

Original Research Article

Perspectives of telemedicine: a cross-sectional study among health care personnel

Adel M. Aboregela^{1,3*}, Abdullah A. Hashish^{1,3}, Masoud M. Alqahtani³, Anas A. Alqarni³,
Abdullah N. Almuawi³, Mohannad S. Alamri^{2,3}

¹Department of Basic Medical Sciences, ²Department of Family Medicine, ³College of Medicine, University of Bisha, Kingdom of Saudi Arabia

Received: 24 September 2023

Accepted: 13 November 2023

*Correspondence:

Dr. Adel M. Aboregela,

E-mail: aaboregela@ub.edu.sa

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Telemedicine is the remote delivery of medical services. There has yet to be sufficient data in our community on perspectives on telemedicine. Therefore, this study aimed to evaluate the perception and attitude of physicians and medical students in Bisha region toward telemedicine.

Methods: A cross-sectional study was conducted among physicians in ten hospitals and primary health care centers in Bisha and medical students at the College of Medicine, University of Bisha, Saudi Arabia. A structured, self-administered online questionnaire with optional participation was distributed.

Results: 239 responses were received with diverse distribution among different ages, genders, nationalities, occupations, and frequencies of daily technology use. The participants showed 60.3% acceptance of telemedicine, especially its helpfulness in transferring information among sectors. Various sociodemographic-dependent debates were retrieved regarding the viability of telemedicine approach, its integration ability, time and money saving, and flexibility. The frequency of personal computer use correlated positively with the participants' perceptions and attitudes ($p=0.001$ and 0.003). A positive attitude was retrieved from 79.1% of participants, with readiness to obtain telemedicine training for better professional growth, especially in non-Saudi personnel. The lack of suitable equipment, patient satisfaction and compliance, weakness of the doctor-patient relationship, familiarity with technology, and extra load for physicians were the most prominent barriers mentioned by the participants.

Conclusions: Meetings, training, and orientation programs still need to be scheduled for the general population, healthcare personnel, and information technologists to override the weaknesses in community awareness and telemedicine deficiencies and to get the benefit of this technology.

Keywords: Medical technology, Remote medicine, Telecommunication, Telehealth

INTRODUCTION

The efficient and timely delivery of healthcare services has been fundamental for policymakers. Delays and challenges in getting to the closest medical facility have been significant obstacles in some areas. The application of telemedicine to provide medical services is one of the emerging approaches to this dilemma.¹ Telemedicine utilizes electronic information and communication technology to overcome geographic constraints and

improve access to healthcare.² The World Health Organization (WHO) defines telemedicine as the remote delivery of medical services, with communication between healthcare professionals seeking clinical advice and support from other healthcare professionals or between remote healthcare users seeking medical services and healthcare providers.¹ Store-and-forward, remote monitoring, and real-time interactive services are the three basic types of telemedicine.³ Telemedicine plays a significant role in diagnosing and managing chronic

diseases using a patient-centered approach, In addition to real-time monitoring of health status by enabling the recording of physiological indicators that cannot be noticed during clinical visits.⁴ The value of telemedicine has been observed when applied for communication or monitoring of chronic illnesses, with improvements in fatality rates, life quality, and hospitalizations.⁵ It is a rapidly expanding discipline with the potential to overcome challenges that patients and healthcare practitioners already encounter.² Many communities around the world have reacted differently to the evolution of the modern healthcare system, which uses technologies like telemedicine. The strategy's advocates believe that a wide range of entities, including the government, healthcare professionals, and, most importantly, patients, endorse it.⁶ Recently, the Gulf Cooperation Council countries expressed significant expenditures and development in technology, telecommunications and health services.⁷ Telemedicine has faced several difficulties in Saudi Arabia. These problems include bureaucracy, inexperience, an insufficient information technology infrastructure, absence of regulations, and a lack of institutional support.¹ However, recently the Saudi Ministry of Health exerted great efforts in the way to get benefit of telemedicine technology in primary healthcare provision with endeavours to generalize the services on a large scale.⁸ The wide use of telemedicine in clinical settings is contingent on how satisfied doctors and patients are with the service.⁹ To date, there has yet to be data in our study population on physicians' and medical students' perspectives on telemedicine.

