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Factors Influencing Surgical Patients' and Caregivers' Perceptions of Artificial Intelligence-Supported Healthcare Services: A Cross-Sectional Research

Cerrahi Hastalarının ve Bakım Verenlerin Yapay Zekâ Destekli Sağlık Hizmetlerine Yönelik Görüşlerini Etkileyen Faktörlerin İncelenmesi: Kesitsel ve Tanımlayıcı Araştırma

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ABSTRACT Objective: This study aims to examine the influence of surgical patients' and caregivers' general attitudes toward artificial intelligence (AI) on their perceptions of AI-assisted healthcare. **Material and Methods:** A cross-sectional descriptive study was conducted with 450 participants (240 patients and 210 caregivers) in the surgical clinics of a university hospital. Data were collected face-to-face between August-December 2024 using the Sociodemographic Characteristics Form, the Opinion Questionnaire on AI-Assisted Healthcare, and the General Attitudes Towards AI Scale. Descriptive statistics, chi-square analysis, one-way analysis of variance, and multivariate linear regression analysis were employed for data analysis. **Results:** A total of 62.91% of patients and 63.8% of caregivers expressed concerns about AI-based robotic surgeons operating without human intervention. Additionally, 54.5% of patients and 48.5% of caregivers did not want AI-based robotic nurses to perform self-care tasks. Furthermore, 52.9% of patients and 52.3% of caregivers were apprehensive about AI-based robotic nurses assisting with surgery in the operating room. Regression analysis indicated that patients' positive attitudes and education levels accounted for 18% of their views on AI-based healthcare services, while caregivers' attitudes, gender, and education levels explained 25%. Male caregivers demonstrated greater acceptance and trust in AI technologies. **Conclusion:** Both patients and caregivers expressed reservations about AI-assisted healthcare services, emphasizing the importance of human interaction in medical settings. Enhancing education and awareness of AI's potential benefits may support the seamless integration of these technologies within a patient-centered framework.

Keywords: Artificial intelligence; nursing; surgery; robots; healthcares

ÖZET Amaç: Bu çalışma, cerrahi hastalarının ve bakım verenlerinin yapay zekâya (YZ) yönelik genel tutumlarının yapay destekli sağlık hizmet algıları üzerindeki etkisini incelemeyi amaçlamaktadır. **Gereç ve Yöntemler:** Araştırma kesitsel ve tanımlayıcı tipte olup, bir üniversite hastanesinin cerrahi kliniklerindeki 450 (240-hasta ve 210-bakım veren) katılımcı ile yapıldı. Veriler, Sosyodemografik Özellikler Formu, Yapay Zekâ Destekli Sağlık Hizmetleri Hakkında Görüş Anketi ve Yapay Zekâya Yönelik Genel Tutumlar Ölçeği ile yüz yüze Ağustos-Aralık 2024 tarihleri arasında toplandı. Veri analizinde tanımlayıcı istatistikler, ki-kare analizi, tek yönlü varyans analizi ve çok değişkenli doğrusal regresyon analizi kullanıldı. **Bulgular:** Hastaların %62,9'u; hasta yakınlarının %63,8'i insan müdahalesi olmadan çalışan YZ tabanlı robot cerrahlar konusunda endişe duymaktaydı. Hastaların %54,5'i bakım verenlerin %48,5'si YZ tabanlı robot hemşirelerin öz bakım ihtiyaçlarını karşılamasını istememiştir. Hastaların %51,6'sı ve bakım verenlerin %55,2'si YZ tabanlı robot hemşireleri güvenilir bulmadıklarını; hastaların %52,9'u, bakım verenlerin %52,3'ü ameliyathanede ameliyata yardımcı olan YZ tabanlı robot hemşireler konusunda endişeli olduğunu bildirmiştir. Regresyon analizi, hastaların olumlu tutumlarının ve eğitim seviyelerinin YZ destekli sağlık hizmetleri hakkındaki görüşlerinin %18'ini açıkladığını, bakım verenlerin tutumlarının, cinsiyetlerinin ve eğitimlerinin ise %25'ini açıkladığını ortaya koymuştur. Erkek bakım verenlerin YZ teknolojilerini kabullenme ve bu teknolojilere güvenme düzeylerinin daha yüksek olduğu saptandı. **Sonuç:** Hem hastalar hem bakım verenler YZ destekli sağlık hizmetlerine yönelik olumsuz düşüncelere sahiptir. Özellikle sağlık uygulamalarında insan etkileşiminin önemini vurgulamışlardır. YZ'nin potansiyel faydaları konusunda eğitim ve farkındalığın artırılması, hasta odaklı bir yaklaşım benimsenerek bu teknolojilerin daha uyumlu bir şekilde uygulanmasına yardımcı olabilir.

