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IS ARTIFICIAL INTELLIGENCE A MENACE OR AN ASSISTANCE IN NURSING? NURSES' PERSPECTIVES AND EXPERIENCES: A QUALITATIVE STUDY

YAPAY ZEKÂ HEMŞİRELİKTE BİR TEHDİT Mİ YOKSA YARDIMCI MI? HEMŞİRELERİN BAKIŞ AÇILARI VE DENEYİMLERİ: NİTEL BİR ÇALIŞMA

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ABSTRACT

Objective: This study aimed to explore nurses' perspectives and experiences regarding the use of artificial intelligence (AI) in clinical settings, with particular attention to its relevance in technology-intensive areas such as surgical nursing.

Method: This qualitative study was conducted using a phenomenological design. Data were collected between November 2024 and March 2025 through semi-structured interviews with 13 nurses working in Healthcare Information and Management Systems Society (HIMSS) Level 6 and 7 hospitals in Türkiye. Most participants were employed in surgical units, including operating rooms and intensive care settings. Interviews were audio-recorded, transcribed verbatim, and analyzed using thematic analysis. Descriptive statistics were used to summarize participant characteristics. The study was reported in accordance with the COREQ checklist.

Results: Four main themes emerged: use of AI, benefits of AI, challenges of AI, and recommendations. Nurses reported using AI in clinical practice, academic work, and daily life, particularly for literature review, translation, clinical decision support, and patient monitoring. In surgical and high-risk clinical environments, AI-supported systems such as real-time monitoring, early warning mechanisms, and digital documentation were perceived to enhance patient safety and support timely interventions. AI applications were also found to reduce workload and improve time management. However, participants reported important challenges, including concerns about data privacy and security, ethical issues, and the potential negative impact on critical thinking and the human aspect of care.

Conclusion: The findings reveal that the experiences and perspectives of nurses working in HIMSS Level 6 and 7 hospitals regarding artificial intelligence are multidimensional. These results point to the need to support nurses in digital literacy, ethical reasoning, and system integration. The conscious, safe, and humane use of artificial intelligence is particularly critical in surgical and advanced technology-intensive clinical settings. Nevertheless, ethical concerns and structural limitations remain. Strengthening education and infrastructure is essential to ensure the safe and effective use of AI in nursing.

Key Words: Artificial Intelligence, Experiences, Nursing, Perspectives, Qualitative Research

ÖZ

Amaç: Bu çalışmanın amacı, hemşirelerin yapay zekânın (YZ) klinik ortamlarda kullanımına ilişkin bakış açılarını ve deneyimlerini incelemek ve özellikle cerrahi hemşireliği gibi teknoloji yoğun alanlardaki önemini ortaya koymaktır.

Yöntem: Bu çalışma fenomenolojik desen kullanılarak yürütülen nitel bir araştırmadır. Veriler, Kasım 2024-Mart 2025 tarihleri arasında Türkiye'de Sağlık Bilgi ve Yönetim Sistemleri Derneği (HIMSS) Seviye 6 ve 7 hastanelerinde çalışan 13 hemşire ile yarı yapılandırılmış görüşmeler yoluyla toplandı. Katılımcıların büyük çoğunluğu ameliyathane ve yoğun bakım gibi cerrahi birimlerde görev yapmaktadır. Görüşmeler ses kaydı alınarak yazıya döküldü ve veriler tematik analiz yöntemiyle incelendi. Katılımcı özellikleri tanımlayıcı istatistiklerle özetlendi. Çalışma COREQ kontrol listesine uygun olarak raporlandı.

Bulgular: Analiz sonucunda dört ana tema belirlendi: YZ'nin kullanımı, YZ'nin faydaları, YZ'nin zorlukları ve öneriler. Hemşireler YZ'yi klinik uygulamalarda, akademik çalışmalarda ve günlük yaşamda; özellikle literatür tarama, çeviri, klinik karar desteği ve hasta izlem süreçlerinde kullandıklarını ifade etti. Özellikle cerrahi ve yüksek riskli klinik ortamlarda YZ destekli gerçek zamanlı izlem, erken uyarı sistemleri ve dijital kayıt uygulamalarının hasta güvenliğini artırdığı ve zamanında müdahaleyi desteklediği belirtildi. YZ uygulamalarının iş yükünü azalttığı ve zaman yönetimini iyileştirdiği de vurgulandı. Bununla birlikte veri gizliliği ve güvenliği, etik sorunlar ve bakımın insani boyutuna olası etkiler önemli zorluklar olarak dile getirildi.

