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RESEARCH

The patterns and determinants of telemedicine use during the COVID-19 crisis: A nationwide study

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ABSTRACT

Background: Although telemedicine services have been adopted on a large scale in the United Arab Emirates (UAE) during the coronavirus disease 2019 (COVID-19) pandemic, a little is known about the public experience.

Objectives: This study aimed to investigate consumers' patterns, nature, and predictors of telemedicine utilization and consumers' attitude toward this technology.

Methods: A quantitative, self-administered questionnaire was developed, validated, and delivered randomly to adults living across the United Arab Emirates (UAE) between January 2021 and January 2022. The questionnaire included questions about categories of telemedicine used, purpose of use, challenges encountered during the use of telemedicine, and reasons for not using telemedicine technology. We adopted a proportionate random sampling technique to recruit participants by 3 ways: social media, phone calls, and face to face.

Results: The final dataset included 1584 participants, of which 496 (31.3%) used telemedicine during the coronavirus disease 2019 (COVID-19) pandemic. The most common reasons for not using telemedicine during COVID-19 was having no idea that telemedicine exists (38.3%, 417 of 1088) or having no idea how to use it (33.5%, 365 of 1088). Telemedicine users reported that telepharmacy (89.7%), teleconsultation (78.2%), and telediagnosis (23.0%) were the most frequently used telemedicine services during the COVID-19 crisis. Of the 496 telemedicine users, 469 (94.6%) reported using telemedicine for seeking a pharmacist advice about medication instructions, 422 (85.1%) for ordering nonprescription drugs, and 401 (80.8%) for seeking a physician advice. Those with high activity on social media were less likely to be associated with telemedicine users versus nonusers.

Discussion: Although telepharmacy has been increasingly used by consumers, more attention is needed to fix its limitations and improve patient safety.

Conclusion: This study shows a positive attitude and a general acceptance of telemedicine services among the UAE population. Some sociodemographic and clinical characteristics were significantly associated with the use of telemedicine during the pandemic.

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Since its outbreak in late 2019, the coronavirus disease 2019 (COVID-19) has changed the face of the world causing severe economic losses and, regrettably, has resulted in more

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than 5 million deaths worldwide. Given its rapid global spread and serious impact on health of older and immunocompromised individuals, the COVID-19 pandemic has posed serious challenges, especially in health care delivery. To protect patients and health care workers from contracting the infection, preventive measures and restrictions on health care visits and surgeries were enforced in almost all countries. However, only few countries had the plans and infrastructure to strike a balance between halting the spread of COVID-19 and maintaining the public's access to health care services.

In this respect, telemedicine, which uses technological advances and digital tools to deliver remote health care services, was considered a promising approach to improve the

Key Points**Background:**

- Telemedicine services have been adopted worldwide to face COVID-19.
- Telemedicine services are diverse and need huge infrastructure.

Findings:

- There was a significant positive correlation between agreement on the necessity of telemedicine and the willingness to use it in the future.
- Activity on social media was significantly associated with using telemedicine services during the pandemic.
- Age, gender, college education, medical insurance, monthly prescription, diabetes, and immune diseases were all strong predictors of telemedicine use during COVID-19.

clinical outcomes of a variety of chronic conditions, such as hypertension, diabetes, anxiety, and cancer. Telemedicine is a general term of remote health care services and include teliagnosis and telepharmacy. Teliagnosis is the use of telemedicine services to identify the disease, its nature, and severity, whereas telepharmacy can be defined as “the delivery of pharmaceutical care through telehealth technology and includes prescribing and dispensing of medications, medical products, herbal, food supplements, cosmetic products, formulary compliance, patient counselling, medicine therapy management, automated packaging and labelling systems.”¹ Before COVID-19, telemedicine was already implemented to health care in many countries. Nevertheless, after the COVID-19 outbreak, the implementation of telemedicine was globally activated and accelerated to meet the unrepresented challenges in health care delivery. In the United States, a multimillion-dollar telemedicine program was launched by the Federal Communications Commission,² and more regulations to encourage stakeholders implementing active telemedicine services during the pandemic were issued.³ In Canada, COVID-19 necessitated the active incorporation of telemedicine services to urban health care.⁴ In Australia, the use of telemedicine during the pandemic was advanced by legitimizing telemedicine practice, strengthening the relationship between consumers and practitioners, and securing resources.⁵ Several private companies in Spain⁶ and the United Kingdom⁷ supported local health authorities in rolling out telemedicine for health care facilities and personnel.

