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RESEARCH / ARAŞTIRMA

Readiness of Nurses and Nursing Students to Use Artificial Intelligence in Healthcare and Influencing Factors

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ABSTRACT

Objective: The acceptance and efficient implementation of artificial Intelligence (AI)-based applications in routine nursing activities depends on readiness towards artificial intelligence. This study aims to explore nurses' and nursing students' knowledge, opinions, and attitudes towards artificial intelligence and the factors that influence them.
Material and Method: The analytical cross-sectional study was conducted between March and May 2022, with 580 participants, including nurses (217) and nursing students (363) in a city in eastern Turkey. The data was collected using the "Information Form for Personal Details and Artificial Intelligence Knowledge of Nurses and Students" and the "Medical Artificial Intelligence Readiness Scale for Medical Students (MAIRS-MR)".
Results: This study showed that 46.1% of nurses and 34.4% of nursing students did not know how to use artificial intelligence in nursing. Both nurses and nursing students' sources of information regarding artificial intelligence in nursing were essentially "social media" and the application they mostly associated the concept of artificial intelligence with was "robots". More than half of nurses and students were curious about using artificial intelligence in nursing care. The nurses' and nursing students' mean MAIRS-MR scores were 67.17±18.19 and 69.41±15.18, respectively.
Conclusion: The study demonstrated that nurses and nursing students had a moderate level of readiness for medical artificial intelligence.
Keywords: Artificial intelligence, nurse, nursing student, readiness.

Hemşirelerin ve Hemşirelik Öğrencilerinin Sağlık Hizmetlerinde Yapay Zeka Kullanımına Hazır Bulunuşlukları ve Etkileyen Faktörler

ÖZET

Amaç: Rutin hemşirelik faaliyetlerinde yapay zekâ (artificial Intelligence, AI) tabanlı uygulamaların kabulü ve etkin bir şekilde uygulanması, yapay zekaya karşı hazır olmaya bağlıdır. Bu çalışmanın amacı, hemşirelerin ve hemşirelik öğrencilerinin yapay zekaya yönelik bilgi, görüş, hazır bulunuşlukları ve bunları etkileyen faktörleri araştırmaktır.
Gereç ve Yöntem: Bu çalışma Mart 2022 ile Mayıs 2022 arasında, Türkiye'nin doğusundaki bir şehirde hemşireler (217) ve hemşirelik öğrencileri (363) olmak üzere 580 katılımcıyla kesitsel-analitik tipte yürütülmüştür. Veriler, "Hemşirelerin ve Öğrencilerin Kişisel Bilgi ve Yapay Zekaya İlişkin Bilgi Formu" ve "Tıbbi Yapay Zekâ Hazır Bulunuşluk Ölçeği" kullanılarak toplanmıştır.
Bulgular: Bu çalışma, hemşirelerin %46,1'inin ve hemşirelik öğrencilerinin %34,4'ünün hemşirelikte yapay zeka kullanımı hakkında hiçbir bilgisinin olmadığını göstermiştir. Hem hemşirelerin hem de hemşirelik öğrencilerinin hemşirelikte yapay zeka ile ilgili temel bilgi kaynaklarının "sosyal medya" ve yapay zeka kavramını en çok ilişkilendirdikleri uygulamanın "robotlar" olduğu belirlenmiştir. Hemşirelerin ve öğrencilerin yarısından fazlasının hemşirelik bakımında yapay zekanın kullanımı konusunda meraklı olduğu bulunmuştur. Çalışmada hemşirelerin ve hemşirelik öğrencilerinin Tıbbi Yapay Zekâ Hazır Bulunuşluk Ölçeği puan ortalamaları sırasıyla 67,17±18,19 ve 69,41±15,18 olarak bulunmuştur.
Sonuç: Çalışma, hemşirelerin ve hemşirelik öğrencilerinin tıbbi yapay zekaya orta düzeyde hazır bulunduklarını göstermiştir.
Anahtar Kelimeler: Yapay zeka, hemşire, hemşirelik öğrencisi, hazır bulunuşluk.