Therefore, the objective of this study was to evaluate the perception and attitude of physicians and medical students in Bisha region toward telemedicine.

METHODS

This observational cross-sectional study was conducted among physicians working at King Abdullah Hospital, Maternal and Children's hospital, Tathleeth Hospital, Al-Alaya Hospital, and primary health care centers in Bisha city, in addition to medical students at the college of medicine, university of Bisha, Saudi Arabia. Data were collected between November 2022 and February 2023 via a structured, self-administered online questionnaire. The questionnaire was distributed among medical students and physicians who were accessible during the data collection in Bisha region through emails and WhatsApp groups. The questionnaire was delivered through google documents and marked anonymous with optional participation and ability to edit and change their answers before final submission. At the beginning of the survey, a plain-language informative statement describing who the investigators are, the aim of the study, the number of items, the required duration to fill in, and full details about data confidentiality and storage were given to all participants. They were asked to read the consent and choose to agree before proceeding carefully. The first section of the questionnaire included sociodemographic

data of the participants including their: gender, age, educational attainment, professional ranking, the frequency of using computers at home and the electronic interaction with others. The second section identified the perception of the participants towards telemedicine. In this section, the questions were about the availability, the familiarity, the viability, the flexibility, and the helpfulness of telemedicine as well as its ability to preserve resources, to be integrated with the current practices and to affect the patient doctor relationship. The third section asked about the attitude of the participants from different aspects such as the preference in practice, the openness to use, the conviction of its value and the plan to obtain training in telemedicine. Lickert scale ranging from score one to five was used to assess the participations (1: strongly disagree, 2: disagree, 3: neither agree nor disagree, 4: agree, and 5: strongly agree) in the second and third sections. Good perception was considered when the respondent total score exceeded 24/40 in the whole section (eight questions). Also, the positive attitude was considered if the total score was above 12/20 in the whole section (four questions). The last section supplied the participants with ten different barriers of using telemedicine and multiple choices were allowed as well as a blank space was provided to add their input. The statistical package for social sciences version 25 was used for data analysis. Validation of the questionnaire was performed through calculation of Cronbach's alpha test for the consistency (0.76), Kaiser-Meyer-Olkin (KMO) test for sampling adequacy (0.887) and Bartlett's test of sphericity (<0.001). All parameters in this study were expressed in frequencies and means±standard deviation (SD). Student t-test and ANOVA were used to compare between means of different categories. Spearman's rho non-parametric correlation was used to identify relations between different parameters. Statistically significant differences were considered at $p < 0.05$.

RESULTS

The population socio-demographics

In total, 239 responses were retrieved, with 143 (59.8%) Saudi and 96 (40.2%) non-Saudi completed the survey. Respondent gender breakdown was males: 84.1% and females: 15.9%. A good percentage of medical students 102 (42.7%) shared in the questionnaire with participation rate of 30.9% of college students. In addition, physicians participated by 57.3% with different ranks as described in Table 1 with the highest proportion for specialists (18.8%). It was interesting to find that the younger age group (20-30 years) participated predominantly in the study (58.2%) with variable participations from different age groups as detailed in Table 1. Moreover, 29.7% of participants declared that they sometimes use the computers at home, as well as 24.7% often use computers and 22.6% always use them at home. However, 14.6% of the respondents mentioned that they rarely use their personal computers at home and

8.4% never use them. Regarding the use of emails and social media for communication, 36.4% revealed that they never use such methods. Moreover, 28.5% of participants sometimes use online communication methods. While 19.7% rarely use this way of distant communication. A very limited percentage (7.9%) declared that they often use emails and social media and 7.5% always use this technology.

Table 1: Distribution of sociodemographic characteristics of participants.