Sonuç: Bulgular, SBYST Seviye 6 ve 7 hastanelerinde çalışan hemşirelerin YZ'ye ilişkin deneyim ve bakış açılarının çok boyutlu olduğunu ortaya koydu. Bu sonuçlar, hemşirelerin dijital okuryazarlık, etik akıl yürütme ve sistem entegrasyonu konularında desteklenmesinin gerekliliğine işaret etmektedir. Özellikle cerrahi ve ileri teknoloji gerektiren klinik alanlarda yapay zekânın bilinçli, güvenli ve insancıl biçimde kullanımı kritik önem taşımaktadır. Ancak etik ve yapısal sorunlar devam etmektedir. YZ'nin güvenli ve etkili kullanımı için eğitim ve altyapının güçlendirilmesi gereklidir.

Anahtar Kelimeler: Yapay Zekâ, Deneyimler, Hemşirelik, Algılar, Nitel Araştırma

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INTRODUCTION

Artificial intelligence (AI), first defined by John McCarthy in 1955 [1], refers to algorithms that learn from data to perform automated tasks without explicit human programming [2]. It encompasses advanced cognitive abilities such as reasoning, interpretation, generalization, and learning from experience [3]. In healthcare, AI technologies are increasingly adopted in clinical settings worldwide [4], offering faster, more efficient, and cost-effective solutions through data analysis and learning [5].

The rapid advancement of AI holds great potential to transform healthcare and has become a focus of attention for its versatile capabilities. In nursing, AI and robot technologies represent a new and increasingly indispensable development [5]. As frontline care providers, nurses can benefit significantly from AI integration [6,7], with applications ranging from clinical care to administrative tasks. While debates continue how AI may reshape the profession, engineers have developed systems capable of detecting and responding to emotions [6]. Although AI-supported robots cannot yet replace core nursing skills, they are already used in hospitals, homes, and workplaces for patient monitoring, basic care, medication management, and logistical support [6,8]. AI-enabled devices and sensors allow continuous monitoring and real-time alerts, facilitating early diagnosis and interventions to improve outcomes [9]. Similarly, AI-powered chatbots and virtual assistants provide education, answer questions, and enhance patient engagement and health literacy [10]. Other tools, such as medication reminders and automated documentation, reduce workload and free nurses' time for direct care [7]. Overall, AI applications span direct patient care, organizational support, and risk prediction or prevention [7,10]. As with other health technologies, their effective adoption depends partly on nurses' positive attitudes toward AI [11]. However, these positive developments also bring some concerns.

While AI may improve care quality and efficiency, it also carries risks of ethical violations [3]. The literature presents differing views on AI's ethical and legal dimensions, advantages, and disadvantages [4,12], underscoring the need to explore whether AI will replace nurses and how it will influence practice. AI raises concerns in nursing about the reduction of professional roles, the erosion of autonomy, and the weakening of the human aspect of care. Nurses note that transferring emotional empathy and ethical responsibilities to technology could negatively impact the quality of care [12,13]. Furthermore, ethical uncertainties such as data privacy violations, patient confidentiality breaches, algorithmic biases, and responsibility in AI-based decision-making processes are among the main threats highlighted in the existing literature [14-16]. Furthermore, structural and organizational challenges to AI integration are also significant problems faced by nurses. The literature emphasizes that nurses have limited technological knowledge, low AI literacy levels, increased workloads, and a lack of training and institutional support, all of which complicate this process [7,8,17]. These difficulties prevent nurses from embracing technology and effectively integrating it into clinical care processes. Therefore, while artificial intelligence offers significant opportunities for nursing, it also poses new ethical**,** professional, and emotional challenges**.** This situation necessitates reevaluating the balance between human-centered care, a core value of nursing, and technological efficiency [18]. Although studies primarily focus on nursing students' attitudes and knowledge [19-21], research investigating the experiences of clinical nurses with AI is scarce, limited to a few qualitative studies in countries such as Jordan [22], and absent in Türkiye. Studies conducted in the Turkish context have primarily focused on nursing students' knowledge and attitudes [5,21]. However, nurses working in hospitals accredited at HIMSS (Healthcare Information and Management Systems Society) levels 6-7, which are part of the digital transformation process, interact directly with artificial intelligence systems. This situation highlights the importance of their experiences in understanding the actual effects of artificial intelligence applications in nursing. Therefore, the current study arose from the need to thoroughly examine the perceptions of clinical nurses in Türkiye regarding artificial intelligence, the difficulties they experience, and how they interpret this technology as both an opportunity and a threat [23,24]. This study was therefore conducted to address this gap by examining the views and experiences of nurses working in HIMSS-accredited hospitals in Türkiye. By doing so, it offers a unique local perspective on the role of nurses in digitalizing healthcare. It contributes to understanding both the opportunities and challenges of AI integration in clinical practice, thereby supporting the strategic digital transformation of nursing.