1. Introduction

There is an increasing demand for nursing systems supported by artificial intelligence (AI) (1). The growth in data volume and complexity has significantly influenced the integration of AI in healthcare. AI can potentially improve many aspects of healthcare (2,3) as AI applications can cover various facets of nursing care, including supporting direct patient care, organising healthcare, risk prediction, and risk prevention (4). AI health technologies also have the power to transform the nursing profession with the potential to improve workflows and guide clinical care (5).

In recent years, AI has made remarkable inroads across various aspects of nursing (6). It aids in routine care activities, including vital sign monitoring (7), and enables nurses to create more sophisticated and personalized care plans (6,8). Moreno-Fergusson et al. (2021) found that using AI improves inpatient care management and reduces nurses' workload (9). Similarly, Liu et al. (2022) suggested that AI-based medical information processing can be implemented in emergency first-aid nursing management (10). In addition, Zhou et al. (2022) used virtual counselling to improve paediatric patient safety and quality of transfers (11), and Shorey et al. (2019) used it for communication skills training in nurses (12). Furthermore, integrating AI into the nursing workflow was shown to increase accuracy and completeness while reducing the time required for documentation (13).

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Given the advances in AI technology in healthcare, healthcare professionals are expected to come across different technologies and related applications in the clinical environment (14). The increasing use of AI and the changes it brings in all fields urge institutions and organisations to consider integrating AI regarding professional members and their roles. Previous studies from different countries report that many higher education institutions in the field of health sciences announced the integration of AI at all levels of healthcare professional education (15-19).

Various obstacles impede large-scale clinical adoption of innovative healthcare AI technologies (20). The most crucial one is that the acceptance and efficient implementation of AI-based applications in routine nursing practices depend on nurses' attitudes towards AI and their readiness (21). For example, in a study conducted by Swan involving nursing students, nurses, and nurse educators, more than 70% of the participants had little to no understanding of the technologies used in AI, with only 30% familiar with how to implement AI in nursing practices (22). Another study conducted in Türkiye revealed that 66.9% of nurse managers were aware of AI and robot nurses, and 67.2% believed that robot nurses could benefit the nursing profession (23). Furthermore, a study with nursing students showed that 63% held negative attitudes towards AI, while 37% viewed it positively (24). A study involving physicians, nurses and healthcare technicians in Saudi Arabia found that the participants were unaware of the advantages and difficulties of AI applications in healthcare (25). A study with students of nursing, nutrition, dietetics, and physiotherapy-rehabilitation departments in Türkiye determined that students were aware of the dynamics of AI applications in healthcare that may affect their professions in the future (14).

According to the World Health Organization report, the global nursing workforce is estimated to include more than 27 million professionals (26). Nurses represent one of the most populous groups among healthcare professionals. It is anticipated that nurses and nursing students will be significantly impacted by all changes associated with AI and will be among the primary users of these technologies. Consequently, nurses are encouraged to enhance their knowledge and skills by familiarizing themselves with this new technology, just as they adapt to other tools and applications used in the care process (27). Therefore, managers and educators must address the knowledge, opinions, awareness, and readiness of nurses and nursing students towards AI (14,22). Little is known about the readiness of nurses and nursing students to use AI in healthcare. Understanding the basic knowledge, views and concerns of nurses and future nurses regarding AI can help raise awareness about AI applications in healthcare and shape the training needed on this subject. For this reason, this research aimed to explore nurses' and nursing students' knowledge, opinions and attitudes towards artificial intelligence and the factors that influence them.

This study sought answers to the following questions:

- What is the level of knowledge, opinions and readiness of nurses regarding using AI in healthcare?
- Do nurses' AI readiness differ according to their socio-demographic characteristics?
- What is the level of knowledge, opinions and readiness of nursing students regarding using AI?
- Do students' AI readiness differ according to their socio-demographic characteristics?
- Is there a difference between students' and nurses' AI readiness?

2. Materials and Methods

2.1. The Study Design and Participants

This research was conducted using an analytical cross-sectional design. The data were collected between March 2022 and May 2022. The description of the study was conducted by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (28).

This study included 760 nurses and 754 students enrolled in the nursing department of a university hospital in a province in eastern Turkey. A power analysis was performed using OpenEpi Version-3 "Sample Selection with Known Universe" and a sample size of 256 nurses and 255 students was determined with an effect size of 80% and a 95% confidence interval. All individuals who volunteered to participate in the study were included in the study. After removing the questionnaires with missing data, the final sample consisted of 580 participants (217 nurses and 363 nursing students).