The United Arab Emirates (UAE) had issued the first telemedicine framework in 2013, which comprised the regulatory guidelines for 6 major elements: teliagnosis, telecounseling, telemedical interventions, teleconsultation, teleprescribing, and telemonitoring.⁸ At the early beginning of the pandemic, the UAE responded quickly through a series of innovative solutions. First, the Remote Care Platform for digital care was launched.⁸ Second, “doctor for every citizen” service was extended to include all residents of the UAE.⁹ This service

offers a free medical consultation through videoconferencing. Third, the guidelines for telemedicine practice were continuously updated.¹⁰ The largest health care company in UAE, Abu Dhabi Health Services Company, indicated that teleconsultation and teleprescribing accounted for 9.0% and 10.0% of all the total outpatient consultations and prescriptions, respectively.¹¹ In Abu Dhabi, the findings of a cross-sectional survey showed that video consultations were a statistically significant predictor for physicians' confidence toward treating acute cases during COVID-19.¹²

Although consumers' awareness toward and satisfaction with telemedicine are key requirements to sustain the use of telemedicine during and beyond the pandemic,¹³ little is known about the experience of adults with the use of telemedicine during COVID-19 in the UAE. This topic is important considering the ongoing consequences of COVID-19 and the UAE plans regarding nationwide implementation of telemedicine. Therefore, this study aimed to assess the pattern, nature, and predictors of the use of telemedicine among adults in the UAE during COVID-19. Furthermore, we aimed to investigate factors that influence future use of telemedicine.

Methods*Study design, setting, and participants*

This cross-sectional study was conducted in 7 UAE emirates (Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al-Quwain, Fujairah, and Ras Al Khaimah) using a self-administered, online questionnaire over a year (from January 2021 to January 2022). All adults (≥ 18 years) who were residents in the UAE, spoke Arabic or English, and were competent enough to complete the questionnaire without assistance met the inclusion criteria for the study. In contrast, adults who were critically ill or were mentally incompetent were excluded from the study. According to Raosoft sample size calculator (Raosoft, 2014),¹⁴ the minimum recommended sample size was 384, considering a population size of 8,240,361, a 5% margin of error, and a 95% CI. Nevertheless, to meet the study aims in providing a nationwide assessment of telemedicine services during COVID-19, we aimed to collect responses from 1600 eligible participants. The Strengthening the Reporting of Observational Studies in Epidemiology reporting guideline for cross-sectional studies was adopted and followed as a protocol for conducting this study.

Questionnaire development and validation

This study used a structured questionnaire, which was developed through a 5-step process. First, the main investigator extensively reviewed the literature^{12,15-19} and drafted the first version of the questionnaire in the English language. Second, the research team gathered through a virtual meeting and discussed the structure and flow of the questionnaire. Ambiguous questions were clarified, duplicates were removed, and questions with inaccurate information were corrected. Third, the main investigator invited an expert in health informatics who was a system developer, a general practitioner with telemedicine experience, and a community pharmacist who were operationalizing telepharmacy services to attend a