Anahtar Kelimeler: Yapay zekâ; hemşirelik; cerrahi; robotlar; sağlık hizmetleri

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In recent years, rapid technological advancements have profoundly transformed diagnostic and treatment services.[1] Artificial Intelligence (AI) applications provide innovative solutions to the healthcare sector by assisting professionals with diagnosis and examination recommendations.[2-4] AI's growing significance in healthcare stems from its capabilities in big data analysis, decision-making, and operational efficiency, all of which positively impact patient outcomes.[5] A review of the literature reveals both positive and negative perspectives regarding AI's role in healthcare.[2,6-8] Much of the existing research has focused on healthcare professionals and medical students, particularly in radiology.[6,8] However, limited studies have examined patients' perspectives on AI. One study on neurosurgery patients found that most patients and caregivers accepted AI's potential role in neurosurgery.[9] Another study reported that 55% of patients (n=145) were uncomfortable with automated robotic surgery, while 94% expressed willingness to pay for an AI-driven application to review their medical imaging.[10]

Despite the growing interest in AI application within nursing, high-quality publications in this area remain scarce.[11] Nurses play a critical role in patient care, and necessitating adaptation to technological advancements.[12] AI supports nursing by enhancing real-time decision-making, reducing administrative workload, and improving patient data management.[13] However, studies on AI's applications in nursing practice remain insufficient. A systematic review highlighted AI's potential in various nursing domains, including documentation, formulation of nursing diagnoses and care plans, patient monitoring, predictive analytics for patient care, and wound management.[14,15]

The increasing integration of AI in healthcare presents both opportunities and challenges. However, most studies have focused on the perspectives of healthcare professionals rather than those of patients and caregivers.[3,9,10,16] Understanding patients' views on the use of their health data in AI research is crucial for the successful implementation of AI-driven healthcare services. Although some studies have explored AI in surgical settings, there is a lack of research on surgical patients' and caregivers' perspectives on AI-enabled nursing systems A literature review found that while there are studies on the use of AI in healthcare services for surgical patients and their caregivers, no studies examine their views on using AI-enabled systems in nursing practice.[3,9,14] This study aims to fill this gap by investigating the attitudes of surgical patients and their caregivers toward AI-assisted healthcare. The findings will contribute to understanding the factors influencing acceptance or rejection of AI-based systems in medical settings, thereby supporting the development of patient-centered AI applications

Research Questions

1. What are the perceptions of surgical patients and caregivers regarding AI-supported healthcare services?

2. What are the attitudes of surgical patients and caregivers toward AI?

3. What factors predict the perceptions of surgical patients and caregivers regarding AI-supported healthcare services?

MATERIAL AND METHODS

DESIGN AND PURPOSE

This study employed a descriptive and cross-sectional research design to examine the impact of surgical patients' and caregivers' general attitudes toward AI on their perceptions of AI-supported healthcare services.

PARTICIPANTS AND SETTING

The study was conducted with patients and their caregivers who stayed for at least one day in the surgical clinics (general surgery, cardiovascular surgery, neurosurgery, urology, and orthopedics and traumatology) of a university hospital. A total of 450 individuals (240 patients and 210 caregivers) who met the inclusion criteria participated.