Since the total population of nurses and nursing students is known, the sample size was determined using calculation methods that are considered more appropriate for such studies. Additionally, a post-hoc power analysis was performed using G*Power v.3.1.9.7 software to assess the statistical power of the sample. The analysis considering the Medical Artificial Intelligence Readiness Scale for Medical Students (MAIRS-MR) mean scores of the participants according to their level of knowledge about the use of artificial intelligence in health revealed that the power of the study (1-β) was 99% with a 95% confidence interval and a type I error level of 0.05. The simple random sampling method was used to collect the data.

Inclusion criteria for nurses:

- Being a nursing graduate (high school, associate, bachelor's or master's degree)
- Working as a nurse, regardless of unit or title, at the university hospital where the study was conducted.

Inclusion criteria for nursing students:

- Being a registered and active student in the nursing undergraduate education department of the specified university at the time the study was conducted.

2.2. Data Collection Tools

The data was collected using the Information Form for Personal Details and Artificial Intelligence Knowledge of Nurses and Students developed by the researchers by reviewing the relevant literature and the MAIRS-MR.

2.2.1. Information Form for Personal Details and Artificial Intelligence Knowledge of Nurses and Students

This form was prepared by the researchers by conducting a literature review (5,14,15,22) and consists of two parts and a total of 20 questions. The first part contains ten questions regarding the socio-demographic characteristics of the participants, and the second part includes ten questions assessing the knowledge, opinions and awareness of nurses and nursing students about AI.

2.2.2. Medical Artificial Intelligence Readiness Scale for Medical Students (MAIRS-MR)

The scale was developed by Karaca et al. and analysed for validity/reliability in 2021. It is designed to evaluate the perceived readiness of medical students regarding AI technologies and

their applications in medicine (30). Karaca et al. noted that the scale was also suitable for use by students studying in other health sciences fields. It is a 5-point Likert-type scale with 22 items and four sub-dimensions: "Cognition, Ability, Vision and Ethics". The minimum score attainable on the scale is 22, while the maximum is 110. The Cronbach's alpha coefficient of the scale was reported as 0.87 by Karaca et al. and found to be 0.95 in this study.

2.3. Implementation of the Study

2.3.1. Data Collection

Data was collected using an online method once the nurses and students expressed voluntary participation. Participants were allowed to view the survey questions after confirming their understanding of the informed consent page, which explained the purpose of the research. Completing each form took approximately 10 minutes. The data collection process was conducted entirely online.

2.3.2. Data Analysis

SPSS version 22 software package was used to retrieve the data obtained through the Google Forms and analyse them statistically.

Descriptive statistics were presented as percentage values, arithmetic means, and standard deviation values. Kolmogorov-Smirnov normality tests were used to assess the normality of the data distribution. The t-test was used to evaluate the difference between two independent groups with normal distribution, and the Mann-Whitney U test between two independent groups without normal distribution. The chi-square test was used to assess the difference between two independent groups. $p<0.05$ was accepted as statistically significant.

2.4. Ethical Consideration

The study was approved by the Firat University Social Humanities Ethics Committee of a university in Turkey (decision no: 2022/04-4, dated 22 February 2022) and was conducted in accordance with the Declaration of Helsinki. Participants were first asked to read the informed consent text, which explained the purpose and rationale of the study, in the link sent over the internet. After being informed about the research, they answered the following question by clicking 'yes' or 'no': 'Would you like to participate in this research voluntarily?' Volunteers filled out the survey. They were informed that they could withdraw from the study at any time without giving any reason. The survey does not include questions containing participants' contact information or any personal identifiable information. There is no incentive for participants to participate in the study.

3. Results

The mean age of the nurse participants was 30.97±6.74 years. Of these, 74.7% were women, and 53% were married. A total of 69.6% reported having an average income, and 82% held a bachelor's degree. While 46.1% did not know the use of AI in nursing, 30% acquired information about the use of AI in nursing through social media, and 63.6% associated AI with robots. In addition, 52.1% expressed curiosity (Table 1).