virtual meeting to validate the content of the questionnaire. During the meeting, the panel members were asked to grade each item in the questionnaire on a scale of 1–10 for clarity, relevance, and appropriateness.²⁰ The overall means of clarity, relevance, and appropriateness were 8.51 SD \pm 1.67, 9.34 SD \pm 2.07, and 8.27 SD \pm 1.14, respectively. Additional amendments and comments recommended by the panel members were also considered. Fourth, the validated version of the questionnaire was translated into Arabic language by 3 bilingual linguistics who used forward and backward translation technique.²¹ Finally, the research team performed a pilot test to assess reliability and comprehensibility of the study questionnaire. The pilot test included 35 participants (5 from each emirate) who were asked to complete the questionnaire and report any questions or words that hinder the understandability of the questionnaire. The responses were imported into the SPSS version 26 (IBM Corp, Armonk, NY), in which the Cronbach alpha (α), which measures internal consistency of the questionnaire items, was calculated. The primary outcome of this test was α coefficient, which can take a value that ranges from 0 to 1, with 0 indicating complete independence between the questionnaire items and 1 indicating the highest degree of covariances between the questionnaire items. In this study, α coefficient greater than 0.8 was considered excellent.²²

The study outcomes

The final version of the questionnaire consisted of 3 main parts and 23 questions; the first section of the questions comprised 13 questions designed to collect general information about participants (age, gender, nationality, educational level, marital status, monthly income, medical insurance coverage, comorbidity, social media activity, smoking status, participant's need for monthly prescription, and COVID-19 infection status), and in the second section (5 questions), all participants were firstly asked whether they used telemedicine during the COVID-19 crisis or not. Those who were telemedicine users were asked about categories of telemedicine used, purpose of use, and challenges encountered during the use of telemedicine. Those who were not telemedicine users were asked about the reason beyond not using telemedicine. Social media websites were identified as “dynamic and interactive computer-mediated communication tools that have high penetration rates in the general population in high-income and middle-income countries.”²³ In the last section of the questionnaire, all participants were asked 5 questions to assess their attitude toward telemedicine use. These questions were rated on a 5-point Likert scale (from strongly disagree to strongly agree) and designed to measure participants' agreement or disagreement with the importance of using telemedicine during COVID-19 lockdown, participants' fondness for regular health care services, satisfaction with remote health care services, intention to use telemedicine in the future, and whether the COVID-19 pandemic changed their thoughts about telemedicine.

Data collection and sampling technique

This study followed a proportionate random sampling technique to recruit participants. The study population size was 8,240,361, of which 3,790,566 (46.0%) were living in

Table 1
General information about the study sample (N = 1584)

Parameter	Total, n (%)
Age (y)	
< 40	815 (51.5)
40–49	253 (16.0)
50–59	217 (13.7)
60–69	256 (16.2)
\geq 70	43 (2.7)
Gender	
Female	724 (45.7)
Male	860 (54.3)
Educational level	
College education	906 (57.2)
School education	417 (26.3)
None	261 (16.5)
Marital status	
Married	652 (41.2)
Single	754 (47.6)
Divorced	32 (2.0)
Widowed	45 (2.8)
Other	101 (6.4)
Nationality	
Emirati	114 (7.2)
Asian	924 (58.3)
African	218 (13.8)
Others	328 (20.7)
Monthly income	
> \$2000	221 (14.0)
Between \$1000 and \$2000	896 (56.6)
< \$1000	467 (29.5)
Medical insurance coverage	
> 50%	1168 (73.7)
< 50%	416 (26.3)
Needs monthly prescriptions, yes	214 (13.5)
Comorbidities assessment ^a	
Diagnosed as having hypertension	78 (4.9)
Diagnosed as having diabetes	65 (4.1)
Diagnosed as having a chronic respiratory disorder	86 (5.4)
Diagnosed as having a liver disease	5 (0.3)
Diagnosed as having a kidney disease	2 (0.1)
Diagnosed as having an acute cancer	7 (0.4)
Recovered from cancer	3 (0.2)
Diagnosed as having immunodeficiency/ taking medications that weaken immunity	3 (0.2)
Smoking status	
Smoker	356 (22.5)
Former smoker	77 (4.9)
Nonsmoker	1151 (72.7)
Contracted COVID-19 infection, yes	374 (23.6)
Living with a family member who had contracted COVID-19 infection, yes	858 (54.2)
Activity on social media	
High	986 (62.2)
Moderate	324 (20.5)
Low	247 (15.6)
None	27 (1.7)

Abbreviation used: COVID-19, coronavirus disease 2019.