Item	Groups	Number	Percent
Age	20-30	139	58.2
	31-40	43	18.0
	41-50	32	13.4
	51-60	14	5.9
	More than 60	11	4.6
Gender	Male	201	84.1
	Female	38	15.9
Nationality	Saudi	143	59.8
	Non-Saudi	96	40.2
Professional ranking	Student	102	42.7
	Intern	22	9.2
	Resident	35	14.6
	Register	8	3.3
	Specialist	45	18.8
	Consultant	27	11.3
Frequency of PC/laptop use at home	Never	20	8.4
	Rarely	35	14.6
	Often	59	24.7
	Sometimes	71	29.7
	Always	54	22.6
Frequency of interaction via e-mail or social media	Never	87	36.4
	Rarely	47	19.7
	Often	19	7.9
	Sometimes	68	28.5
	Always	18	7.5

Perception of telemedicine

Interestingly, 60.3% of the participants expressed a good perception towards telemedicine with their total scores more than 24. As shown in Figure 1, the item that asked about the helpfulness of telemedicine in transferring information across sectorial boundaries got the highest perception level with mean±SD (3.75±0.93). While the success of integrating telemedicine into the existing practice procedures showed the lowest degree of perception (mean±SD of 3.36±0.99). In addition, some items aroused debates between different sociodemographic groups in the form of significant differences in their inputs. Gender consideration in perception showed significant difference between the input of males and females in the viability of telemedicine approach in providing medical care services to patients with $p=0.028$. Significant differences between Saudis and non-Saudis were apparent in their responses about the viability of telemedicine approach (mean±SD =3.33±1.05 and 3.69±0.81 and $p=0.003$) and the ability of telemedicine to save money and time (mean±SD =3.53±1.24 and 3.89±0.79 and $p=0.005$). Analysis of the results showed that the group above 60 years old perceived that telemedicine is more flexible than those aged 41-50 years (mean±SD =4.09±0.30 and 3.13±1.01 with $p=0.039$). Also, the input of the group aged 51-60 years old showed significant difference with the input of the youngest group (20-30) concerning the ability of telemedicine integration with the current procedures (mean±SD =4.0±0.68 and 3.22±1.02 with $p=0.036$). Specialists perceived that telemedicine could save time and money with significant difference when compared to students (mean±SD =4.04±0.74 and 3.39±1.34 with $p=0.010$). A significant positive weak correlation was elaborated between the use of personal computer, online communication strategies and the perception of telemedicine in the study population ($r=0.209$ and 0.145), ($p=0.001$ and 0.025) respectively.

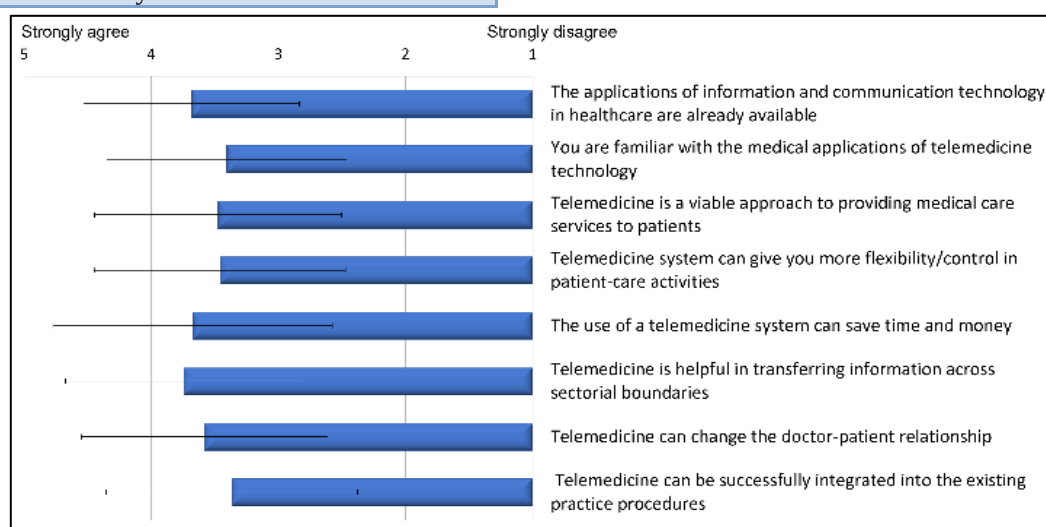


Figure 1: Perceptions of telemedicine.

Scores are based on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). Values are Mean±SD.