METHOD

Theoretical and Philosophical Foundations

This study was designed within an interpretivist paradigm to understand nurses' perspectives and experiences regarding the use of artificial intelligence. The interpretivist paradigm argues that reality is constructed through individuals' experiences, interpretations, and social contexts rather than being a single, objective structure. This approach allows for the examination of the worlds of meaning nurses develop in their interactions with artificial intelligence from a subjective perspective.

The methodological basis of the research is grounded in Heideggerian hermeneutic phenomenology. This approach aims not only to describe individuals' experiences but also to interpret the meaning they attach to their experiences. Therefore, the study thoroughly examined how nurses perceive artificial intelligence and how they interpret its effects on care processes and their professional identities.

In the interpretive phenomenological approach, the researcher is not an external observer of the process, but an integral part of it. Therefore, as a member of the nursing profession, the researcher was aware of the possible effects of their own professional experiences and biases on the research process and adopted a reflexive attitude during the data collection and analysis stages. Reflexivity is a fundamental principle in qualitative research that enables the researcher to consciously observe their own position and influence in the interpretation of data.

Furthermore, the conceptual framework of the study is built on theories that explain how nurses perceive technology and their adoption processes. In this context, the Technology Acceptance Model and the Diffusion of Innovations Theory served as the basis [25,26]. These two theories are frequently used to explain the processes by which healthcare professionals perceive, adopt, and integrate new technologies into clinical practice. Current health research examining the adoption of artificial intelligence and digital health technologies also draws on similar conceptual foundations [27].

Consequently, the theoretical and philosophical foundation of this study is a holistic structure that combines an interpretive phenomenological approach, a reflexive researcher position, and theories of technology adoption. This foundation aims to explain how nurses make sense of artificial intelligence and how they position this technology as both an opportunity and a professional threat.

Study Design and Partipicants

This study is a qualitative research conducted using a phenomenological design to examine the views and experiences of nurses regarding AI. The phenomenological design is an approach that aims to understand individuals' lived experiences and the perceptions underlying these experiences. The phenomenological approach, employed in studies related to an individual's subjective experience, aims to illuminate a phenomenon, such as an event, situation, experience, or concept, thereby facilitating the discovery and understanding of these experiences. This study employed a phenomenological design to explore how nurses working in HIMSS hospitals make sense of their experiences with a current topic, such as AI The study was reported following the COREQ checklist [28].

The study was conducted in HIMSS Level 6 and 7 hospitals across Türkiye between November 1, 2024, and March 16, 2025. These hospitals stand out for their digital infrastructure and are defined as institutions that heavily integrate AI technologies. HIMSS Level 6 hospitals integrate medical devices and information systems, enabling users to access health data via wearable devices and online services to support remote patient management [29]. HIMSS Level 7 hospitals further incorporate external data sources, automated alerts, and real-time outcome measurement tools to enhance patient engagement [30]. Criterion sampling was used as the purposeful sampling method in the study [31]. Inclusion criteria were: (1) currently working as a nurse in a HIMSS Level 6 or 7 hospital in Türkiye, and (2) voluntary participation. The sample size was determined based on data saturation. There is no definitive and accessible data on the total number of nurses in the HIMSS 6 and 7 level hospitals where the research was conducted. Therefore, the population size could not be determined precisely. Participants were selected voluntarily from among nurses working in these hospitals who met the specified inclusion criteria. Specific clinical units, years of experience, or educational level did not categorize participants. This situation was considered a limitation of the study, as it could affect the level of representation of different units or experience groups in the study findings. Codes and themes were continuously monitored through comparative analysis throughout the interviews, and participant recruitment was halted when no new information or themes emerged from new participants, and content began to repeat in subsequent interviews [31]. A total of 13 participants (10 female, three male) aged between 23 and 45 years took part in the study. Eight participants had postgraduate education, and none had previously participated in AI-related scientific events (Table 1).

Outcome Measures

Information Form: Developed by the researchers based on literature, this form included nine sociodemographic and AI-related knowledge questions [15,18,23,32,33].

Semi-structured Interview Form: Researchers, in line with the literature, prepared this form [21,22,33]. Some probing questions were prepared to help obtain more in-depth information regarding the questions included in the form. A pilot study was conducted with four participants to assess the functionality and comprehensibility of the questions; the pilot study data were not included in the analysis. The interview questions are presented in Table 2.