^a Participants could pick more than one response.

Dubai, 1,920,004 (23.3%) in Sharjah, 1,676,914 (20.3%) in Abu Dhabi, 441,683 (5.4%) in Ajman, 271,932 (3.4%) in Ras Al Khaimah, 74,163 (0.9%) in Fujairah, and 65,099 (0.7%) in Umm Al-Quwain. Each emirate was further stratified into districts based on population density. Two districts from each emirate were chosen randomly, and then, a random sample of adults was approached from each district. During data collection, 46%

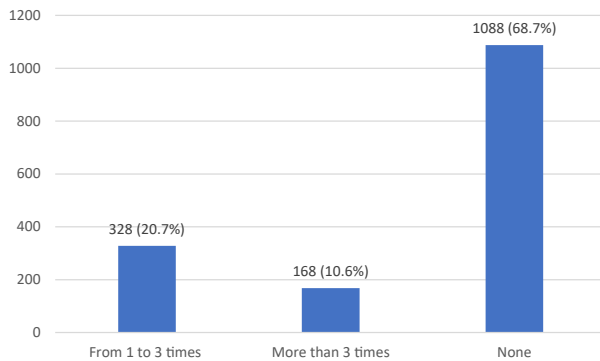


Figure 1. Pattern of telemedicine use.

of participants (736 of 1600) were enrolled from Dubai based on its proportion of adults from the total number of the study population in the UAE (46.0%, 3,790,566 of 8,240,361). Similarly, 23.3% (373 of 1600) were recruited from Sharjah, 20.3% (325 of 1600) were recruited from Abu Dhabi, 5.4% (86 of 1600) were recruited from Ajman, 3.4% (54 of 1600) were recruited from Ras Al Khaimah, 0.9% (14 of 1600) were recruited from Fujairah, and 0.7% (11 of 1600) were recruited Umm Al-Quwain.

The Google tool (Google)²⁴ of survey building was used to construct the final draft of the questionnaire. The research associates approached participants randomly in the streets, pharmacies, malls, and restaurants. After greeting participants and checking their eligibility and getting their verbal

Table 2

Features of telemedicine use during COVID-19 (N = 496)

Parameter	Total, n (%)
Categories of telemedicine used^a	
Telepharmacy	445 (89.7)
Teleconsultation	388 (78.2)
Telediagnosis	114 (23.0)
Telemonitoring	169 (34.1)
Mobile health	67 (13.5)
Telerobotic	3 (0.6)
Uses of telemedicine^a	
Filling or refilling a prescription	236 (47.6)
Ordering a nonprescription medicine	422 (85.1)
Booking an appointment	374 (75.4)
Seeking a physician advice	401 (80.8)
Seeking a pharmacist advice about medication instructions	469 (94.6)
Seeking a nurse help	321 (64.7)
Getting laboratory results	145 (29.2)
Follow-up purposes	172 (34.7)
Generating a report	36 (7.3)
Emergency case	2 (0.4)
Challenges encountered during the use of telemedicine^a	
Limited insurance covering	368 (74.2)
Internet issues	263 (53.2)
Privacy concerns	68 (13.7)
Delays in medical response	142 (28.6)
Other	13 (2.6)

Abbreviation used: COVID-19, coronavirus disease 2019.

^a Participants could pick more than one response.

consent, the research associates sent the link of the questionnaire either via e-mail or WhatsApp. The research associates sought participants until the quota for each district and emirate had completed the questionnaire. Responses of participants were kept anonymous and confidential. Participants had the choice and the right to withdraw from filling the questionnaire or ignore answering any question without justification.

