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Evaluation of Telehealth Knowledge, Attitudes and Experiences of Medical Faculty Students

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ABSTRACT

Objective: The aim of the study was to assess the knowledge, attitudes and experiences of students in a medical school about telehealth. Method: The data of this descriptive study were collected through face-to-face questionnaire interviews. A total of 603 medical faculty students selected by convenience sampling method were included in the study by completing the survey form in its entirety. Results: A total of 89.1% of the students had no telehealth experience during medical education. The mean score of the telehealth attitude questionnaire of the medical students participating in the study was 46.7 ± 9.4 (9.0-79.0). Attitude questionnaire scores of preclinical students were significantly higher than those of clinical students (p=0.018). The perceived telehealth knowledge level, which was stated by the students on a scale of 1-10, was 1.9 ± 1.4 on average. Conclusion: This study shows that medical students' knowledge about telehealth is insufficient and almost all of the students didn't experience telehealth during their medical faculty education. It's thought that students' telehealth attitudes will be an important determinant of their use of telehealth in clinical practice. This study will benefit the educational interventions that can be made to medical students in terms of showing which methods used in the field of telehealth are known.

Key words: Attitude, Experience, Medical students, Knowledge, Telehealth.

Tıp Fakültesi Öğrencilerinin Telesağlık Bilgi, Tutum ve Deneyimlerinin Değerlendirilmesi

ÖZ

Amaç: Araştırmanın amacı bir tıp fakültesi öğrencilerinin telesağlık konusundaki bilgi, tutum ve deneyimlerini değerlendirmektir.
Yöntem: Tanımlayıcı nitelikteki bu çalışmanın verileri yüz yüze anket görüşmesi ile toplanmıştır. Kolayda örnekleme yöntemiyle seçilen toplam 603 tıp fakültesi öğrencisi anket formunu eksiksiz doldurarak çalışmaya dahil edilmiştir.
Bulgular: Öğrencilerin %89,1'inin tıp eğitimi süresince telesağlık deneyimi yoktu. Araştırmaya katılan tıp öğrencilerinin telesağlık tutum anketi puan ortalaması 46,7±9,4 (9,0-79,0) olarak bulunmuştur. Klinik öncesi öğrencilerin tutum anketi puanları klinik öğrencilerine göre anlamlı derecede yüksekti (p=0,018). Öğrencilerin 1'den 10'a kadar puan verdikleri algılanan telesağlık bilgi düzeyi ortalama 1,9±1,4'tür.
Sonuç: Bu çalışma, tıp öğrencilerinin telesağlık konusundaki bilgilerinin yetersiz olduğunu ve öğrencilerin neredeyse tamamının tıp fakültesi eğitimleri sırasında telesağlık deneyimi yaşamadıklarını göstermektedir. Öğrencilerin tele-sağlık tutumlarının, klinik uygulamalarda tele-sağlık kullanımlarında önemli bir belirleyici olacağı düşünülmektedir. Bu çalışma, tele sağlık alanında kullanılan yöntemlerin hangilerinin bilindiğini göstermesi açısından tıp öğrencilerine yapılabilecek eğitimsel müdahalelere fayda sağlayacaktır.

Anahtar kelimeler: Bilgi, Deneyim, Telesağlık, Tıp öğrencileri, Tutum.

This study was presented as an oral presentation at the 2nd International Congress of Medical, Health and Communication Sciences held as a hybrid (online and face-to-face, Anadolu University, Eskişehir, Turkey) between October 5-8, 2022.

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INTRODUCTION

Telehealth is all of the health services provided by using information and communication technologies for the necessary information exchange, research, evaluation and education in the diagnosis, treatment, rehabilitation and prevention of diseases and injuries (WHO, 2010). It is used by all healthcare professionals to improve the health of individuals and communities. These information and communication technologies used can be a simultaneous video, e-mail, smart phone or other smart devices that can connect to the internet.