The mean age of the nursing students was 21.01±1.93 years. Of these, 76% were women, and 77.9% were single. A total of 66.4% reported having an average income. Approximately 28.7% were freshmen. About 34.4% did not know the use of AI in nursing. Meanwhile, 43% obtained information about the use of AI in nursing from social media. A total of 55.4% were curious, and 38.3% were hopeful about AI applications in nursing care. Additionally, 63.4% associated AI with robots, 42.4% with mobile applications, and 30.6% with wearable sensors (Table 2).

Table 1. Distribution of some characteristics of nurses regarding their socio-demographics and use of AI in healthcare

	n	%
Gender		
○ Female	162	74.7
○ Male	55	25.3
Marital status		
○ Married	115	53
○ Single	102	47
Income		
○ Poor	35	16.1
○ Average	151	69.6
○ Good	31	14.3
Education		
○ Highschool	8	3.7
○ Associate degree	10	4.6
○ Bachelor's degree	178	82
○ Masters' degree	21	9.7
Years worked as a nurse		
○ 0-3 years	84	14.5
○ 4-7 years	30	5.2
○ 8-11 years	39	6.7
○ 12-15 years	32	5.5
○ > 16 years	32	5.5
Current unit of employment		
○ Emergency services	22	3.8
○ Surgical services	84	14.5
○ Internal services	60	10.3
○ Pediatric services	30	5.2
○ Intensive care	21	3.6
Years worked in the current unit		
○ 0-3 years	135	62.5
○ 4-7 years	40	18.5
○ > 8 years	41	19
Work pattern		
○ Daytime	76	35.2
○ In shifts	140	64.8
Information source on the use of AI in nursing*		
○ Graduate/postgraduate education	31	14.3
○ Scientific publications/meetings	35	16.1
○ In-service training	16	7.4
○ Science fiction movies	29	13.4
○ TV/Radios/Newspapers/Magazines	39	18
○ Social media	65	30
○ Family/friends	14	6.5
○ No information	100	46.1
Applications they associate with AI *		
○ Robots	138	63.6
○ Machine learning	61	28.1
○ Telehealth	60	27.6
○ Mobile applications	84	38.7
○ Personal assistant	62	28.6
○ Wearable sensors	74	34.1
Feelings/thoughts about AI applications in nursing care*		
○ Excited	51	23.5
○ Sad	11	5.1
○ Worried	44	20.3
○ Hopeful	94	43.3
○ Curious	113	52.1

* More than one option is marked

Table 3 shows that 82.9% of the nurses and 86% of the nursing students in our study kept up with technological developments. About 22.6% of both groups were knowledgeable about the use of AI in nursing. A significant majority, 89.9% of nurses and 89.8% of nursing students, respectively, believed that nurses and nursing students should receive training on AI. Only 19.8% of the nurses thought that AI applications should be utilized in nursing care, and 11.1% had used an AI technology or application in

nursing practices. Among the students, these rates were slightly higher, at 26.2% and 15.4%, respectively (Table 3).

Table 2. Distribution of some characteristics of nursing students regarding their socio-demographics and use of AI in healthcare

	n	%
Gender		
○ Female	276	76
○ Male	87	24
Marital status		
○ Married	4	3.4
○ Single	359	77.9
Income		
○ Poor	50	13.8
○ Average	299	66.4
○ Good	14	31.1
Grade		
○ Freshman	104	28.7
○ Sophomore	83	22.9
○ Junior	94	25.9
○ Senior	82	22.6
Information source on the use of AI in nursing*		
○ Graduate/postgraduate education	71	19.6
○ Scientific publications/meetings	36	9.9
○ In-service training	22	6.1
○ Science fiction movies	58	16
○ TV/Radio/Newspapers/Magazines	81	22.3
○ Social media	156	43
○ Family/friends	37	10.2
○ No information	125	34.4
Feelings/thoughts about AI applications in nursing care*		
○ Excited	122	33.6
○ Sad	15	4.1
○ Worried	78	21.5
○ Hopeful	139	38.3
○ Curious	201	55.4
What they think of as AI applications*		
○ Robots	230	63.4
○ Machine learning	106	29.2
○ Telehealth	101	27.8
○ Mobile applications	154	42.4
○ Personal assistant	108	29.8
○ Wearable sensors	111	30.6