At the end of the study, a power analysis was conducted using the G-Power 3.1 program, based on the positive attitudes sub-dimension of the AI Attitude Scale. The effect size was calculated as 0.80, and the power of the sample was determined to be 0.99.

Inclusion Criteria for Patients: Being over 18 years or older, being literate, possessing a communi-

cation device with internet access, hospitalized for at least one day in the surgical clinic.

Inclusion Criteria for Caregivers Being Over: 18 years or older, being literate, possessing a communication device with internet access, providing care for a patient hospitalized for at least one day in a surgical clinic, no hearing or perceptual impairments, no psychiatric diagnosis.

Exclusion Criteria for Patients: Unable to provide informed consent, undergoing outpatient surgery, having a severe visual or auditory impairment that prevents communication

Exclusion Criteria for Caregivers: Unable to provide informed consent, caring for a patient undergoing outpatient surgery, having severe visual or auditory impairment that prevents communication

DATA COLLECTION

Data were collected through face-to-face interviews conducted between August-December 2024. Three data collection tools were used: a Sociodemographic and Clinical Characteristics Form, an Opinion Survey on AI-supported Healthcare Services, and the General Attitudes Toward Artificial Intelligence Scale (GAAIS).

Sociodemographic-Clinical Characteristics Form: The Sociodemographic and Clinical Characteristics Form, developed by the researchers, consisted of 17 questions assessing participants' demographic details, the type of surgical procedure performed, the surgical clinic where the patient was hospitalized, the patient's current health stage, age, gender, education level, frequency and purpose of internet use, and AI usage pattern.[1,2,4,6]

Opinion Survey on AI-Supported Healthcare Services: The Opinion Survey on AI-Supported Healthcare Services was created based on a review of the literature and contained 11 questions exploring participants' views on AI-based surgeries and AI-assisted robotic nurses in healthcare. Responses were categorized as "Yes", "No", or "Undecided".[7,14,17] To ensure the validity of this survey, it was reviewed by three experts in surgical nursing, and their agreement was analyzed using Fleiss' Kappa analysis, which yielded a Kappa value of 0.738 ($p<0.001$), indicating very good agreement among the experts.[18]

General Attitudes Toward Artificial Intelligence Scale: The GAAIS, developed by Schepman and Rodway, was used to measure individuals' general attitudes toward AI.[19] This scale consists of 20 items, with 12 positive statements and 8 negative statements, rated on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The scale has demonstrated good internal consistency reliability, with a Cronbach's Alpha of 0.88 for positive GAAIS and 0.83 for Negative GAAIS.[1] In 2022, Kaya and colleagues conducted the Turkish validity and reliability study of the scale. Scores for positive attitudes toward AI range from 12 to 60, while negative attitudes toward AI range from 8 to 40. Permission to use the scale was obtained.[20] In the present study, Cronbach's Alpha coefficients were calculated as 0.91 for the positive attitude sub-dimension and 0.85 for the negative attitude sub-dimension, confirming high reliability.

DATA ANALYSIS

Statistical analyses were conducted using SPSS 24.0. Descriptive statistics, including frequency and percentage distributions, were used to summarize sociodemographic characteristics. The normal distribution of data was assessed using the Kolmogorov-Smirnov test, and Skewness-Kurtosis values. A p value of less than 0.05 was considered statistically significant. Depending on whether the data followed a normal distribution, both parametric and non-parametric tests were employed for analysis. Differences in mean scores based on sociodemographic and clinical variables were assessed using descriptive statistics, chi-square analysis, one-way analysis of variance, and multivariate linear regression analysis. Additionally, multivariate linear regression analysis was performed to identify factors influencing perceptions of AI-supported healthcare services among surgical patients and caregivers.