In some sources, the terms telehealth and telemedicine are used synonymously. However, telemedicine is the use of electronic technology or media, including simultaneous videoconferencing technologies, to provide diagnosis, treatment or rehabilitation of a patient, to conduct remote patient monitoring, to consult with other healthcare providers about the diagnosis and treatment of a patient. Simultaneous videoconferencing, store and forward systems, remote patient monitoring, e-health, mobile health and distance medical education are considered as a part of telehealth (Wijesooriya et al., 2020). E-health is the development of health-related information, opportunities and services using information and communication technologies (ICT). Mobile health refers to the health applications and programs that patients use on their smartphones, tablets or laptops. These applications allow patients to track their health measurements, set medication and appointment reminders, and share information with clinicians (WHO, 2016).

Telehealth improves access to healthcare by eliminating the constraints posed by time and geographical distances. By reducing the need for personalized consultation and travel, it allows patients to receive health services in a manner that is most convenient for them (Telehealth: Defining 21st Century Care, n.d.). Telehealth is also recognised as a key component in improving quality of care by empowering patients through education and self-monitoring, advancing integrated care and managing demand on health sector resources.

Telehealth practices in Turkey were initiated with the e-Transformation Turkey Project under the coordination of the State Planning Organization and an e-Health working group was formed by the Ministry of Health (Sağlık Bakanlığı, 2004). In the Information Society Strategy Action Plan published in 2006, it was decided to establish the Health Information System and Telemedicine Syste (Devlet Planlama Teşkilatı, 2010). In 2019, in the circular published by the Ministry of Health, it was stated that the telemedicine and tele-radiology system was developed. This system enables uninterrupted access to radiological examinations on the internet, reporting of these images, teleconsultation between radiologists, evaluation of images and reports in terms of quality, and sharing with citizens and physicians through the e-Pulse application (Teletıp ve Teleradyoloji Birimi Genelgesi 2019/16, n.d.). With the COVID-19 pandemic, the Dr e-Pulse Telehealth Project was launched. Within the scope of the project, coronavirus patients and contact citizens can get a video examination appointment via MHRS (Central Physician Appointment System) without leaving the isolation areas. In this context, the project was implemented as a pilot in hospitals in four provinces. In Samsun, pilot implementation was started in family health centers. It is planned to expand the Dr. e-Nabız system all over Turkey in a short time (T.C. Sağlık Bakanlığı, 2021).

With technological developments in the field of medicine and the COVID-19 pandemic, telehealth applications are also increasing. However, a study shows that medical students are unprepared for telemedicine when they graduate and need training on telemedicine (Waseh & Dicker, 2019). In a study conducted by Kong et al. in the USA, 17.4% of students were found to have telemedicine experience (Kong et al., 2020). In a study conducted in China by Chen et al. in which awareness and use of telemedicine was analysed, the use of chronic disease management application was found to be 17.0% and the use of virtual visit was found to be 11,0% among medical students (Chen et al., 2017). In a study by Boyers et al., medical students who had telemedicine experience during their undergraduate medical education reported that telemedicine contributed to the development of core competencies in patient care, medical knowledge and practice-based learning. It was also found that these benefits tended to be stronger when telemedicine experience occurred during undergraduate medical education compared to postgraduate medical education (Boyers et al., 2015).

The continued increase in telehealth applications increases the importance of these applications for medical faculty

students, who are the future users of these applications. For this reason, in our study, it was aimed to evaluate the knowledge and attitudes of Karadeniz Technical University Faculty of Medicine students about telehealth.

MATERIAL AND METHOD

1. Research Population

The population of the descriptive study consisted of 1586 students continuing their education in a medical faculty. The students included in the study were selected using convenience sampling method. In this voluntary study, the question "Do you want to participate in the study?" was asked at the beginning of the data form. The 603 medical students who volunteered to participate in the study by answering yes and completed the form completely were included in the study.

2. Data Collection

A survey form developed by the researchers was used as a data collection tool. Data were collected between 14 February and 4 March 2022 using a face-to-face survey. The survey form used in the research consists of 2 parts.

2.1.Sociodemographic and personal characteristics: In this section, age, gender, class of education, total monthly income of the household, chronic disease status, regular drug use, smart wristband or watch usage are questioned.