* More than one option is marked

The mean MAIRS-MR scores of nurses and nursing students were 67.17±18.19 and 69.41±15.18, respectively, indicating moderate readiness for medical AI for both groups. MAIRS-MR cognition sub-dimension mean scores of nurses and nursing students were 22.6±6.9 and 23.54±6.19, respectively, and ability sub-dimension mean scores were 25.76±7.63 and 26.37±6.2, respectively. The vision factor mean scores were 9.08±2.99 and 9.53±2.5, respectively, and the ethics factor subscale mean scores were 9.71±3.08 and 9.96±2.59, respectively. The nurses and students in our study had mean scores from all MAIRS-MR subscales (Table 3).

The study showed that the MAIRS-MR mean scores of nurses and students who followed technological developments and had knowledge about the use of AI in nursing were significantly higher than those who did not ($p<0.05$, $p<0.001$). The MAIRS-MR mean scores of nurses thinking that AI-related courses should be included in undergraduate/graduate education in nursing and that nurses/nursing students should be given AI-related training were also significantly higher than the others ($p<0.05$). However, the students' mean scores did not differ significantly ($p>0.05$). No significant difference was identified in the MAIRS-MR mean scores of nurses and students who thought AI applications should be used in nursing care compared to the others ($p>0.05$).

Table 3. Comparison of some views of nurses and students regarding the use of AI in healthcare

	Nurse n(%)	Student n(%)	Statistical test and p-value
Following technological developments			
○ Yes	180 (82.9)	312 (86)	X^{2*}=0.95
○ No	37 (17.1)	51(14)	p= 0.196
Knowing the use of AI in healthcare			
○ Yes	71 (32.7)	117 (32.2)	X^2=0.015
○ No	146 (67.3)	246 (67.8)	p= 0.487
Knowing the use of AI in nursing			
○ Yes	49 (22.6)	82 (22.6)	X^2=0.000
○ No	168 (77.4)	281 (77.4)	p= 0.542
Thinking that AI-related courses should be included in undergraduate/graduate education in nursing			
○ Yes	320 (88.2)	192 (88.5)	X^2=0.14
○ No	43 (11.8)	25 (11.5)	p= 0.51
Thinking that nurses/nursing students should be given training in AI			
○ Yes	195 (89.9)	326 (89.8)	X^2=0.000
○ No	22 (10.1)	37 (10.2)	p= 0.552
Thinking that AI applications should be used in nursing care			
○ Yes	43 (19.8)	95 (26.2)	X^2=3.025
○ No	174 (80.2)	268 (73.8)	p= 0.053
Using an AI technology/application in nursing practices			
○ Yes	24 (11.1)	56 (15.4)	X2=2.178
○ No	193 (88.9)	307 (84.6)	p= 0.087
MAIRS-MR	67.17±18.19	69.41±15.18	t**=1.525 p=0.128
○ Cognition factor	22.6±6.9	23.54±6.19	t=1.682 p=0.102
○ Ability factor	25.76±7.63	26.37±6.2	t=1.044 p=0.322
○ Vision factor	9.08±2.99	9.53±2.5	t=1.948 p=0.052
○ Ethics factor	9.71±3.08	9.96±2.59	t=1.044 p=0.297

*X^2: Chi square test, **t: t test in independent groups

While there was no significant difference between the MAIRS-MR mean scores of nurses who used an AI technology/application in their nursing practices compared to those who did not ($p>0.05$), the MAIRS-MR mean scores of the students who used an AI technology/application in their nursing practices were found to be significantly higher than those who did not ($p<0.001$) (Appendix 1).

4. Discussion

The study revealed that approximately one-third of nurses and students acquired information about AI through social media. In Sheela's research, more than one-third of nursing students obtained information about AI from social networks (24). This trend could be attributed to the widespread use of social networks in contemporary society, with a significant portion of daily internet usage dedicated to social media, and the common practice of using social media for news and communication.

In our study, both the nurses and students associated AI mostly with robots. In the study by Yilmaz et al., more than half of the participants reported that the term AI reminded them of robot systems (14). The fact that robots/robotic applications are frequently featured in both social media and broadcast media, such as television/newspapers, within the scope of AI may have affected this result.