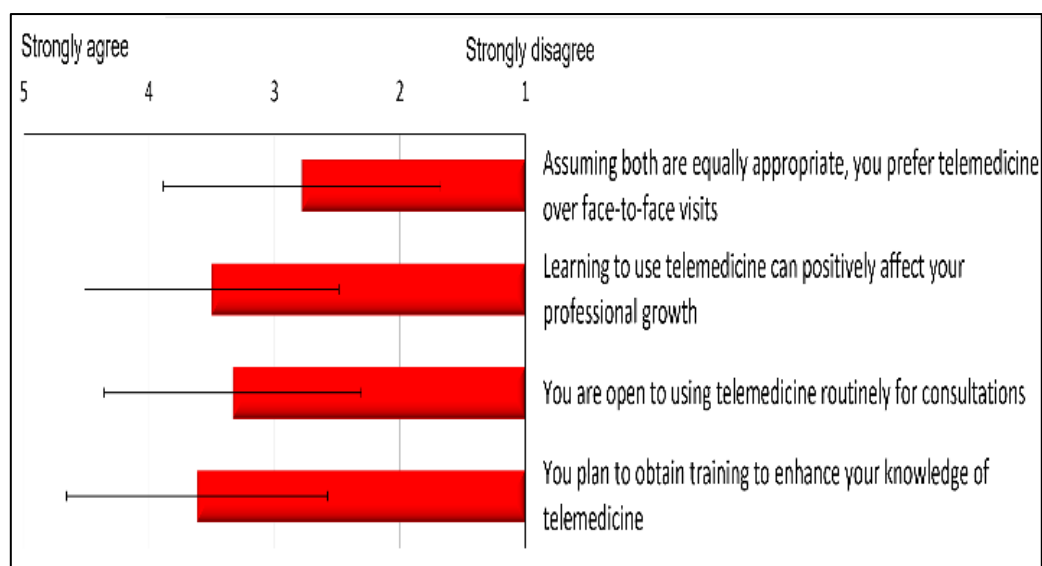


Figure 2: Preference and attitude towards telemedicine.

Scores are based on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). Values are Mean $\pm$ SD.

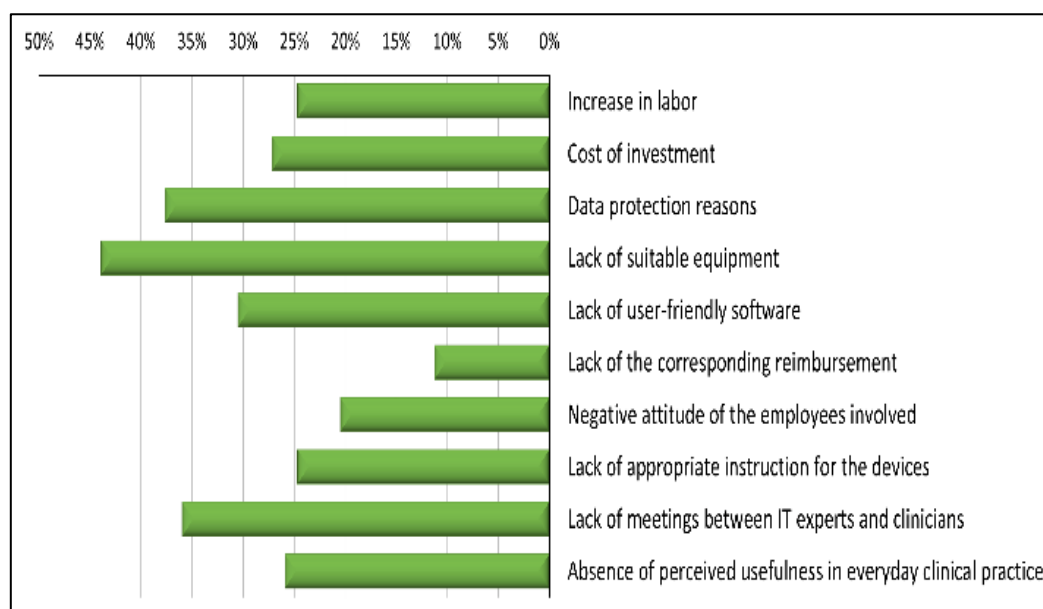


Figure 3: Frequency distribution of telemedicine barriers in the scope of the participants.