2.2.Telehealth knowledge and attitudes: The participants were asked whether they had previously encountered the term "telehealth," which methods were utilized in telehealth fields such as teleradiology, telepsychiatry, teledermatology, and teleneurology, which e-health services were currently available in our country, and how they would evaluate their own telehealth knowledge on a scale of 1 to 10.

Participants were asked in which branches telehealth applications could be used, in which groups it would be more beneficial to use telehealth applications, whether they had heard of blockchain technology before, whether the use of blockchain technology for telehealth applications would be beneficial and what the potential benefits could be.

The experience of using telehealth during medical education, whether telehealth should be included in medical education, and the preference for using telehealth in clinical practice after graduating from medical school were also questioned.

The telehealth attitude questionnaire consisting of 12 propositions about the positive aspects of telehealth such as "it can provide location-independent health services, reduce health costs, etc" and 9 propositions about the risks such as "the quality of the interview may be low due to technical problems, it may cause deterioration in the patient-physician relationship, etc" was prepared by the researchers as a result of the literature review. The responses to the telehealth attitude questionnaire include: strongly agree, agree, undecided, disagree, and strongly disagree. Positive propositions were scored as strongly agree:4, agree:3, undecided:2, disagree:1 and strongly disagree:0 and propositions about risks were scored in the opposite way. The total score that can be obtained is between 0-84 and as the total score increases, the positive attitude towards telehealth increases. The cronbach alpha of the telehealth attitude questionnaire was 0.80.

3. Analysing Data

Statistical analyses were performed using IBM SPSS Statistics for Windows 26.0 statistical package programme. Descriptive statistics were given as number and percentage for categorical variables and mean, standard deviation, minimum and maximum for numerical variables. The conformity of the data to normal distribution was evaluated by visual (histogram and probability graphs) and analytical (Kolmogorov-Smirnov or Shapiro-Wilk tests) methods. Mann Whitney U or Kruskall Wallis Analysis of Variance was used to analyse the measured data. The significance value was accepted as $p<0.05$ in all statistical analyses.

4. Study Permit

Permission for the research was obtained from the Ethics Committee of the Faculty of Medicine (dated 13.01.2022 and numbered 24237859-35) and the Dean of the Faculty of Medicine (dated 09.12.2021 and numbered 72699152-929-24101).

RESULTS

The mean score of the telehealth attitude questionnaire of the medical students participating in the study was

calculated as 46.7 ± 9.4 (9.0-79.0). The mean age of the students was 21.7 ± 2.3 years (18.0-35.0) and 320 (53.0%) were female. There was no significant difference between the telehealth attitude questionnaire scores of females and males (p=0.665). The attitude questionnaire scores of the students in the preclinical period were significantly higher than those of the students in the clinical period (p=0.018) (Table 1).

Table 1. Comparison of students' sociodemographic and personal characteristics and telehealth attitude questionnaire scores

Features	n	%	Telehealth Attitude Questionnaire Scores		
			Median (Min.-Max.)	25th-75th percentiles	p value
Gender					
Female	320	53.0	46.0 (18.0-79.0)	41.0-52.0	0.665
Male	283	46.9	46.0 (9.0-75.0)	43.0-52.0	
Class					
1st class	186	30.8	47.0 (18.0-72.0)	44.0-52.0	**0.018**
2nd class	60	9.9			
3rd class	60	9.9			
4th class	93	15.4	45.0 (9.0-79.0)	40.0-52.0	
5th class	103	17.1			
6th class	101	16.8			
Monthly income (n=513)	**Mean ± SD**	**Min.-Max.**			
	9257.4 ± 6622.2	200-65000			
<8000 TL			46.0 (9.0-79.0)	42.0-52.0	0.099
8000 TL and above			47.0 (18.0-75.0)	43.0-53.0	
Chronic disease status	**n**	**%**			
Yes	79	13.1	48.0 (18.0-79.0)	40.0-52.0	0.798
No	524	86.9	46.0 (9.0-75.0)	42.0-52.0	
Regular use of medication					
Yes	83	13.8	46.0 (9.0-75.0)	40.0-52.0	0.416
No	520	86.2	46.0 (21.0-79.0)	42.0-52.0	
Smart wristband/watch use					
Yes	102	16.9	47.0 (9.0-72.0)	43.0-54.0	0.539
No	501	83.1	46.0 (10.0-79.0)	42.0-52.0	