Data Collection

Data were collected through face-to-face or online interviews between November 17, 2024, and March 15, 2025. Participants were selected using a purposive sampling approach, based on predefined inclusion criteria aligned with the study objectives. Eligible participants were nurses with relevant professional experience related to the phenomenon under investigation. Recruitment was carried out through professional networks, social media platforms, and WhatsApp groups facilitated by institutional administrators in order to access information-rich cases. Participation was voluntary, and all participants were informed about the purpose, scope, and confidentiality of the study prior to providing written informed consent. In accordance with the interpretative phenomenological analysis (IPA) framework, the focus of sampling was on depth and richness of lived experiences rather than representativeness. The interviews lasted an average of 56 minutes (ranging from 48 to 64 minutes). With the participants' permission, audio or screen recordings of the interviews were made and transcribed by the researcher. All interviews were conducted by the first and second authors, who have postgraduate training (PhD) and prior experience in qualitative research and interviewing techniques. The transcriptions were completed by the second author and verified by the all authors to ensure accuracy. The data were analyzed manually without the use of computer-assisted qualitative data analysis software, following the interpretative phenomenological approach described by Smith and Osborn [34]. The data collection process was terminated when no new information was obtained and no repeated statements emerged in the interviews, indicating that data saturation had been reached.

Table 1. Socio-demographic characteristics of the participants

Nurse No	Age	Gender	Education Status	Working clinic	Professional Experience	Participation in scientific activities related to artificial intelligence	Type of Scientific Activity	Following/reading scientific publications related to artificial intelligence	Scientific publication tracking type
N1	40	Female	Postgraduate	Algology Unit	14 years	Yes	Statistical data analysis course	Yes	Article
N2	23	Male	Licence	Geriatrics	4 months	Yes	Congress	Yes	Article, social media
N3	42	Female	Postgraduate	Educational Nursing and R&D	19.5 years	Yes	Congress	Yes	Article
N4	31	Female	Postgraduate	Education Nursing	8 years	Yes	Congress, webinar	Yes	Articles, congress booklets
N5	24	Male	Licence	Paediatric ICU	9 months	No	-	No	-
N6	27	Female	Licence	Child Service	1.5 years	Yes	Master's degree course	Yes	Article
N7	23	Female	Licence	Internal medicine service	7 months	No	-	No	
N8	28	Female	Postgraduate	Operating theatre	6.5 years	No	-	Yes	Article
N9	29	Female	Postgraduate	Surgical ICU	5 years	No	-	Yes	Article
N10	30	Female	Postgraduate	Operating theatre	7 years	No	-	Yes	Article
N11	40	Female	Postgraduate	Internal Medicine ICU	16 years	No	-	No	-
N12	45	Male	Licence	Haemodialysis	19	No	-	Yes	Magazine
N13	29	Female	Postgraduate	Operating theatre	9 years	No	-	No	-

Table 2. Semi-structured interview form questions

Questions
When I think of artificial intelligence, I think of .....
Do you use artificial intelligence in your daily life?
• Which artificial intelligence programmes do you use?
• Why didn't you use it before?
Do you use artificial intelligence in the delivery of your nursing service?
• Which artificial intelligence programmes do you use?
• Why didn't you use it before?
How do you evaluate the effects of artificial intelligence on the nursing profession?
• What are the advantages?
• What are the disadvantages?
• What is the effect on workload?
How do you think AI can best be integrated into nursing education or practice settings?
How do you think artificial intelligence technologies affect the future of the nursing profession? Explain your thoughts on this subject.
• Is he threatening you?
• Does it support it
• Do they have opportunities?
Will robot nurses created with artificial intelligence replace nurses in the future?

Research Team and Reflexivity

The research team consisted of three female academics with PhDs in surgical nursing and extensive experience in qualitative research. None of the researchers had prior professional or personal relationships with the participants. The researchers had limited prior experience with AI technologies, which heightened their awareness of potential biases and reinforced their commitment to maintaining neutrality during data collection and analysis. Reflexive notes were kept throughout the study to critically examine how researchers' perspectives and assumptions might influence the research process, and regular team discussions were held to mitigate such influences.

Rigor

Rigor was ensured through credibility, dependability, confirmability, and transferability [35]. Specifically, data collection conducted by two researchers enhanced credibility experienced in qualitative methods, researcher triangulation during coding, prolonged engagement, and peer debriefing. To ensure researcher triangulation during the coding process, both researchers coded the data independently and then held consensus meetings on the themes to establish common themes. The findings were shared with all participants, and the feedback received was incorporated into the analysis process to perform member checking. Dependability was ensured by systematically documenting the research process, including interview guides, coding schemes, and decision logs, thus creating an audit trail. Confirmability was maintained through reflexive journals and independent coding to minimize bias. Transferability was supported by detailed descriptions of the study context, setting, and participants, enabling readers to assess applicability to other contexts.