Data analysis

First, we cleaned the data by removing any duplicates, handling the missing variables if any, and translating responses filled in Arabic into the English language. After the completion of data cleaning, we imported the final dataset into the SPSS version 26. Next, we examined our findings using 3 types of data analysis. First, descriptive analysis, in which data were presented as count (n) and proportions (%). Second, we used Spearman's rank test to assess whether the 5 attitude items are correlated with each other. Third, a multivariable logistic regression model was constructed to test the association between participants' general characteristics (independent variables) and the status of telemedicine use during COVID-19 (dependent variable). To fit logistic regression assumptions, we converted the question of "patterns of telemedicine use" into yes/no question by combining "more than three times" and "from 1 to 3 times" responses to "yes" and labeling "none" response as "no." In addition, entry was set at 0.05 and removal at 0.1 using backward Wald. Adjusted odds ratio (aOR) with 95% CI was estimated. To check collinearity between independent variables, we performed the variance inflation factor (VIF) test, in which VIFs up to 3 were considered acceptable.²⁵ Statistical significance was considered at $P < 0.05$.

Results

Sociodemographic characteristics

To reach the targeted sample size, we approached 2156 participants (74.2% response rate); 496 refused to complete the questionnaire, and 60 were excluded because they did not match the eligibility criteria. Of the 1600 completed the questionnaire, 16 were excluded because their answers were incomplete or inconsistent. Among the study participants (N = 1584) who were included in the final data analysis, 43 (2.7%) were older than 70 years, 724 (45.7%) were females, 906 (57.2%) had college education, and 467 (29.5%) earned less than 1000 U.S. dollar monthly (Table 1). In addition, 374 of the study participants (23.6%) were previously infected with COVID-19.

Assessment of patterns of telemedicine use

Of the 1584 participants included in the study, 496 (31.3%) used telemedicine during the COVID-19 pandemic. In detail, 328 of the study participants (20.7%) used telemedicine from 1 to 3 times during the pandemic and 168 (10.6%) used telemedicine more than 3 times (Figure 1). Telemedicine users (N = 496) reported that telepharmacy (89.7%), teleconsultation (78.2%), and telediagnosis (23.0%) were the most

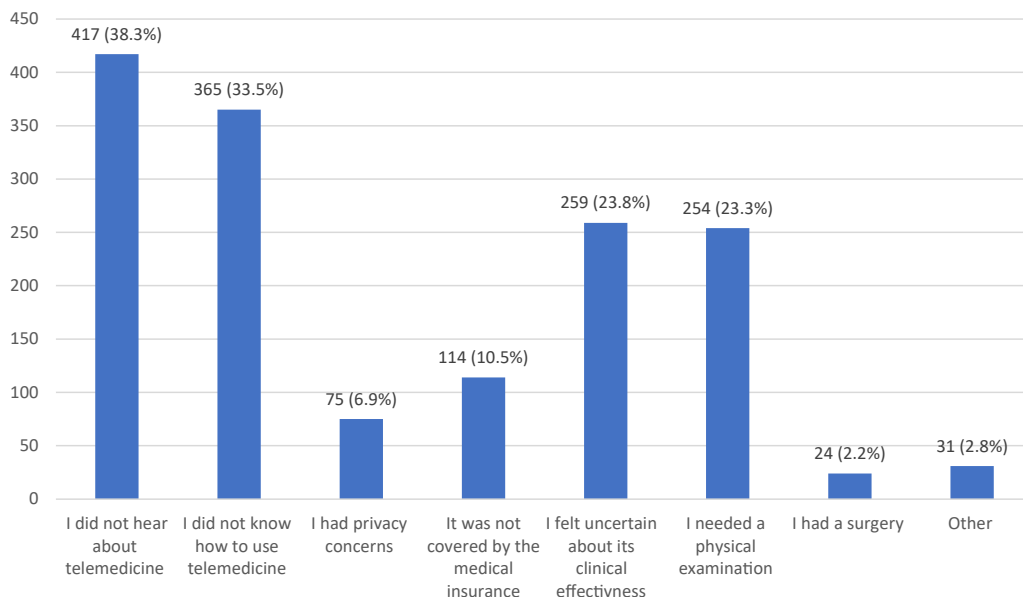


Figure 2. Reasons for not using telemedicine during COVID-19 (N = 1088). (Participants could pick more than one response). Abbreviation used: COVID-19, coronavirus disease 2019.