A total of 79 students (13.1%) reported having a chronic disease. With regard to the student population with chronic disease, 16 (20.3%) had chronic lung disease, 13 (16.5%) had psychiatric diseases, 8 (10.1%) had gynecological diseases, 7 (8.9%) musculoskeletal system diseases, 6 (7.6%) cardiovascular system diseases, 6 (7.6%) endocrine system diseases, 4 (5.1%) dermatological diseases, 4 (5.1%) obesity, 4 (5.1%) digestive system diseases, 3 (3.8%) neurological diseases, 3 (3.8%) immune system diseases, 3 (3.8%) had diabetes and 7 (8.9%) had other diseases.

Only 170 (28.1%) of the students know at least one of the methods used in teleradiology, 216 (35.8%) in telepsychiatry, 132 (21.8%) in teledermatology, 142 (23.5%) in telecardiology, 132 (21.8%) in telepathology, 133 (22.0%) in telepharmacy, 125 (20.7%) in teleneurology, 109 (18.0%) in teleophthalmology, 157 (26.0%) in telerehabilitation, 107 (17.7%) in telesurgery, 181 (30.0%) in telenutrition and 134 (22.2%) in tele-nursing. The techniques known by students in telehealth disciplines are outlined in Table 2.

The telehealth platforms that students are aware of being utilized in Turkey are as follows:

Almost all of them (99.2%) eNabız, 564 (93.5%) of them MHRS, 401 (66.5%) e-prescription system, 231 (38.5%) family medicine information system, 180 (29.9%) FITAS, 177 (29.4%) Dr e-Nabız, 156 (25.9%) Medula, 128 (21.2%) HSYS, 114 (18.9%) Sağlık.NET, 49 (8.1%) Telemedicine-Teleradiology system and 35 (5.8%) of them knew USES.

Most of the students (86.7%) of the students stated that telehealth applications could be used in at least one of the following branches. Of the students who thought that telehealth applications could be used, 73.4% stated that telehealth applications could be used in preventive health services and 69.6% stated that telehealth applications could be used in psychiatry branch (Figure 1).

A total of 532 (88.2%) of the students indicated that the utilization of telehealth applications would be beneficial for at least one of the following individuals. Among the students

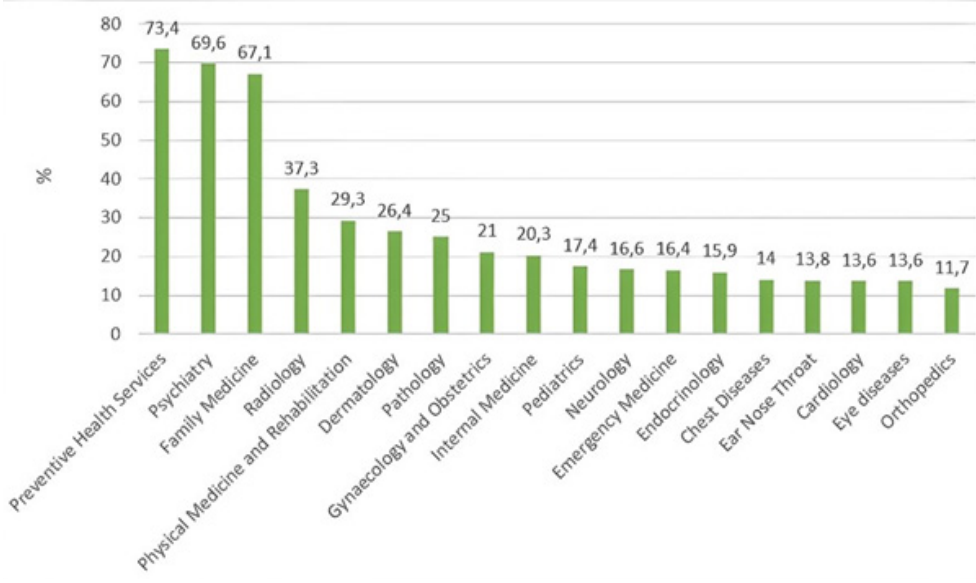

Figure 1. Branches where students think that telehealth applications can be used (n=523)

who perceived telehealth applications as beneficial, 78.9% indicated that they would be advantageous for individuals utilizing home health services, while 70.3% asserted that they would be beneficial for those with physical disabilities (Figure 2).