ETHICAL CONSIDERATIONS

Prior to conducting the research, the necessary permissions were obtained from the tertiary hospital where the research was conducted. Ethical approval was granted by the Dokuz Eylül University's Non-Interventional Clinical Research Ethics Committee (date: July 17, 2024, no: 2024/25-06). All participants were informed about the study, and their written and

verbal informed consent was obtained before participation. The research was conducted in accordance with the Declaration of Helsinki principles.

RESULTS

This study examined the sociodemographic characteristics and opinions on AI-supported healthcare services among 450 participants (240 patients and 210 caregivers). The proportion of male patients was 57.5%, while 57.1% of the caregivers were female. While 66.2% of the patients were unemployed, 50.5% of caregivers were employed. Regarding education levels, 39.6% of patients had completed primary school, whereas 38.1% of caregivers were university graduates. The majority of both groups primarily used the internet for social media (66.6% of patients and 70.0% of caregivers). AI usage was reported by 22.0% of patients and 28.5% of caregivers. The primary reason for using health-related AI was to obtain information about surgical procedures, both before hospitalization (16.2% of patients, 12.8% of caregivers) and during hospitalization (12.5% of patients, 8.5% of caregivers) (Table 1).

Among patients, 62.9% expressed concern that AI-based robotic surgeons could operate without human intervention, while 52.9% were uneasy about robotic nurses assisting in surgeries. Additionally, 54.5% felt uncomfortable with AI managing their self-care needs, and 49.5% were uneasy about AI handling communication. Patients also reported discomfort with technical procedures performed by AI-based robots, including intravenous medication preparation (59.1%), medication administration (64.5%), and intravenous line insertion (67.5%). Furthermore, 17.0% of patients distrusted the reliability of AI nurses, and 49.5% believed that AI implementation would lead to higher healthcare costs. Additionally, 37.0% of patients remained undecided about the use of AI in Türkiye over the next 5 years.

Among caregivers, 63.8% were uncomfortable with robot surgeons performing surgery, 52.3% were uneasy with robot nurses assisting in surgeries, and 48.5% expressed discomfort with AI handling self-care needs. Only 4.7% were concerned about AI managing communication. Similar to patients, caregivers were reluctant to accept AI-based robots performing intravenous medication preparation (60.0%), medication administration (65.2%), and intravenous

TABLE 1: Characteristics of surgical patients and caregivers (n=450)

	Surgical patients (n=240) n (%)	Caregivers (n=210) n (%)	Test statistics p value
Gender			
Female	102 (45.5)	120 (57.14)	**X^2=9.60**
Male	138 (57.5)	90 (42.86)	**p=0.002**
Working status			
Working	81 (33.75)	104 (50.47)	**X^2=11.51**
Not working	159 (66.25)	106 (49.53)	**p=0.001**
Education			
Primary education	95 (39.58)	56 (26.66)	**X^2=9.90**
High School	80 (33.33)	74 (35.23)	**p=0.007**
University	65 (27.09)	80 (38.11)	
Internet usage time/day			
0-60 min	92 (38.33)	61 (29.04)	**X^2=12.47**
61-120 min	70 (29.16)	49 (23.33)	**p=0.01**
121-180 min	43 (17.91)	57 (27.14)	
181-240 min	23 (9.58)	22 (10.47)	
Over 240 min	12 (5.00)	21 (10.00)	
Purpose of internet use*			
Social media	160 (66.66)	147 (70.00)	
Playing games	43 (17.91)	43 (20.47)	
Shopping	48 (20.00)	71 (33.80)	
Obtaining information	128 (53.33)	126 (60.00)	
Other**	26 (10.83)	31 (14.76)	
Having knowledge about AI			
Yes	123 (51.25)	127 (60.47)	**X^2=3.86**
No	117 (48.75)	83 (39.53)	**p=0.04**
Use of AI in daily life			
Yes	53 (22.08)	60 (28.58)	
No	187 (77.92)	150 (71.42)	
Use of health-related AI in the hospital			
Yes	42 (17.50)	27 (12.85)	X^2=1.86
No	198 (82.50)	183 (87.15)	p=0.19
Reasons for using health-related AI in hospital*			
Nutrition	11 (4.58)	14 (6.66)	
Medicines	26 (10.83)	15 (7.14)	
Surgery	30 (12.50)	18 (8.57)	
Users of health-related AI prior to hospitalization			
Yes	55 (22.92)	47 (22.39)	X^2=0.18
No	185 (77.08)	163 (77.61)	p=0.91
Reasons to use health-related AI before hospitalization			
Nutrition	22 (9.16)	22 (10.47)	
Medicines	36 (15.00)	22 (10.47)	
Surgery	39 (16.25)	27 (12.85)	