Attitude towards telemedicine

The analysis of data revealed that 79.1% of participants expressed a positive attitude to telemedicine with total score >12 . Generally, planning to obtain training in telemedicine and the concept of learning to use telemedicine for better professional growth showed the highest score of positive attitude (mean $\pm$ SD = 3.62 ± 1.04 and 3.50 ± 1.01 in order) as shown in Figure 2. The non-Saudi participants thought that telemedicine can positively affect their professional growth more than Saudi participants with mean $\pm$ SD = 3.67 ± 0.88 and 3.39 ± 1.09 respectively with $p=0.032$. Also, the non-Saudi residents showed more readiness to obtain training in telemedicine than Saudi citizens (mean $\pm$ SD = 3.88 ± 0.74

and 3.45 ± 1.17 with $p=0.001$). No other significant differences were identified between the attitude of different groups. However, the non-parametric Spearman's rho correlation test showed significant week positive correlation between the rank of participants, the frequency of personal computer use at home and the attitude of the participants ($r=0.131$ and 0.191), ($p=0.042$ and 0.003) respectively. As well as highly significant moderate positive correlation between the perception and the attitude ($r=0.555$ and $p<0.001$).

Barriers to telemedicine

The inputs of respondents regarding the barriers of telemedicine were diverse as presented in Figure 3.

Summarization of the data showed that 43.93% of participants saw that the lack of suitable equipment is a strong barrier against telemedicine use. On the other hand, only 11.30% rated the lack of corresponding reimbursement as the main obstacle. Also, the floor was open for the respondents to share their personal input about the barriers they consider. Various additions were quoted in the survey such as “patient response”, “usually the patient is not satisfied and prefers face to face visit specially in surgery”, “patient compliance to the practice”, “lack of doctor-patient relationship that helps patients to be more comfortable”, “hard to use for old patients and persons that are not familiar with technology”, “negative attitude of the patients serviced” and “extra load for already overloaded physicians”.

DISCUSSION

Telemedicine is the distant provision of healthcare services through information technology when the patients and healthcare providers are at different locations. The main target for telemedicine is to improve the health of recipients through the exchange of useful information, facilitating the training of healthcare providers, and conducting research.¹⁰ A cross sectional study was conducted to assess the perception and attitude as well as the barriers to the use of telemedicine in Bisha region at the kingdom of Saudi Arabia. The results of the current study revealed a good perception towards telemedicine, especially its role in transferring information among physicians and medical students. This is in accordance to the study conducted in Germany and expressed the awareness of the participants that telemedicine can help to transfer information across sectoral boundaries.¹¹ The ease of integrating telemedicine into the existing practice expressed the lowest level of perception in an age wise manner among the respondents in this study. However, in another study, 65.6% of the participants felt it easy to add telemedicine services to their existing clinical workflows.² Also, Srinivasan et al reported that the physicians in the general primary care clinics believed that telemedicine could be a part of the applied medical practice.¹² The viability of telemedicine in providing medical care services to patients and the importance of information and communication technology in health care was highly perceived among participants in the current study and in previous studies.⁴ This preferential perception for telemedicine is generally dependent on multiple factors that might improve the quality of physician life. For example, time-savings to both the physician and patients, cost-effectiveness, and better flexibility of scheduling visits.¹³ Diverse views concerning these factors were recorded in the current study and showed age, gender, nationality, and occupational level dependence. Previous studies showed no significant difference between different genders, ages, or occupation in their perception to the value of telemedicine in time saving, cost effectiveness and flexibility in their schedules.^{9,13,14} One of the most important factors affecting the perception of