The perceived telehealth knowledge level, which was stated by the students on a scale of 1-10, was 1.9 ± 1.4 (1.0-10.0) on average. A total of 95 (57.6%) of the students who were aware of blockchain technology indicated that its utilisation in telehealth would be advantageous. Among the students who think that the use of blockchain technology will be beneficial in the field of telehealth, the types of benefits they stated are as follows:

209 (80.4%) of them secure data sharing, 206 (79.2%) of them data privacy, 171 (65.8%) of them to set rules for patients' access to their own health records, 155 (59.6%) to keep their

Table 2. Methods that students know in telehealth fields

	Remote patient monitoring	Simultaneous video-conference with the patient	Simultaneous voice	Storing and transmitting data	Consultation among health personnel	Triage	Mobile health	Distance health education
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Teleradiology	39 (22.9)	24 (14.1)	23 (13.5)	91 (53.5)	87 (51.2)	11 (6.5)	52 (30.6)	30 (17.6)
Telepsychiatry	87 (40.3)	156 (72.2)	138 (63.9)	60 (27.8)	41 (19.0)	6 (2.8)	35 (16.2)	58 (26.9)
Teledermatology	39 (29.5)	48 (36.4	38 (28.8)	47 (35.6)	51 (38.6)	10 (7.6)	25 (18.9)	28 (21.2)
Telecardiology	52 (36.6)	36 (25.4)	33 (23.2)	64 (45.1)	65 (45.8)	19 (13.4)	31 (21.8)	25 (17.6)
Telepathology	24 (18.2)	21 (15.9)	20 (15.2)	68 (51.5)	69 (52.3	7 (5.3)	22 (16.7)	25 (18.9)
Telepharmacy	37 (27.8)	26 (19.5)	25 (18.8)	60 (45.1)	57 (42.9)	7 (5.3)	31 (23.3)	36 (27.1)
Teleneurology	37 (29.6)	38 (30.4)	35 (28.0)	50 (40.0)	54 (43.2)	13 (10.4)	28 (22.4)	25 (20.0)
Teleophthalmology	20 (18.3)	23 (21.1)	24 (22.0)	44 (40.4)	49 (45.0)	10 (9.2)	25 (22.9)	25 (22.9)
Telerehabilitation	61 (38.9)	80 (51.0)	66 (42.0)	49 (31.2)	43 (27.4)	11 (7.0)	38 (24.2)	47 (29.9)
Telesurgery	22 (20.6)	21 (19.6)	15 (14.0)	45 (42.1)	57 (53.3)	12 (11.2)	21 (19.6)	25 (23.4)
Telenutrition	88 (48.6)	92 (50.8)	90 (49.7)	61 (33.7)	41 (22.7)	7 (3.9)	56 (30.9)	80 (44.2)
Telenursing	56 (41.8)	35 (26.1)	42 (31.3)	43 (32.1)	41 (30.6)	25 (18.7)	27 (20.1)	40 (29.9)

