward accepting telehealth while the influence of habit seems to be minimal. We also observed that although all the domains of modified technology acceptance model were positively correlated with each other ($p<0.01$) however, highly significant correlation had been noted between perceived ease of use and attitude ($r=0.720$) as well as perceived ease of use and intention to use telehealth ($r=0.707$). This indicates that the increase in the perceive ease of use is directly and highly correlated with their attitude and with physicians' intention to use telehealth. In a study of Gagnon et al. [10], healthcare professionals' acceptance to telemonitoring were based on their habit, followed by facilitators while perceived of ease to use and subjective norm were the least factors. They also indicated that facilitator domain was the only independent significant predictor that influences intention to use telemonitoring. In India, Shadangi, et al. [11], indicated that, perceived usefulness is the powerful predictor of physician's attitude and intention to use services provided for healthcare services through telemedicine. They further explained that perceived ease of use was found to be the vital predictor to perceived usefulness however, they surmised that technical infrastructure support does not forecast the perceived usefulness as well as intention to use. In another published study in China [12], perceived usefulness and perceived ease of use of telehealth services, were found to have greater impact on physician's behavioural intentions. This led to more efficiency, better quality of services and patient care delivery, and physicians' satisfaction in utilizing telehealth services. Similarly, in Ethiopia [13], perceived usefulness has a significant impact on healthcare professionals' attitude and intention to use eHealth. In addition, they found that the attitude, perceived usefulness, and intention to use eHealth demonstrated significant association on perceived ease of use while attitude and intention to use eHealth exhibited direct correlation with technical infrastructure. On the other hand, study of Ayatollah et al. [14], denoted that most of the clinicians thought that the system's characteristics, such as ease of use, could greatly impact the use of telehealth technology and found significant associations

between the clinicians' perspectives about the advantages of telemedicine and the security of using it ($p<0.05$). This finding is also comparable with our results.

Moreover, our further investigations noted that the perception and acceptance of older age group (>45 years) were not as high as those in younger age group (25 – 35 years) or those in the middle age group (36 – 45 years). Based on our findings, older age group were significantly less likely being influenced by the perceived usefulness ($p=0.004$), perceived ease of use ($p=0.002$), attitude ($p=0.009$), compatibility ($p=0.010$), facilitators ($p=0.003$) and intention to use ($p=0.023$). This implies that the perception to accept telemedicine among older physicians was poor. As Chen, et al. [14] expressed that, most of the older adults have positive outlook about the technology however, they do not show great interest in adopting new technology and are less likely to use technology than the younger adults which seems to be in line with our results.

Conversely, we noticed that the perception and acceptance of family physicians was better than that of general practitioners. Our results, indicated that family physicians were positively influences by the perceived ease of use, attitude and intention to use telehealth. When measuring the perception and acceptance of primary care physicians based on the year of experience, we have learned that working for more than 15 years were negatively influences by perceived of usefulness, attitude, and subjective norm but working in 5-15 years positively influences by facilitators. On the other hand, the difference in perception of males and females toward telehealth were similar across the domains of modified TAM.

CONCLUSION

Primary care physicians' perception to accept telehealth was greatly influenced by the perceived usefulness and their attitude about it. Furthermore, the perception and acceptance of family physicians toward telehealth was higher than that of general practitioners specifically in the perceived ease of use, their intention, and their attitude.

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