AI is a broad field of computer science that focuses on creating intelligent machines. It is difficult to predict the effects of AI on healthcare in the next decade (31). More than half of the nurses and students in our study were curious about the use of AI. In the study of Yılmaz et al., 10.6% of medical students were worried about using AI in healthcare (14). In the study of Tamori et al., both doctors and the public were optimistic about AI (32). A study of nurses and nursing students found that both groups showed moderate levels of anxiety and readiness regarding AI (33). AI applications were expected to arouse curiosity in nurses and students due to the innovations and conveniences they brought to our lives, as well as the literature describing their future possibilities.

The term 'medical AI readiness' refers to the extent to which nurses and students have the necessary knowledge, skills, and attitudes to use artificial intelligence applications in healthcare. The study found that nurses' and students' medical AI readiness level was moderate. Similarly, Ghalibaf et al. reported moderate readiness for medical AI in their study with medical students (33). Our findings demonstrated the need to increase healthcare professionals' readiness to AI in the field of healthcare, where AI applications are frequently used and will be used even more frequently soon.

In the study, it was found that the majority of nurses and students follow technological developments, and those who follow technological developments have higher levels of medical AI readiness. In the study by Swan, more than seventy per cent of the nurses reported that they followed technology (22). Ghalibah et al. found that participants who described themselves as technologically competent had higher readiness for medical AI (33). Our finding is important as it reveals the importance of following technological developments for the level of readiness for medical AI. This highlights that fostering technological engagement among healthcare professionals may be a key strategy to enhance their preparedness for adopting AI-based tools and systems in clinical practice.

In our study, one-third of nurses and students (32.7%, 32.2%) knew about the use of AI in healthcare, and one-fifth (22.6%) knew about the use of AI in nursing. Those with knowledge about the use of AI in healthcare and nursing had higher readiness for medical AI. In the study by AlZaabi et al. with doctors and medical students, 21% of the doctors and 48% of the medical students stated that they were familiar with AI as a new and developing tool in medicine (34). In Swan's study, approximately 70% of the participants had heard of AI in healthcare, but only 30% knew the use of AI in nursing (22). Since knowing AI will reduce the anxiety caused by the unknown, using AI-based applications or having knowledge about the perception of AI may provide an advantage to individuals (35). These results are significant as they highlight the need for education on AI.

In our study, almost all nurses and students believed that courses on AI should be integrated into nursing education and that nurses and nursing students should receive training on AI. Additionally, the nurses and students who held this belief demonstrated a higher readiness for medical AI. Alzaabi et al. reported that physicians and medical students were willing to adopt AI if it was included in international guidelines. Since evidence-based practices are included in international guidelines, the inclusion of AI in guidelines may increase its applicability. Alzaabi et al. reported that physicians and medical students were willing to apply AI if it was included in international guidelines (30.5%), published in reputable scientific journals (17.1%) or included in formal education (12.2%) (34). In their study with medical students, Xuan et al. found that those who received training on AI had higher readiness for medical AI (31). The results show that nurses and students are willing to receive training on AI, and those who receive training are more inclined to use AI applications.

Despite the growing interest in the application of AI in healthcare, healthcare professionals still have mixed attitudes and perceptions regarding the application of AI technologies (36). Surprisingly, our study found that only approximately one-fifth of both nurses and students thought that AI applications should be used in nursing care. There was no significant difference between the nurses and students who believed that AI applications should be used in nursing care and those who did not in their readiness for medical AI. In the study by Elsayed and Sleem with nurse managers, 65.4% of the participants had positive attitudes towards using AI in nursing environments (36). Tamori et al. reported that less than half of the participants, both lay people and doctors, were willing to use AI-driven medicine (32). This result may be due to nurses' and students' lack of knowledge about AI or their concerns about the point that AI can reach in the future.