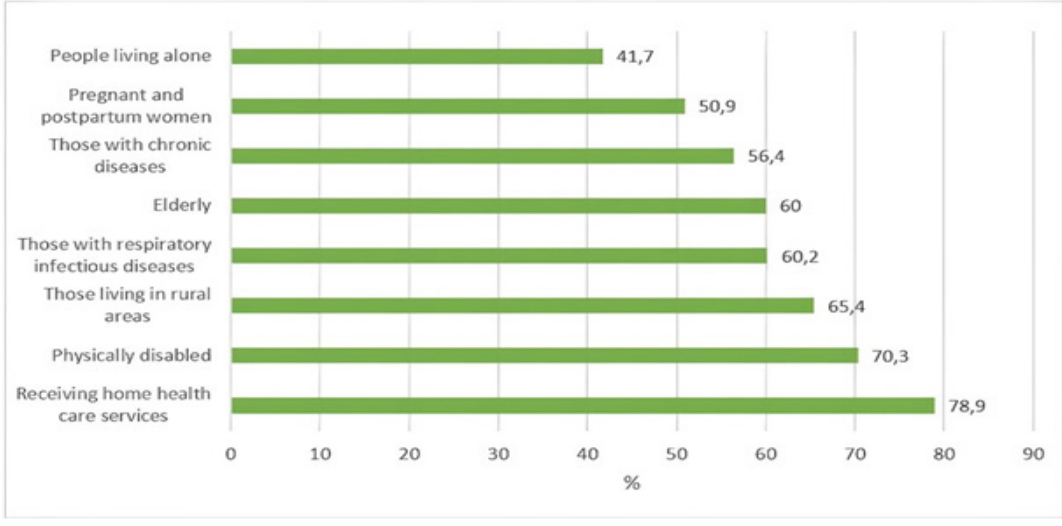

Figure 2. People for whom the use of telehealth applications would be more beneficial (n=532)

health records in more than one place, 154 (59.2%) to not change past health records, 179 (68.8%) to enable remote monitoring of health services, and 175 (67.3%) to enable rapid exchange of health records.

The attitude scores of students who responded regarding the potential utility of blockchain technology in the context of telehealth were significantly higher than those of students who responded no/no idea ($p < 0.001$). 487 (80.8%) of the students stated that telehealth education should be included in medical school education optionally and 33 (5.5%) as compulsorily. The attitude score of students who thought telehealth should not be included in medical education was significantly lower than those who thought it should be included as mandatory or optional ($p<0.001$) (Table 3).

Table 3. Comparison of students' knowledge of telehealth and blockchain technology and telehealth attitude questionnaire scores

Features	n	%	Telehealth Attitude Questionnaire Scores		
			Median (Min.-Max.)	25th-75th percentiles	p value
Hearing the term telehealth					
Yes	144	23.9	46.0 (10.0-73.0)	41.0-52.0	0.436
No	459	76.1	46.0 (9.0-79.0)	42.0-52.0	
Hearing about blockchain technology					
No	438	72.6	46.0 (9.0-72.0)	42.0-52.0	0.524
Yes	165	27.4	46.0 (10.0-79.0)	42.0-51.0	
Blockchain technology is useful in the field of health (n=165)					
Yes	95	57.6	48.0 (18.0-71.0)	43.5-54.0	
No	11	6.7	44.0 (9.0-72.0)	41.0-51.0	**0.029**
No idea	59	35.8			
Telehealth experience in medical education					
Yes	66	10.9	48.0 (10.0-73.0)	41.0-56.0	0.170
No	537	89.1	46.0 (9.0-79.0)	42.0-52.0	
Necessity of including telehealth in medical education*					
Yes it should be mandatory	33	13.8	49.0 (25.0-75.0) [b]	42.0-56.0	**<0.001**
Yes it should be optional	487	80.8	47.0 (10.0-79.0) [b]	43.0-56.0	
No	83	13.8	43.0 (9.0-64) [a]	35.0-48.0	
The thought of using telehealth after medical faculty					
No	79	13.1	41.0 (9.0-75.0 [ab]	34.0-46.0	
Undecided	368	61.0	46.0 (10.0-72.0) [b]	42.0-51.0	**<0.001**
Yes	156	25.9	50.0 (18.0-79.0) [c]	45.0-57.0	

* Significant difference was found between different letters.

DISCUSSION

The development of technologies used in the field of health and the introduction of new technologies has enabled telehealth to grow further. Thus, telehealth has become an important part of medicine. Considering these developments in the field of telehealth, the knowledge and attitudes of medical students about telehealth are important.

In this study, only 23.9% of medical students had previously encountered the term "telehealth." In the study conducted by Chen et al., 41% of medical students indicated that they were aware of this concept (Chen et al., 2017). This difference may be due to the different implementation processes of telehealth systems in the places where the studies were conducted.