*More than one answer was given; **Other: work, communication.
AI: Artificial intelligence; X^2: chi-square test

line insertion (67.6%). A total of 55.2% of caregivers expressed doubts regarding the reliability of robot nurses, and 42.8% believed that healthcare costs would increase. Additionally, 26.1% of caregivers remained undecided about AI use in Türkiye within the next 5 years (Table 2).

TABLE 2: Opinions of surgical patients and caregivers on the use of artificial intelligence-based robots in health services

	Surgical patients (n=240) n (%)	Caregivers (n=210) n (%)	Test statistics p value
1. I worry about AI-based robot surgeons operating without human intervention			
Yes	151 (62.91)	134 (63.80)	X^2=0.38
No	48 (20.00)	41 (19.52)	p=0.98
Undecided	41 (17.09)	35 (16.68)	
2. I am not worried about AI-based robot nurses assisting surgery in the operating room			
Yes	63 (26.25)	72 (34.28)	**X^2=6.05**
No	127 (52.91)	110 (52.38)	**p=0.04**
Undecided	50 (20.84)	28 (13.34)	
3. It does not bother me if AI-based robot nurses fulfill my self-care needs (dressing, bathing, eating, etc.).			
Yes	77 (32.08)	84 (40.00)	X^2=3.07
No	131 (54.58)	102 (48.57)	p=0.21
Undecided	32 (13.34)	24 (11.43)	
4. I do not feel uncomfortable when AI-based robot nurses communicate with me.			
Yes	85 (35.41)	74 (35.23)	X^2=2.78
No	119 (49.58)	115 (54.77)	p=0.24
Undecided	36 (15.01)	21 (10.00)	
5. I am not bothered by AI-based robot nurses preparing my intravenous medications.			
Yes	61 (25.41)	54 (25.71)	X^2=1.13
No	142 (59.16)	126 (60.00)	p=0.94
Undecided	37 (15.43)	30 (14.29)	
6. It does not bother me if AI-based robot nurses administer my medication.			
Yes	58 (24.16)	52 (24.76)	X^2=0.18
No	155 (64.58)	137 (65.24)	p=0.91
Undecided	27 (11.26)	21 (10.00)	
7. AI-based robot nurses taking my vital signs (blood pressure, pulse) does not disturb me.			
Yes	112 (46.66)	86 (40.95)	X^2=1.91
No	100 (41.68)	101 (48.09)	p=0.38
Undecided	28 (11.66)	23 (10.96)	
8. It wouldn't bother me if AI-based robot nurses had vascular access.			
Yes	40 (16.64)	41 (19.52)	X^2=1.29
No	162 (67.50)	142 (67.61)	p=0.55
Undecided	38 (15.83)	27 (12.87)	
9. I find AI-based robot nurses trustworthy.			
Yes	41 (17.08)	32 (15.23)	X^2=0.61
No	124 (51.66)	116 (55.23)	p=0.73
Undecided	75 (31.26)	62 (29.54)	
10. I think AI will increase my healthcare costs.			
Yes	119 (49.58)	90 (42.86)	X^2=2.74
No	46 (19.16)	52 (24.76)	p=0.25
Undecided	75 (31.26)	68 (32.38)	
11. I think AI will provide healthcare services in Türkiye in the next 5 years.			
Yes	64 (26.66)	58 (27.62)	**X^2=6.89**
No	87 (36.25)	97 (46.19)	**p=0.03**
Undecided	89 (37.09)	55 (26.19)	