Ethical Approval

Ethical approval was obtained from the Gazi University Ethics Committee (date: 28.10.2024, decision number: E.1077704). Written informed consent, including permission for audio/video recording, was secured from all participants. The study complied with the Declaration of Helsinki, and participants' confidentiality was maintained through anonymization. AI tools were used solely for language editing: Transcriptor AI were used only for the initial transcription of interview recordings. All transcripts were manually verified by the researchers, and AI was not used in data analysis, interpretation, or reporting. ChatGPT (OpenAI) for alternative phrasing, DeepL, and Grammarly for grammar correction and fluency. No AI was involved in content creation, data analysis, literature review, method development, or interpretation of results.

Statistical Analysis

In this study, the four-stage phenomenological research analysis approach proposed by Smith and Osborn (2003) was used [34]. These stages are: (1) transcribing the interview recordings, (2) identifying themes, (3) organizing codes and themes, and (4) interpretation. Qualitative data were assessed utilizing the 'thematic analysis' methodology. The interview recordings were anonymized, and initial verbatim transcripts were generated using the Transcriptor AI program. All transcripts were then independently reviewed, corrected, and verified by two researchers to ensure accuracy, completeness, and the preservation of meaning. In the first stage of analysis, the researchers read the interview transcripts independently several times to gain a comprehensive understanding of the data. During these readings, noteworthy and meaningful statements were coded. In the second stage, the obtained codes were analyzed and grouped into possible categories. In the third stage, these categories were organized into themes and sub-themes, and the relationships between the themes were examined. In the fourth stage, quotes were selected from participants for each theme, the themes were defined, and the findings were reported. The coding and theme development process was conducted entirely manually. Three researchers analyzed the data independently through repeated readings. Two researchers conducted primary and secondary coding, and themes were developed collaboratively through consensus.

Member checking was conducted at the interpretive level. After preliminary themes were developed, a summary of the key findings and thematic interpretations was shared with participants to assess whether the results accurately reflected their experiences. Four participants provided feedback, which largely confirmed the credibility of the findings. Minor clarifications suggested by participants were incorporated into the final analysis, and no substantive changes to the overall thematic structure were required.

RESULTS

Data based on focus group interviews in the study revealed four main themes and eight sub-themes based on nurses' experiences with AI (Table 3).

Table 3. Context, theme and sub-themes

Theme	Sub-themes
Use of AI	Scientific and professional use
	Social and daily life use
Benefits of AI	-
Challenges of AI	Concerns
	Infrastructure/hardware problems
	Ethical problems
Recommendations	Integration of AI into education
	Strengthening the infrastructure
	Ensuring standardization

Theme 1: Use of AI

It was determined that nurses benefit from AI applications in many areas of daily life and professional practices, especially those working in digital hospitals who are more familiar with AI tools. This theme can be explained with the following two sub-themes:

Scientific and Professional Use: Nurses use AI for academic and professional purposes, including accessing and summarizing scientific literature, translating publications, preparing presentations, supporting clinical decision-making, and improving patient care.

... "I had difficulty understanding and interpreting the calculation of data tables in statistics. Now I upload my table, and when I ask if you can analyze this table, he quickly straightforwardly interprets the

process. There are places that I do not understand. When I take that section and say that I do not understand what you mean here, it continues by teaching me the details. When I did not understand, he sent me a source, saying I could watch the video here...." (N4)

"...Recently, I have been using it in my academic processes, preparing presentations or research I will do..." (N11)

"...There are AI programs that warn the nurse, especially about medication; this drug may be allergenic in this patient, and it warns that it may cause an allergic reaction in the patient..." (N5)

“Maintenance plans are made through the computer system. Thanks to technology, we can now do what I need to do and follow up for maintenance with a single click... " (N9)

“...I use it to look for animated videos or cartoons when opening an IV in pediatric patients" (N6)

"We have immobile patient groups where human power is not enough, for example, we have immobile patient groups; we try to activate them in bed, mobilization or perineum care; we can benefit from robots that can support the nurse in terms of physical strength " (N1)

Social and Daily Life Use: Nurses apply AI in communication, social interaction, and daily life tasks, such as using AI tools for messaging, scheduling, or personal organization, enhancing both personal and professional efficiency.

"For example, when I am going on a trip somewhere, I write down the details of the trip, for example, our house is here, I say I want to see every possible place as soon as possible, I say what kind of route we can take. I say, 'Can you create the closest route for me for places to visit and museums? We will rent a car; let us go accordingly,' and she immediately creates a route. " (N1)

Theme 2: Benefits of AI

Nurses reported that AI applications in scientific, social, or clinical practice reduce workload, save time, and enhance patient safety. In digital hospitals, AI supports patient monitoring, care planning, and quick access to information, allowing nurses to devote more time to patient care. Nurses emphasized that AI applications, such as warning systems and smart wristbands, improve patient safety by preventing errors and enabling continuous tracking of patient status.