In our study, only 11.1% of the nurses and 15.4% of the students stated that they used any AI technology/application in their nursing practice. At the same time, the level of medical AI readiness of students using an AI technology/application in nursing practice was higher than those who did not, although there was no significant difference between the medical AI readiness levels of nurses who did and did not use an AI technology/application in nursing practice. In the study by Yilmaz et al. with students of the faculty of healthcare sciences, 47.66% of the participants used an application related to AI (14), and in a study with medical and healthcare sciences students in Kazakhstan, 51.2% used an AI application for schoolwork (37). In Menekli and Şentürk's study, no significant difference was found between the AI-related concerns of nurses who did and did not use AI applications (38). In their study, Kloka et al. found that anaesthesia and intensive care specialists with AI experience had a higher AI benefit evaluation score (39). Looking at our study findings and the literature, it can be concluded that AI application experiences vary in terms of readiness, anxiety, or benefit definition. Our finding highlights the need for research in this area.

4.1 Limitations

The limitations of this study include the fact that the data collection forms were distributed online, and the findings cannot be generalized to the broader population, as the study was conducted exclusively with nurses and students at a university hospital.

5. Conclusions

The study demonstrated that nurses and nursing students had a moderate level of readiness for the use of AI in healthcare. Almost half of nurses and nursing students did not know the use of AI in nursing, and those who knew the use of AI in healthcare and nursing had higher medical AI readiness levels. Surprisingly, only approximately one-fifth of both nurses and students thought that AI applications should be used in nursing care. Nurses and students were willing to receive training on AI, and those who had received training were more inclined to use AI applications. Our findings underscore the necessity to enhance the readiness of

service providers for medical AI in healthcare, where AI applications are increasingly utilized and are expected to become even more prevalent shortly. Additionally, our results underscore the significance of keeping abreast of technological advancements to improve readiness for medical AI. Recommendations include increasing the use of AI in nursing practices, facilitating the integration of institutions and professional members into this domain, raising awareness through in-service training on AI applications and usage, developing a curriculum for AI applications and use, particularly in undergraduate and graduate education, and conducting further research in this area.

6. Contribution to the Field

The study found that nurses' and nursing students' knowledge of AI applications was low, and their readiness for medical AI was moderate. Only about a fifth of both nurses and students thought that AI applications should be used in nursing. In line with these findings, it may be recommended to increase awareness of the use of AI in nursing practice and to involve institutions and professionals in this area. In addition, curricula for AI applications and use can be developed based on undergraduate and postgraduate education.

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Conflict of Interest

There is no conflict of interest with any person and/or institution.

Authorship Contribution

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Appendix 1. Comparison of MAIRS-MR and subscale mean scores of nurses and nursing students according to some variables