frequently used telemedicine services during the COVID-19 crisis (Table 2). Of the 496 telemedicine users, 469 (94.6%) reported using telemedicine for seeking a pharmacist advice about medication instructions, 422 (85.1%) for ordering nonprescription drugs, and 401 (80.8%) for seeking a physician advice. Moreover, 374 (75.4%) used telemedicine services for booking an appointment and 236 (47.6%) for filling or refilling a prescription. The most frequent telemedicine-related challenges encountered by telemedicine users were limited insurance covering (74.2%), Internet issues (53.2%), and delays in medical response (28.6%). When we asked those who did not use telemedicine services during the COVID-19 crisis about their decisions (N = 1088), 38.3% reported that they had no idea that telemedicine exists, 33.5% indicated that had no idea how to use telemedicine services, and 23.8% were uncertain about telemedicine clinical effectiveness (Figure 2). Furthermore, 23.3% of the participants reported that they needed a physical examination and 10.5% indicated that telemedicine services were not covered by their medical insurance.

Participants' attitude toward the use of telemedicine

Approximately 67% of the respondents strongly agreed or agreed that using telemedicine during the COVID-19 crisis was necessary (Table 3). A total of 40% of the participant strongly disagreed or disagreed with preferring to visit hospitals or clinics during the COVID-19 crisis. Roughly the same frequency (~41.6%) were satisfied with the telemedicine services provided during the pandemic. Approximately half of the participants agreed or strongly agreed that they would seek telemedicine services in the future. Nevertheless, only 33.5% strongly agreed or agreed that they had changed their opinions regarding telemedicine services.

The findings of this study showed significant correlations among some of the attitude items (Table 4). First, individuals who agreed more on the necessity of telemedicine during the COVID-19 crisis were more willing to continue using telemedicine services in the future and are probably more disposed to change their opinions regarding the use of these services. Preference for seeking regular health care services

Table 3
Participants' attitude toward telemedicine services during COVID-19 (N = 1584)

Item	Strongly disagree, n (%)	Disagree, n (%)	Undecided, n (%)	Agree, n (%)	Strongly agree, n (%)
Given the lockdown and the risk of infection, using telemedicine during COVID-19 was a necessity.	165 (10.4)	215 (13.6)	135 (8.5)	793 (50.1)	276 (17.4)
During the pandemic, I preferred going to the hospital or the clinic to receive health care services.	228 (14.4)	405 (25.6)	178 (11.2)	432 (27.3)	341 (21.5)
Overall, telemedicine services provided during the pandemic were satisfying.	177 (11.2)	365 (23.0)	382 (24.1)	474 (29.9)	186 (11.7)
I will continue to use telemedicine health care services even after COVID-19 ends.	154 (9.7)	345 (21.8)	286 (18.1)	512 (32.3)	287 (18.1)
Seeing the infection spreading and watching people under isolation have changed my opinion about using telemedicine.	302 (19.1)	474 (29.9)	277 (17.5)	411 (25.9)	120 (7.6)

Abbreviation used: COVID-19, coronavirus disease 2019.

Table 4

Assessment of correlation among attitude items (N = 1584)

Item	(1)	(2)	(3)	(4)	(5)
Importance of telemedicine during the COVID-19 pandemic	1.0	-	-	-	-
Preference for seeking health care face-to-face services	-203 ^a	1.0	-	-	-
Satisfaction with telemedicine services during the pandemic	0.257	-196 ^a	1.0	-	-
Intention to use telemedicine in the future	0.512 ^a	-0.241	0.624 ^a	1.0	-
Change of opinions regarding telemedicine	0.411 ^a	0.016	0.054	0.032	1.0

Abbreviation used: COVID-19, coronavirus disease 2019.

^a $P < 0.001$

was negatively correlated with satisfaction with telemedicine. In particular, individuals who preferred to seek regular health care services were less likely to be satisfied with telemedicine services provided during the pandemic. In addition, satisfaction with telemedicine services was positively correlated with the intention to use telemedicine in the future; participants who were satisfied with telemedicine services were more likely to state that they would continue to use these services in the future.