AI: Artificial intelligence; X^2: chi-square test

No statistically significant difference was found between the positive (t=-0.03, p=0.42) and negative (t=-0.01, p=0.99) attitudes of patients and caregivers toward AI. Among patients, employment status, education level, AI awareness, and daily AI usage were associated with positive attitudes toward AI. Employed patients exhibited more positive attitudes than unemployed patients (p=0.006). Additionally, as education level increased, positive attitudes also increased (p<0.001). Patients who were aware of AI and used AI daily exhibited more positive attitudes (p<0.01). Similarly, among caregivers, a significant relationship was found between education level, AI awareness, daily AI usage, and positive attitudes (p<0.001). University graduates exhibited more positive attitudes than primary school graduates, and caregivers who used AI daily and were aware of AI demonstrated higher acceptance of AI (p<0.01) (Table 3).

Regression analysis indicated that patients' positive attitudes toward AI, negative attitudes, and education level accounted for 18% of their perceptions of AI-supported healthcare services. Among these factors, positive attitudes had the strongest influence. In contrast, for caregivers, positive attitudes, negative attitudes, and gender collectively explained 25% of their perceptions of AI-supported healthcare services. Notably, gender differences were statistically significant, with male caregivers exhibiting a greater tendency to accept AI (Table 4).

DISCUSSION

This study evaluated the attitudes of surgical patients and caregivers toward AI-supported healthcare services. The findings indicated that 62.9% of patients were apprehensive about AI-based robotic surgeons performing surgeries independently, while 52.9% expressed similar concerns regarding robotic nurses assisting in surgeries. While previous literature has documented concerns about robotic surgeons, no studies have specifically examined apprehensions re-

TABLE 3: Attitudes of surgical patients and caregivers towards AI(n=450)

	Surgical Patients (n=240)		Caregivers (n=210)	
	Positive attitudes $\bar{X}$±SD	Negative attitudes $\bar{X}$±SD	Positive attitudes $\bar{X}$±SD	Negative attitudes $\bar{X}$±SD
Gender				
Female	33.16±12.02	23.35±7.15	34.03±13.49	23.09±8.28
Male	34.54±12.27	23.27±8.29	36.18±14.62	23.60±8.21
Test statistics p value	t=-0.86 p=0.38	t=0.07, p=0.93	t=-1.10, p=0.27	t=-0.43, p=0.66
Employment status				
Employee	37.09±12.73	23.36±7.63	35.75±13.41	24.18±7.95
Not working	32.35±11.57	23.27±7.92	34.17±14.56	22.43±8.46
Test statistics p value	**t=2.89 p=0.006**	t=0.07 p=0.93	t=0.81 p=0.41	t=0.41 p=0.12
Education				
Primary education	30.29±11.19	22.50±7.96	27.64±12.99	20.62±8.86
High school	32.58±12.02	22.65±7.91	36.77±14.01	24.17±7.98
University	41.00±10.81	25.31±7.19	38.40±12.88	24.35±7.70
Test statistics p value	**F=2.94 p<0.001**	F=2.94 p=0.05	**F=11.79 p<0.001**	**F=4.01 p=0.02**
Knowledge about AI				
Yes	37.01±12.44	24.12±7.06	37.69±13.39	24.06±7.73
No	30.74±11.02	22.44±8.47	30.77±13.93	22.16±8.88
Test statistics p value	**t=-4.12 p<0.01**	t=-1.65 p=0.10	**t=-3.57 p<0.001**	t=-1.62 p=0.11
Use of AI in daily life				
Yes	40.54±9.84	26.28±5.62	41.73±11.77	25.90±7.69
No	32.09±12.12	22.45±8.14	32.24±13.92	22.25±8.24
Test statistics p value	**t=-4.65 p<0.01**	**t=-3.20 p<0.01**	**t=-4.65 p<0.01**	**t=-2.93 p=0.03**