	Nurse					Student				
	MAIRS-MR*	**Cognition factor**	**Ability factor**	**Vision factor**	**Ethics factor**	**MAIRS-MR**	**Cognition factor**	**Ability factor**	**Vision factor**	**Ethics factor**
Following technological developments										
Yes	68.51±17.54	23.19±6.58	26.23±7.47	9.22±2.92	9.86±3.07	70.37±14.71	23.88±6.09	26.75±6.08	9.67±2.43	10.07±2.56
No	60.62±20.09	19.75±7.77	23.48±8.08	8.37±3.3	9±3.05	63.52±16.79	21.47±6.46	24.05±6.52	8.68±2.8	9.31±2.73
Statistical test and p-value	t**= 2.431 **p=0.031**	t=2.800 **p=0.016**	t=2.006 p=0.063	t=1.575 p=0.153	t=1.553 p=0.125	t=3.017 **p=0.008**	t=2.595 **p=0.015**	t=2.9 **p=0.008**	t=2.628 **p=0.021**	t=1.935 p=0.069
Knowing the use of AI in health										
Yes	75.59±18.07	25.16±6.69	28.95±7.39	10.4±2.77	11.05±2.83	72.94±14.92	25.07±6.26	27.64±6.11	9.97±2.43	10.24±2.54
No	63.07±16.85	21.36±6.68	24.21±7.28	8.43±2.89	9.06±2.99	67.73±15.05	22.81±6.04	25.76±6.16	9.32±2.51	9.82±2.61
Statistical test and p-value	t=5.012 **p=0.001**	t=3.933 **p=0.001**	t=4.48 **p=0.001**	t=4.763 **p=0.001**	t=4.684 **p=0.001**	t=3.094 **p=0.002**	t=3.296 **p=0.001**	t=2.729 p=0.007	t=2.32 p=0.02	t=1.436 p=0.148
Knowing the use of AI in nursing										
Yes	76.57±16.45	25.34±6.18	29.53±6.88	10.48±2.61	11.2±2.68	74.51±15.27	25.73±6.34	28.15±6.37	10.18±2.39	10.43±2.5
No	64.42±17.8	21.8±6.92	24.66±7.51	8.67±2.98	9.27±3.06	67.92±14.86	22.9±6.01	25.85±6.06	9.34±2.51	9.82±2.61
Statistical test and p-value	t=4.27 **p=0.001**	t=3.221 **p=0.001**	t=4.06 **p=0.001**	t=3.85 **p=0.001**	t=3.975 **p=0.001**	t=3.508 **p=0.001**	t=3.697 **p=0.001**	t=2.995 **p=0.004**	t=2.757 **p=0.007**	t=1.887 p=0.056
Thinking that AI-related courses should be included in undergraduate/graduate education in nursing										
Yes	68.03±17.77	22.78±6.75	26.15±7.51	9.19±2.97	9.91±3	69.69±14.95	23.6±6.09	26.51±6.15	9.55±2.48	10.01±2.58
No	60.52±20.33	21.28±8.04	22.8±8.1	8.24±3.08	8.2±3.29	67.34±16.87	23.04±6.98	25.3±6.53	9.39±2.68	9.6±2.71
Statistical test and p-value	Z***=-2.077 **p=0.038**	Z=-0.977 p=0.329	Z=-2.118 **p=0.034**	Z=-1.619 p=0.105	Z=-2.527 **p=0.012**	t=0.949 p=0.391	t=0.558 p=0.617	t=1.204 p=0.255	t=0.387 p=0.716	t=0.966 p=0.357
Thinking that nurses/nursing students should be given training in AI										
Yes	68.11±17.68	22.84±6.69	26.14±7.46	9.21±2.96	9.9±2.9	69.86 ±15.28	23.63±6.24	26.56±6.22	9.61±2.53	10.05±2.61
No	58.81±20.88	20.5±8.48	22.36±8.47	7.9±3.06	8.04±3.4	65.43±13.88	22.72±5.8	24.67±5.87	8.86±2.12	9.16±2.33
Statistical test and p-value	Z=-2.412 **p=0.016**	Z=-1.529 p=0.126	Z=-2.201 **p=0.028**	Z=-2.548 **p=0.011**	t=2.718 **p=0.021**	t=1.686 p=0.075	t=0.841 p=0.377	t=1.759 p=0.072	t=1.719 p=0.053	t=1.989 **p=0.035**
Thinking that AI applications should be used in nursing care										
Yes	72.18±19.21	24.81±6.54	27.23±7.83	9.69±2.97	10.44±3.31	71.76±15.17	24.87±6.7	26.89±6.07	9.76±2.38	10.23±2.49
No	65.93±17.77	22.06±6.9	25.4±7.56	8.93±2.99	9.53±3	68.57±15.13	23.07±5.95	26.18±6.25	9.45±2.54	9.86±2.63
Statistical test and p-value	t=2.033 p=0.057	t=2.363 **p=0.017**	t=1.41 p=0.172	t=1.506 p=0.135	t=1.737 p=0.107	t=1.764 p=0.08	t=1.764 p=0.08	t=2.452 **p=0.022**	t=1.059 p=0.276	t=1.168 p=0.233
Using an AI technology/application in nursing practices										
Yes	71.79±20.41	24.33±7.44	27.62±8.59	9.83±2.92	10±3.09	75.14±12.69	26.12±5.54	28.35±5.13	10.23±2.27	10.42±2.5
No	66.59±17.87	22.39±6.82	25.53±7.5	8.98±3	9.67±3.08	68.36±15.39	23.07±6.2	26±6.32	9.4±2.52	9.87±2.61
Statistical test and p-value	t=1.321 p=0.244	t=1.299 **p=0.235**	t=1.267 p=0.264	t=1.302 p=0.195	t=0.481 p=0.635	t=3.106 **p=0.001**	t=3.44 **p=0.001**	t=2.624 **p=0.003**	t=2.278 **p=0.016**	t=1.456 p=0.138

* Medical Artificial Intelligence Readiness Scale for Medical Students, **t: t-test in independent groups, ***Z: Mann-Whitney U test