“It calculates the patient's risk of falling and the risk of pressure injury… This is a great convenience and reduces the nurse's workload.” (N7)

“Access to fast data thanks to AI allows nurses to spend more time with patients and provide care more effectively.” (N6)

“I used to search a lot of literature myself, but now AI saves me time by summarizing the content for me.” (N3)

“Records are taken quickly in digital hospital processes, and abnormal values trigger immediate warnings on the screen.” (N10)

“To prevent the loss of pathology samples, we can track this through the system set up by the hospital to transfer materials safely.” (N8)

“Smart wristbands provide comfort and ensure patient safety. Everything is visible in the system, including patient location during operations.” (N13)

Theme 3: Challenges of AI

It was determined that nurses experienced various difficulties using AI applications. These difficulties were explained in three sub-themes: concerns, infrastructure/hardware problems, and ethical problems.

Concerns

Nurses have stated that the lack of training in AI applications creates uncertainty; while acknowledging the benefits, they have pointed out that reliance on ready-made information may weaken critical thinking and holistic care. They have also expressed concerns that easy access to data may raise ethical issues regarding patient safety and personal data protection, and that their concerns about robots relate to patient safety and autonomy.

"Since it is a database, patient information can be easily leaked with an external intervention. This may violate the law on the protection of personal data... (N2)

"Nurses also need to be able to make decisions without emotion in the clinic. AI can be very useful at this point, for example, because it will make decisions without emotion, but it can also be dangerous." (N3)

Infrastructure/hardware problems: Nurses stated that adequate infrastructures were not established for the use of AI applications, especially in terms of informatics and operating systems, and therefore, in addition to the storage and security of data, patient care processes were also disrupted.

"As technology advances, its handicaps increase. Viruses, hackers, etc., and internet crashes may slow down due to infrastructure problems. Updates may not be done effectively. I think the infrastructure should be developed carefully considering this issue."(N10)

Ethical problems: Nurses stated that they had concerns about the correct or incorrect use of AI applications, errors in the warnings of programmed systems, empathy in the management of the patient related to robots, and holistic care with environmental and cultural factors may be risky in terms of providing holistic care, and these situations may cause ethical problems by causing adverse effects on the patient. Ethical problems regarding patient safety, privacy, and data security were discussed.

"The kangaroo technique is essential in the newborn; how will a robot give it. When the robot cannot adjust the force applied by the human, this may pose a risk for the patient." (N6)

"We have many roles, one of them is advocacy. However, since it is programmed in AI applications, it may not be able to assume that advocacy role. It may undermine the profession's ethical values regarding privacy issues. (N1)

"Since it is a database, patient information can be leaked very easily with an external intervention. This may be against the law on the protection of personal data."(N12)

Theme 4: Recommendations

Nurses expressed their suggestions for the future of AI applications in the sub-themes of integration of AI into education, strengthening infrastructure, and ensuring standardization.

Integration of AI into education: Nurses have recommended that technologies used in digital hospitals be incorporated into the nursing curriculum; that simulations be used to prevent diseases and gain experience; and that gamification be used to increase the sustainability of education. They have also emphasized that integrating AI applications into patient education is important for continuity of care.

"Families can be trained. When an application is installed on the phone, it can make reminders for families of children with home care needs, such as you need to aspirate the child at this time, you need to feed the child at this time... (N6)

"One of our training sessions was prepared with a game mechanism to teach where the material was in the emergency cars, and this was done by using right and wrong scoring, congratulations, or a negative sign if it was bad. The participants had much fun and enjoyed it very much... (N4)

Strengthening the infrastructure: Nurses stated that hospitals and educational institutions should strengthen their technological infrastructure to use AI applications effectively.

"Infrastructure should be established very well, and very experienced personnel should be employed in this field" (N13)

"Since it has only recently entered our country, we may not have sufficient infrastructure. Due to infrastructure problems, notifications may be delayed in the systems, and errors may occur..." (N12)

Ensuring standardization: Nurses have emphasized the need to balance human resources and educational requirements for the effective use of AI applications in healthcare and the standardization of technology literacy. They have also recommended conducting scientific research on the effects and development of AI in nursing education and practice.