telemedicine is the frequency and familiarity of using technology throughout the day. The results in the current study showed significant positive correlation between the use of personal computer, online communication strategies and the perception of telemedicine. In addition, it was reported previously that physicians that showed limited contact with personal computers, internet, conferences, speeches or meetings have low knowledge about telemedicine and are concerned about the possible legal use of online means of communication to interact with patients independent of the specialty.⁴ Most of the respondents in this study expressed their willingness to improve their professional experience using telemedicine as well as their readiness to obtain continuous training in telemedicine. The same positive attitude was reported repeatedly in the literature with different considerations. Some physicians referred this attitude to the beneficial effects of telemedicine in evaluating acute medical problems and chronic illness reviews as well as considered it a safe substitute specially in pandemics.⁹ Others agreed that telemedicine services improved their job effectiveness and performance and helped them to take care of patients without several referrals but cannot support their treatment plan or provide more comprehensive care.² The physicians in other study reported their positive attitude to telemedicine emerged from the preferability of their patients.¹⁴ According to the participants in this study, the lack of suitable equipment is the main obstacle against the use of telemedicine. Also, data protection measures and the lack of meetings with the information technologists are major barriers. These findings were in line with the previous study conducted in Germany.¹¹ Various barriers were added by the participants in the current study such as patient response, satisfaction, and compliance with technology. Also, weakness of the relationship between physician and patient which negatively affects the attitude of the patient. In addition to the load of technology learning and training that will be added to the schedule of the physician. The bulk of studies in literature focused on the usability and cost effectiveness, platforms used, application challenges and facilitators with limited reporting about other obstacles like ethical and legal aspects.¹⁵⁻¹⁸ Many previous studies showed great concern about patient safety and privacy and some participants considered telemedicine as a threat to medical practice.¹⁹ Others considered that telemedicine will reduce the quality of health care delivery and they were doubtful about patients' competence for virtual health care as well as reported that healthcare service is best achieved via face-to-face visits.²⁰ In addition, some recent studies mentioned that the poor understanding of telemedicine regulations is a matter of concern for future practice.²¹ Although, this reduced awareness of guidelines did not affect the use of technology in patient care through different applications.²² This great debate about telemedicine use was referred to the lack of orientation about this technology in the medical curricula and limitation of the knowledge to self-learning although the

undergraduates acknowledge that they need training in their curriculum.²³

CONCLUSION

Telemedicine is an emerging optimistic scope in healthcare systems. Although, it had a positive perception and willingness to adopt it in clinical practice, the population still have low knowledge of this technology. Factors such as patient privacy, equipment costs, physician training, information technology and social awareness are still deficient and face against the application of telemedicine. It is suggested that orientation and training programs should be conducted for both healthcare personnel and general population.

ACKNOWLEDGEMENTS

The authors feel thankful for all the participants in this work as well as acknowledge the administrative support from the college of medicine, University of Bisha and from the directorate of health affairs in Bisha.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of the University of Bisha (RELOC) with reference number UB-RELOC H-06-BH-087/ (0401.23)