Factors associated with the use of telemedicine during the COVID-19 pandemic

There were statistically significant differences between telemedicine users (N = 496) versus nonusers (N = 1088) for the sociodemographic characteristics (Table 5). Participants who were older than 70 years (aOR 1.56 [95% CI 1.16–1.86], $P = 0.015$) versus those who were younger than 40 years,

females (aOR 1.67; 95% CI [1.42–1.98], $P = 0.001$) versus males, and participants who had college education (aOR 2.32 [95% CI 2.18–2.54], $P = 0.001$) versus noneducated participants were more likely to be associated with telemedicine users versus nonusers. In addition, participants who had medical insurances covering more than 50% of the expenses (aOR 1.35 [95% CI 1.14–1.71], $P = 0.035$) versus those with less than 50% coverage, participants who had monthly prescriptions (aOR 1.59 [95% CI 1.36–1.84], $P = 0.021$) versus those who had no monthly prescriptions, participants who had diabetes (aOR 1.83 [95% CI 1.59–2.06], $P = 0.001$) versus those who had chronic respiratory disorders, and participants who were immunocompromised (aOR 2.46 [95% CI 1.87–3.14], $P = 0.002$) versus those who had chronic respiratory disorder were more likely to be associated with telemedicine users versus nonusers. However, participants who were entirely not active on social media (aOR 0.54 [95% CI 0.36–0.68] $P = 0.001$) versus those with high activity on

Table 5

Association of participants' general characteristics (N = 1584) with telemedicine using status (user vs. nonuser)

Parameter (parameter vs. reference)	Adjusted odds ratio	95% CI		P value
		Lower	Upper	
Age (y)				
40–49 vs. < 40	0.75	0.66	1.17	0.091
50–59 vs. < 40	0.98	0.82	1.24	0.122
60–69 vs. < 40	1.03	0.91	1.42	0.192
≥ 70 vs. < 40	1.56	1.16	1.86	0.015
Gender				
Female vs. male	1.67	1.42	1.98	0.001
Educational background				
College education vs. None	2.32	2.18	2.54	0.001
School education vs. none	1.53	0.95	1.78	0.140
Medical insurance coverage				
> 50% vs. < 50%	1.35	1.14	1.71	0.035
Monthly prescription				
Yes vs. no	1.59	1.36	1.84	0.021
Comorbidity				
Hypertension vs. chronic respiratory disorder	1.03	0.87	1.21	0.210
Diabetes vs. chronic respiratory disorder	1.83	1.59	2.06	0.001
Liver diseases vs. chronic respiratory disorder	0.89	0.72	1.13	0.153
Kidney diseases vs. chronic respiratory disorder	1.02	0.94	2.16	0.302
Acute cancer vs. chronic respiratory disorder	1.24	0.85	4.53	0.247
Recovered from cancer vs. chronic respiratory disorder	1.15	0.93	1.42	0.152
Immunocompromised vs. chronic respiratory disorder	2.46	1.87	3.14	0.002
COVID-19 infection status				
Infected vs. noninfected	1.78	1.59	2.53	0.017
Activity on social medial				
Moderate vs. high	0.95	0.81	1.23	0.114
Low vs. high	0.92	0.76	1.66	0.623
None vs. high	0.54	0.36	0.68	0.001

Abbreviation used: COVID-19, coronavirus disease 2019.

social media were less likely to be associated with telemedicine users versus nonusers.

Discussion

There is a growing worldwide interest in telemedicine services as a potential substitute to the face-to-face care delivery. This study examines the patterns of using telemedicine services among people of the UAE during the COVID-19 pandemic, their attitudes and willingness to use these services in the future, and the factors that predict telemedicine use to assess its future implementation and possible enhancements. We found that one-third of respondents used telemedicine services, whereas the majority did not owing to a number of reasons, including unfamiliarity with the service, the need for physical examination, and limited insurance coverage. Most of the telemedicine services used were telepharmacy and teleconsultation mainly to seek advice from pharmacists or physicians.