"People who graduate from universities do not graduate with the same qualifications; they have not even seen patients with the same potential and profile, so it would be useful to integrate them with AI applications in the laboratory part of universities and to ensure standardization... (N1)

"The system used in each hospital is different; the system we use in the ward differs from that used in intensive care units. When I first came here, I had a hard time learning the system because we do not see anything like this at the university" (N7)

DISCUSSION

The use of AI technologies, resulting from the digital age in providing health services is almost a revolution. It is important to ensure the adaptation of nurses, who are indispensable health system members and at the forefront among the professions affected by digital change, to AI Technologies [18,24]. This study reveals that nurses in digital hospitals face significant challenges while utilizing AI technologies; the findings point to the need for integration into nursing education, strengthening technical infrastructure, and ensuring standardization.

In the study, most nurses reported using AI applications such as ChatGPT, Copilot, and DeepL mainly for scientific purposes in postgraduate education, highlighting their convenience in literature review, translation, presentation preparation, and statistical analyses. Maj et al. [33] stated that AI summarises articles and presents concepts by simplifying outlines, while Tseng et al. [36] found that nursing students in Taiwan used ChatGPT and Copilot in "Writing Case Reports" and "Writing Seminars" courses. Similarly, Jallad et al. [32] reported that students in Palestine integrated ChatGPT into mobile learning. Nurses in digital hospitals also employed AI from decision support systems to electronic records and robots in critical units, yet their awareness of autonomy in AI-driven decision-making remained limited. Wang et al. [37] found that in China, 57% of healthcare professionals had little knowledge of AI and 13.4% had none. Zhou et al. [38] reported that 28.6% of AI use in oncology nursing was for risk prediction, Tarsuslu et al. [39] identified AI as a digital leadership tool, and Naureen et al. [19] found that 59.9% of nursing students in Pakistan had heard of AI, while 38.3% had never encountered it. Consistent with these, our findings indicate that AI use depends on institutional systems, but training remains insufficient. Almagharbeh et al. [22] also emphasized limited training and competence in AI, suggesting the need to enhance AI literacy in nursing. Finally, our study showed that AI technologies such as early warning systems, patient monitoring, and decision support reduced errors, improved care quality, and decreased documentation workload, aligning with a Jordanian study where AI shortened patient data entry, reporting, and follow-up times.

It has been reported that AI enables nurses to spend more time on direct patient care and facilitates workflow, particularly in critical units [22]. Alkan and Kırmacı [23] highlighted AI as a supportive tool that enhances nursing care and clinical decision-making. At the same time, Park et al. [18] showed its benefits in reducing administrative burden and optimizing workflows in intensive care. Similarly, Sumengen et al. [20] found improvements in decision-making, patient outcomes, and workflows, and Gökalp and Üzer [13] reported that AI and nurse robots reduce routine workload, allowing more focus on patient care. Consistent with these, our findings show that AI improves workload, time management, and care quality while creating new roles such as robot nurses and software engineers. The digital hospital context significantly shapes nurses' experiences with artificial intelligence, as care delivery in these settings is mediated by highly integrated digital systems such as electronic health records, clinical decision support tools, and robotic technologies. While this infrastructure enhances efficiency and standardization, it also embeds AI-driven recommendations into routine workflows, which may normalize automated decision-making and reduce opportunities for reflective practice. Continuous exposure to institutionally mandated AI systems may contribute to nurses' limited awareness of professional autonomy and increased reliance on algorithmic outputs. At the same time, the emphasis on performance, speed, and data-driven monitoring in digital hospitals intensifies ethical concerns related to data security, accountability, and the preservation of holistic, human-centered care. These findings highlight that nurses' AI experiences are not solely determined by the technology itself, but are strongly influenced by the organizational and technological environment of digital hospitals. However, challenges were noted regarding data security, patient privacy, and reduced holistic care. Due to inadequate infrastructure, disruptions or cyberattacks may increase risks. Gallagher [15] warned that AI misuse and algorithmic bias may create inequalities and that robots' lack of empathy could harm nurse-patient relationships. Similarly, Nashwan et al. [24] reported ethical issues, including privacy concerns and biases, Maj et al. [33] highlighted the lack of legal regulations and need for human verification, and Ibuki et al. [16] noted that robot roles in advocacy and care require nurse supervision. Our study confirms these concerns, stressing that AI should complement rather than replace human-centered care, with nurses trained and made more aware. However, nurses also expressed concern that AI's convenience may weaken critical thinking. The reported weakening of critical thinking among nurses may be explained by the task-oriented and convenience-driven use of AI technologies, particularly in environments with high workload and time pressure. When AI systems are primarily used to automate documentation, generate recommendations, or provide decision support, nurses may increasingly rely on algorithmic outputs rather than engaging in reflective clinical reasoning. This phenomenon aligns with the concept of automation bias, whereby users tend to trust and follow automated suggestions, even when critical evaluation is required. In settings where structured training on AI limitations and critical appraisal is lacking, such reliance may inadvertently reduce opportunities for analytical thinking and professional judgment. Similarly, nurses' low awareness of autonomy in AI-supported decision-making appears to be closely linked to limited AI literacy and organizational hierarchies. Although AI tools are increasingly embedded in institutional systems, nurses often use these technologies within predefined protocols, with minimal involvement in system design or decision authority. As a result, AI is perceived as an external directive rather than a collaborative tool, which may weaken nurses' sense of professional autonomy. The absence of clear guidelines delineating human versus algorithmic responsibility further obscures nurses' roles in AI-mediated care processes.