REFERENCES

1. Naqvi SZ, Ahmad S, Rocha IC, Ramos KG, Javed H, Yasin F, et al. Healthcare workers' knowledge and attitude toward telemedicine during the COVID-19 pandemic: a global survey. *Cureus*. 2022;14(10).
2. Alqahtani SS, Alraqi AD, Alageel AA. Physicians' satisfaction with telehealth services among family physicians in Cluster 1 hospitals. *J Fam Med Prim Care*. 2022;11:5563.
3. Garavand A, Aslani N, Nadri H, Abedini S, Dehghan S. Acceptance of telemedicine technology among physicians: a systematic review. *Inform Med Unlocked*. 2022;30:100943.
4. Albarrak AI, Mohammed R, Almarshoud N, Almujailli L, Aljaeed R, Altuwaijiri S, et al. Assessment of physician's knowledge, perception and willingness of telemedicine in Riyadh region, Saudi Arabia. *J Infect Public Health*. 2021;14(1):97-102.
5. Totten AM, Womack DM, Eden KB, McDonagh MS, Griffin JC, Grusing S, et al. Telehealth: mapping the evidence for patient outcomes from systematic reviews. Agency for Healthcare Research and Quality (US), Rockville (MD); 2016.
6. Wright JH, Caudill R. Remote treatment delivery in response to the COVID-19 pandemic. *Psychother Psychosomat*. 2020;89:130-2.
7. Weber AS, Turjoman R, Shaheen Y, Al Sayyed F, Hwang MJ, Malick F. Systematic thematic review of e-health research in the Gulf cooperation council (Arabian gulf): Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. *J Telemed Telecare*. 2017;23(4):452-9.
8. Alghamdi SM, Alqahtani JS, Aldhahir AM. Current status of telehealth in Saudi Arabia during COVID-19. *J Fam Community Med*. 2020;27:208.
9. Khan KL, Kanani S, Nisa M. Assessment of primary care physicians' perception of telemedicine use during the COVID-19 pandemic in primary health care corporation, Qatar. *Cureus*. 2022;14.
10. Hajesmaeel-Gohari S, Bahaadinbeigy K. The most used questionnaires for evaluating telemedicine services. *BMC Med Inform Decision Mak*. 2021;21:1-11.
11. Waschkau A, Flägel K, Goetz K, Steinhäuser J. Evaluation of attitudes towards telemedicine as a basis for successful implementation: a cross-sectional survey among postgraduate trainees in family medicine in Germany. *Zeitsch Evid Fortb Qual Gesundheit*. 2020;156:75-81.
12. Srinivasan M, Asch S, Vilendrer S, Thomas SC, Bajra R, Barman L, et al. Qualitative assessment of rapid system transformation to primary care video visits at an academic medical center. *Ann Intern Med*. 2020;173(7):527-35.
13. Malouff TD, TerKonda SP, Knight D, Perlman AI, Munipalli B, Dudenkov DV, et al. Physician satisfaction with telemedicine during the COVID-19 pandemic: the Mayo Clinic Florida experience. *Mayo Clin Proceed Innov Qual Outcome*. 2021;5(4):771-82.
14. Idriss S, Aldhuhayyan A, Alanazi AA, Alasaadi W, Alharbi R, Alshahwan G, et al. Physicians' perceptions of Telemedicine Use during the COVID-19 pandemic in Riyadh, Saudi Arabia: cross-sectional study. *JMIR Format Res*. 2022;6(7):e36029.
15. Hincapié MA, Gallego JC, Gempeler A, Piñeros JA, Nasner D, Escobar MF. Implementation and usefulness of telemedicine during the COVID-19 pandemic: a scoping review. *J Prim Care Community Health*. 2020;11:2150132720980612.
16. Shanbehzadeh M, Kazemi-Arpanahi H, Kalkhajeh SG, Basati G. Systematic review on telemedicine platforms in lockdown periods: lessons learned from the COVID-19 pandemic. *J Educ Health Promot*. 2021;10.
17. Ruiz Morilla MD, Sans M, Casasa A, Giménez N. Implementing technology in healthcare: insights from physicians. *BMC Med Inform Decision Mak*. 2017;17:1-9.
18. Waqas A, Mehmood S, Jawwad AM, Pittam B, Kundu S, Correia JC, et al. Telemedicine in Arab countries: innovation, research trends, and way forward. *Front Digit Health*. 2021;58.
19. Yaghobian S, Ohannessian R, Iampetro T, Riom I, Salles N, de Bustos EM, et al. Knowledge, attitudes and practices of telemedicine education and training

- of French medical students and residents. *J Telemed Tel*. 2022;28(4):248-57.
20. El Kheir DY, Alnufaili SS, Alsaffar RM, Assad MA, Alkhalifah ZZ. Physicians' perspective of telemedicine regulating guidelines and ethical aspects: a Saudi experience. *Int J Telemed Appl*. 2022;2022.
21. Lehrer M, Murray S, Adler C, Haerter S. Telemedicine education for undergraduate medical students. In: Meeting of Keck School of Medicine of the University of Southern California. 2016.
22. Alanzi T, Al-Yami S. Physicians' attitude towards the use of social media for professional purposes in Saudi Arabia. *Int J Telemed Appl*. 2019;2019.
23. Pathipati AS, Azad TD, Jethwani K. Telemedical education: training digital natives in telemedicine. *J Med Internet Res* 2016;18:e193.

Cite this article as: Aboregela AM, Hashish AA, Alqahtani MM, Alqarni AA, Almuawi AN, Alamri MS. Perspectives of telemedicine: a cross-sectional study among health care personnel. *Int J Community Med Public Health* 2023;10:4618-24.