According to the Centers for Disease Control and Prevention's Morbidity and Mortality Weekly Report, one-third of health visits between June and November 2020 used telemedicine, which is similar to our respondent group.²⁶ Technical issues, low reimbursement rates, licensure issues, and regulatory variation all act as roadblocks to the widespread adoption of telemedicine.²⁷ Thus, policy makers should actively implement services, such as covering telehealth visits by insurance companies.²⁸ Our study highlighted that insurance coverage of digital visits is important to improve the public's involvement in telemedicine use. Payán et al.²⁹ examined telemedicine services in the United States during the pandemic and found a significant association between reimbursing digital visits and high-quality telemedicine experiences. The need for physical examination was another major issue raised by our respondents. A previous study showed that patients tend to be less confident in their physician's diagnosis when there is no physical examination. This can be encountered by implementing strategies to improve patients' telehealth experiences such as explaining to the patient in advance the list of conditions that are suitable for telehealth services and the potential need for another in-person appointment.³⁰ Telemedicine is more likely to be used as a follow-up consultation or in medical conditions that do not require physical examinations, as was previously successful in psychiatry and radiology.³

Our results showed a significant positive correlation between the necessity of using telemedicine during COVID-19 crises, the satisfaction, and the willingness to use these service in the future. In contrast, respondents who disagreed with the necessity of telemedicine preferred traditional hospital visits and were less satisfied with telemedicine services. This is consistent with previous studies indicating that satisfaction, perceived acceptance, and perceived necessity are directly correlated to patients' future use of this service.³¹ In studies of various scopes, satisfaction was highly connected with future use and implementation of similar experiences.³² This necessitates focusing on considering patients satisfaction with the telemedicine expansion and future continuation.

In line with other studies, telehealth users were more likely to be female, be college educated, be immunocompromised, and have diabetes.^{33,34} This can be attributed to the fact that

female patients reported more fear of COVID-19 and were more likely to adopt behavioral changes in response to it.³⁵ Given that immunocompromised patients are more susceptible to COVID-19, they have been actively encouraged to use telemedicine to avoid contact with health personnel or infected patients.³⁶ In addition, many diabetes tests can be performed at home by patients and do not require physical presence, making telemedicine very appealing to such patients.³⁷ Furthermore, these conditions have been found to have similar outcomes when using telemedicine versus in-person visits, encouraging more of these patients to use this technology.³⁸ Surprisingly, studies have a large variation in the most common age group who uses telemedicine services.³⁹ Our findings confirm that older people are more likely to use telehealth services if they are convinced of their utility and receive adequate technical assistance.⁴⁰

Limitations

There are several limitations to this study. First, the study design is observational cross-sectional, with attitudes and patterns of telemedicine use assessed at a certain time frame. However, people's perceptions of this service may change over time. As a result, it would be beneficial to continue investigating people's willingness to use telemedicine in the future and post-COVID-19. Second, there is a risk of methodological bias related to the self-reporting nature of the study. People might tend to exaggerate their use of telemedicine to seek approval or social desirability. Therefore, it would be useful to interview the study sample to get an in-depth information regarding their opinions. Third, the data collection of this study is limited given that we approached participants in public places and were not able to reach those at home. This may induce bias given that not all the study population are exposed to data collection. Although we are aware of the limitation of this data collection technique, this may lay the ground for future comprehensive public survey.

Conclusions

Overall, this study showed a positive attitude and a general acceptance of telemedicine services among the UAE population. Age, gender, college education, medical insurance, monthly prescription, diabetes, immune diseases, and activity on social media were all strong predictors of telemedicine use during COVID-19. The lack of awareness with telemedicine was one of the most prominent reasons reported by our respondents for not using this service. Policy makers play an essential role in developing educational programs that promote the range of telemedicine services to improve patients care during these challenging times. The findings of this study will guide future research to investigate the barriers and the continuing use of telemedicine after the pandemic.

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