SD: Standard deviation; AI: Artificial intelligence; t: t-test; F: Analysis of variance

TABLE 4: Examination of the factors affecting the opinions of surgical patients and caregivers about artificial intelligence-supported healthcare services

	Surgical patients				95.0% Confidence interval for B		Caregivers				95.0% Confidence interval for B	
	B	SE	β	t value	p value	Lower bound	Upper bound	B	SE	β	t value	p value	Lower bound	Upper bound
Constant	10.61	1.57		6.7	**<0.001**	7.52	13.72	8.005	1.73		4.61	**<0.001**	4.58	11.42
Sex	0.34	0.612	0.03	0.55	0.57	-0.86	1.54	2.28	0.67	0.21	3.40	**0.001**	0.96	3.61
Education level	1.69	0.73	0.14	2.31	**0.02**	0.25	3.14	0.20	0.72	0.01	0.28	0.779	-1.22	1.63
Use in daily life	1.30	0.76	0.10	1.70	0.090	-0.20	2.81	-0.59	0.80	-0.05	-0.73	0.46	-2.18	1.00
Positive attitudes	0.10	0.02	0.24	3.75	**p<0.001**	0.04	0.15	0.15	0.02	0.40	6.19	**<0.001**	0.10	0.20
Negative attitudes	0.08	0.04	0.12	2.08	**0.03**	0.005	0.16	0.09	0.04	0.14	2.28	**0.02**	0.01	0.17
R	**0.42**							**0.50**						
R^2	**0.18**							**0.25**						
F	**10.45**							**13.59**						
p	**<0.001**							**<0.001**						
DW (1.5-2.5)	**1.23**							**1.80**						

R: Correlation coefficient, R^2: Coefficient of determination, F: F-test, DW: Durbin-Watson statistic

garding robotic nurses. Palmisciano et al. emphasized the importance of human intervention in surgical procedures, particularly in neurosurgery patients.[9] Similarly, another study highlighted concerns regarding the immaturity of AI technology and the lack of trust in AI-driven surgical processes executed without human intervention.[21] These findings suggest that both patients and caregivers remain reluctant to accept AI's complete replacement of human involvement in surgical processes.

The study further revealed that both patients and caregivers were uncomfortable with AI-based robots providing care. Many patients expressed unease about AI managing their care needs, with caregivers sharing similar concerns. Discomfort also extended to AI-facilitated communication. Additionally, both groups reported unease regarding AI-based robots performing professional tasks such as intravenous medication preparation, medication administration, and intravenous line insertion. AI-based nurses were also perceived as unreliable. These concerns highlight the fact that nursing extends beyond technical skills, encompassing fundamental elements such as human interaction and direct patient engagement. While no comparable studies were identified in the literature, previous research has suggested that the absence of human interaction in AI-mediated healthcare can provoke patient anxiety.[6,7,22] Another study found that although patients recognize the potential of AI to enhance care, they remain concerned about safety and oversight in AI-driven healthcare.[23] These findings emphasize the critical role of human interaction in nursing. Within surgical inpatient clinics, where patients experience high levels of stress, human interaction is indispensable. Surgical nurses not only meet patients' physical needs but also provide emotional support before, during, and after surgery. The presence of nurses during these critical periods-offering eye contact, empathetic communication, and individual attention-fosters a sense of security and enhances the overall quality of care. While AI integration offers potential benefits to healthcare, the irreplaceable nature of human-to-human contact must be acknowledged.