There wasn't significant difference between the students who heard the term "telehealth" and those who didn't. This may be due to the fact that although the students heard the term telehealth, they did not have detailed information about telehealth. In the study conducted by Kazmi et al. it was emphasised that students who were familiar with the term telehealth also had a superficial understanding (Kazmi et al., 2022).

The branch of telehealth with which students were most familiar was telepsychiatry, while telesurgery was the area with which they were least conversant.

In each of the areas of telehealth, more than half of the students did not know which methods were used. In the study by Dey et al, 31% of students had no knowledge of telehealth application areas (Dey & Bhattacharya, 2016). In this study, the methods used in telemedicine areas were questioned in detail for each area, which may explain this difference. In both studies, the fact that students' knowledge of the methods used in telehealth fields is insufficient is an important finding, indicating that students need telehealth education.

The telehealth attitudes questionnaire scores of the preclinical students were statistically significantly higher than those of the clinical students. This may be due to the fact that the clinical students did not have a telehealth course to influence their attitudes from the beginning of their medical education. In the study conducted by Fernando et al, it was found that students taking an applied telehealth course could help their competence in using telehealth and this could have a positive effect on students' attitudes (Fernando & Lindley, 2018).

Approximately 73.4% of students believe that telehealth applications can be used in preventive health services, 69.6% in psychiatry. In the study conducted by Wong et al, 77% of internal medicine residents agreed that video visits are an effective way to provide primary care services (Wong et al, 2021). The fact that psychiatry is one of the specialities considered to be most likely to use telehealth may be related to the fact that telepsychiatry methods are more familiar than in other specialities and that physical examination is not dominant due to the nature of psychiatry.

With technological developments, telemedicine in medicine is evolving every day. Blockchain technology is a new technology that is believed to be able to overcome the difficulties of use in the field of telehealth (Ahmad et al., 2021). It was found that the attitude score of students who said that blockchain technology would be useful in the field of telemedicine was significantly higher than that of students who said no/ no opinion. This situation can be explained by the fact that people's acceptance of technology is effective in the adoption of telemedicine, a field where new technologies are used (Rouidi et al., 2022).

Only 10% of students reported having had telemedicine experience during their medical training. No significant difference was found between the telehealth attitudes of students with telehealth experience and those without. This finding may be related to the fact that there is no standard telehealth education in the medical curriculum, and therefore students' experiences are not sufficient to influence their telehealth attitudes. Supporting this finding, the majority of students agreed that telemedicine should be included in medical education. In the study by Kong et al, the majority of medical students also thought that telehealth should be included in the curriculum (Chen et al, 2017).

In this study, 61.0% of students were undecided about the use of telehealth in clinical practice after medical school and 25.9% of them thought they would use it. In the Gray et al.'s study, 49.6% of students reported that they were undecided

about using telehealth in their practice after medical education and 43.0% reported that they thought they would use it (Gray et al., 2022). Similarly, the majority of students in both studies were undecided about using telemedicine after medical education.

The attitude score of the students who considered using telehealth in clinical practice after medical school was found to be significantly higher than both of the students who were undecided and did not consider using telehealth. This finding indicates that telehealth attitudes will be an important determinant of telehealth use in clinical practice.

CONCLUSIONS

This study shows that medical students' knowledge about telehealth is insufficient, and almost all students have no experience with telehealth during their medical education. The fact that the students were in the preclinical period, and the idea that blockchain technology would be useful in the field of telehealth, influenced their attitudes towards telehealth. It is thought that students' attitudes towards telehealth will be an important determinant of the use of telehealth in clinical practice. To ensure that medical students are prepared for the developing field of telehealth, it would be useful to include telehealth education in medical school.

AUTHOR CONTRIBUTION

Idea/Concept: ÜÖ, MT, NEB; Design: MT, NEB; Data Collection and/or Processing: ÜÖ; Analysis and/or Interpretation: : ÜÖ, MT, NEB; Writing the Article: ÜÖ, MT, NEB.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

FINANCIAL DISCLOSURE

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ETHICAL STATEMENT

Permission for the research was obtained from the Ethics Committee of the Faculty of Medicine (dated 13.01.2022 and numbered 24237859-35) and the Dean of the Faculty of Medicine (dated 09.12.2021 and numbered 72699152-929-24101).

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