Ethical concerns regarding AI and robotic technologies may stem from nurses' strong commitment to holistic, human-centered care, which they perceive to be at risk when care processes become increasingly automated. Robots' lack of empathy, the opacity of algorithmic decision-making, and uncertainties surrounding accountability, data security, and patient privacy contribute to ethical unease. Moreover, the lack of comprehensive regulatory frameworks and ethical standards governing AI use in healthcare amplifies these concerns, leaving nurses uncertain about their professional and moral responsibilities. These findings suggest that ethical apprehensions are not a resistance to technology itself, but rather a response to insufficient safeguards, unclear governance, and perceived threats to professional values. Taken together, these findings highlight that the

challenges identified in this study are not solely technological in nature, but are deeply rooted in educational gaps, organizational structures, and the rapid pace of digital transformation. Addressing these issues requires not only technical training but also educational strategies that promote critical reflection, ethical reasoning, and autonomy in AI-supported nursing practice. Qaladi et al. [40] warned that overconfidence in AI may impair clinical reasoning and cause automation bias. In line with other studies, challenges remain in trust-building, maintaining professional roles, safeguarding privacy, and addressing the lack of emotional intimacy with robots, which raises ethical concerns about empathy and professional values [14,16,24]. Thus, regulatory frameworks are needed to address ethical issues and infrastructure gaps.

In our study, nurses stated that AI technologies will introduce new roles and responsibilities to the nursing profession, alter training and skill requirements, and therefore should be integrated into education. They emphasized the need for standardization across AI tools and the strengthening of infrastructures. In the literature, management support, lack of formal AI training, time constraints, and data security concerns are reported as barriers to AI integration in nursing [17]. To enhance nurses' knowledge of technological factors, it is recommended that teaching strategies be adapted and AI-related modules incorporated into nursing curricula [19,22,32]. Sumengen et al. [20] also stressed integrating AI education to prepare students for an evolving healthcare environment. However, limited evidence exists on how AI should be embedded in nursing education, creating uncertainty about how nurses will exercise autonomy in its use. Consistent with this, our study revealed nurses' concerns about AI technologies and robots. Therefore, when integrating AI into education, it is recommended that nurses' readiness levels be assessed, AI literacy programs be promoted through policy initiatives, and ethical guidelines for AI use in healthcare be established.

Limitations

This qualitative study reflects the opinions and experiences of a specific sample, and due to purposive and snowball sampling, the findings are not generalizable. Nurses' views on AI may also have been shaped by individual experience, organizational digital maturity, and technological infrastructure. In addition, the hospitals included in the study employ a large number of nurses; however, participants were selected only from those who met the inclusion criteria and agreed to participate voluntarily. No additional categorization was made according to clinical unit, level of seniority, or educational background. Although this approach increased the diversity of perspectives, it may have limited the representation of some clinical regions or professional experience groups. Therefore, this lack of categorization should be acknowledged as another limitation of the study. These limitations should be considered when interpreting the results.

CONCLUSION

This study demonstrates that nurses working in digitally advanced hospitals actively engage with artificial intelligence across clinical, scientific, and daily contexts, positioning AI as an emerging and integral component of nursing practice. Particularly in high-technology, patient-safety-critical areas such as surgical nursing, the findings reveal that AI reduces workload, improves time management, and enhances patient safety through decision-support systems and real-time monitoring tools. At the same time, nurses experience significant challenges, particularly related to ethical concerns, data security, infrastructure limitations, and the potential impact on critical thinking and the humanistic dimension of care.

By providing in-depth qualitative evidence from nurses directly interacting with AI in HIMSS Level 6 and 7 hospitals, this study contributes to the limited literature on real-world clinical experiences with AI in nursing, particularly within the Turkish context. The results highlight that successful AI integration in nursing is not solely a technological issue but also a professional and ethical transformation process. These findings underscore the importance of developing structured education, strengthening institutional infrastructure, and establishing standardized frameworks to ensure the safe, effective, and human-centered use of AI in nursing practice. It is particularly recommended that these efforts be prioritized in technologically intensive and patient safety-critical areas, such as surgical nursing.

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