The study found no significant differences between the positive and negative attitudes of patients and caregivers toward AI. However, a positive association

was identified between education level, AI awareness, daily usage, and employment status with more favorable attitudes toward AI. These findings align with previous literature, which frequently reports that individuals familiar with AI tend to hold more positive perceptions of the technology.[2,24] Demographic characteristics significantly impact attitudes toward AI. For instance, Pinto Dos Santos et al. found that men and technology enthusiasts demonstrated greater trust in AI's benefits and exhibited lower levels of apprehension.[8] Similarly, in the present study, employed individuals were more likely to express positive attitudes toward AI, possibly due to their younger age and greater exposure to technology. Previous research has also indicated that older patients, women, individuals with lower education levels, and those with limited technological exposure tend to approach AI in healthcare with greater caution.[16]

Regression analyses revealed that 18% of patients' perspectives on AI-supported healthcare services were explained by positive attitudes, while 25% of caregivers' perspectives were influenced by positive attitudes, negative attitudes, and gender. Male caregivers demonstrated significantly more positive attitudes toward AI than female caregivers. These findings are consistent with Yakar's study, which suggested that educated and technologically proficient individuals exhibit greater trust in AI.[24] Although they use AI in their daily lives, their views on AI-supported healthcare services have been only slightly influenced by this study.

Contrary to our findings, an online survey conducted in Türkiye reported that 61% of participants trusted AI and robotic technologies in hospital settings, while 64.1% expressed confidence in AI's role in disease diagnosis and laboratory testing.[25] The discrepancy between these findings and the present study may stem from differences in data collection methods. While Esin's study utilized an online survey, the present study employed face-to-face data collection in a hospital setting, which may have significantly influenced participants' perceptions.[25] Despite AI's increasing integration into daily life, skepticism persists regarding the role of AI-based robots in healthcare. This underscores the enduring importance of human interaction in medical settings. Similar to previous studies, our findings suggest that positive attitudes toward AI increase with higher education levels and greater familiarity with technology. Consequently, targeted educational and awareness programs may facilitate broader acceptance and more effective integration of AI into healthcare services.

LIMITATIONS

This study has certain limitations. First, given the self-reported nature of the data, participants may have exhibited more positive or negative attitudes than they actually hold. Second, since AI-based healthcare robots are not yet widely implemented in Türkiye, participants' reactions may not fully reflect actual responses in real-world applications. These factors should be considered when interpreting the study's findings.

CONCLUSION

This study contributes to understanding the perspectives of hospitalized patients and caregivers regarding AI-based healthcare services. Patients' attitudes toward AI and education level accounted for 18% of their willingness to use AI-supported healthcare services, while caregivers' attitudes toward AI and female gender accounted for 25%. Despite using AI in daily life, patients and caregivers remain hesitant about its role in healthcare services, particularly in nursing. This finding is significant, as it highlights attitudes toward AI integration into nursing practices, an area that has received limited attention in previous studies. Although prior research has examined AI in healthcare, few studies have addressed its impact on nursing and patient-caregiver interactions. The results of this study reveal a mix of optimism and skepticism regarding AI in healthcare services, suggesting that patients' and caregivers' needs and expectations must be prioritized when integrating AI technologies. These findings emphasize that AI should be designed and implemented to enhance-not replace-the human dimensions of healthcare. In conclusion, this study offers valuable insights into patients' and caregivers' perceptions of AI in healthcare and raises important questions for future research. Further studies should explore the role and limitations of AI-based health-

care services to ensure its effective and ethical integration into clinical practice.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Eda Ayten Kankaya;* ***Design:*** *Eda Ayten Kankaya, Nazife Gamze Özer Özlü;* ***Control/Supervision:*** *Eda Ayten Kankaya, Nazife Gamze Özer Özlü;* ***Data Collection and/or Processing:*** *Eda Ayten Kankaya, Nazife Gamze Özer Özlü;* ***Analysis and/or Interpretation:*** *Eda Ayten Kankaya;* ***Literature Review:*** *Eda Ayten Kankaya;* ***Writing the Article:*** *Eda Ayten Kankaya, Nazife Gamze Özer Özlü;* ***Critical Review:*** *Eda Ayten Kankaya;* ***References and Fundings:*** *Eda Ayten Kankaya, Nazife Gamze Özer Özlü;* ***Materials****: Eda Ayten Kankaya, Nazife Gamze Özer Özlü.*

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