Assessing the Healthcare Providers' Perception and Attitude toward the Integration of Artificial Intelligence Technology in Healthcare Settings

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Article

Assessing the Healthcare Providers' Perception and Attitude toward the Integration of Artificial Intelligence Technology in Healthcare Settings

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Abstract

Nowadays, the way that health organizations operate has changed dramatically because of technology. The recent rapid adoption of technology in healthcare has increased the need for healthcare providers and patients to use computer technology. So, the **aim** of the study is to assess healthcare providers' perception and attitude toward using artificial intelligence technology in healthcare settings at Ministry of health hospitals in Jeddah. **Design**: The quantitative, descriptive, cross-sectional and correlational design was implemented. The non-probability Convenience sampling technique was used to recruit the studied sample from the healthcare providers working in the two general hospitals. The **sample** size was equal to 366. Two electronic self-administered questionnaires were utilized to collect data about the perception of artificial intelligence and attitudes questionnaires of healthcare providers. **Results**: The findings demonstrated that most participants perceived AI as a valuable tool for improving healthcare efficiency, decision-making accuracy, and patient safety. High agreement was reported for AI's role in accelerating care processes, enhancing workflow efficiency, and supporting clinical judgment. Although perceptions were generally positive, most nurses demonstrated neutral attitudes toward AI applications. **Conclusion**: This finding concluded that the positive correlation between perception and attitude suggests that enhancing nurses' knowledge and practical engagement with AI may gradually shift attitudes from neutrality toward informed acceptance. This finding recommended that nurse leaders and educators should play a central role in shaping AI implementation strategies to ensure alignment with patient safety, ethical practice, and professional autonomy. Establishing clear policies and involving nurses in AI design and evaluation may further enhance trust and adoption.

Keywords: healthcare providers; perception; attitude; artificial intelligence (AI); healthcare

1. Introduction

The rapid progress in computing power, access to the internet, digitalization, and accumulated information has increased scholarly interest in artificial intelligence (AI) across multiple sectors. Healthcare providers in both the private and public sectors strive to leverage innovations to optimize the user experience, reduce costs, and improve the quality of care. Although healthcare systems are among the most expensive in the world, technology continues to contribute significantly to saving lives and enhancing the quality of life for millions of people [1]. In parallel, healthcare systems are facing increasing challenges related to workforce shortages, workload burden, and efficiency, particularly among frontline healthcare professionals such as nurses.

The effective integration of AI technologies, including machine learning (ML), deep learning, and natural language processing, is expected to transform healthcare services from conventional

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methods to a value-driven approach, prioritizing personalized care [2,3]. ML and AI technologies are increasingly used in healthcare organizations to evaluate, analyze, improve, and respond to the large amount of data that is now accessible. These technologies have the potential to support healthcare providers by enhancing clinical decision-making and optimizing workflows. However, AI also presents challenges, and the effects of AI on medical professionals, healthcare organizations, and governments remain uncertain, particularly regarding acceptance, trust, and readiness for use in clinical practice [4,5].

In recent years, the utilization of AI has increased dramatically with the launch of Vision 2030 in Saudi Arabia, which aims to make the country one of the most efficient in healthcare [6]. Healthcare services are changing due to developments in AI, as these technologies are well adapted to analyze data and detect patterns and insights that people could not independently discover [7]. As a result, healthcare organizations can use algorithms to support clinical decision-making and improve the quality of care and experiences they provide. Additionally, AI can rapidly and precisely detect insights using large datasets, leading to enhanced patient satisfaction and improved clinical, operational, and financial performance [8].

The COVID-19 pandemic further accelerated the adoption of AI and highlighted the need for early and effective digital health strategies. AI played a crucial role during different stages of the pandemic, including identifying viral strains, supporting containment measures, and encouraging public compliance [9] In addition, AI contributed to improving workflows, supporting operational tasks, and facilitating the work of healthcare providers, thereby enhancing the quality of care delivered to patients [10]. These developments emphasized the importance of understanding how healthcare providers perceive and interact with AI technologies.

Despite the increasing adoption of AI in healthcare, limited evidence exists regarding healthcare providers' perceptions and attitudes toward AI integration in clinical settings. In particular, there is a lack of studies examining the views of physicians and nurses working in governmental hospitals in Jeddah, Saudi Arabia. Understanding these perceptions and attitudes is essential, as they influence readiness to adopt AI technologies, acceptance of innovation, training needs, and the overall success of implementation. Therefore, this study aims to assess healthcare providers' perceptions and attitudes toward the integration of AI technology in two governmental hospitals in Jeddah, Saudi Arabia.

2. Materials and Methods

2.1. Research Design

This research utilized a quantitative descriptive cross-sectional design. This approach is widely used in healthcare research to obtain a snapshot of current perceptions and behaviors across a defined population at a specific point in time. Accordingly, this design was deemed appropriate to assess healthcare providers' perceptions and attitudes toward the integration of artificial intelligence within the study setting.

2.2. Research Setting

This study was conducted in two governmental hospitals under the Ministry of Health in Jeddah, Saudi Arabia. These hospitals were selected due to their advanced medical facilities, diverse clinical specialties, and heterogeneous healthcare workforce. In addition, both hospitals are non-profit institutions that serve the general public.

The first setting was East Jeddah Hospital, a governmental hospital with a capacity of 300 beds. It employs approximately 620 staff nurses and 430 physicians and is recognized as a trauma center offering a wide range of medical specialties. The hospital was established in 2016 and has received accreditation from the Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI).

The second setting was King Abdullah Medical Complex, which has a capacity of 500 beds and employs approximately 600 staff nurses and 178 physicians. The hospital was established in 2013

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under the Ministry of Health and provides elective medical and surgical services, supported by a state-of-the-art laboratory, trauma center, and outpatient clinics serving North Jeddah. The hospital has received accreditation from both the Joint Commission International (JCI) and the Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI).

2.3. Sampling and Sample Size

A convenience sampling method was used in this study. The target population consisted of all full-time physicians (n = 608) and staff nurses (n = 1,220) working in inpatient and outpatient departments across the two selected hospitals.

The required sample size was calculated using the Raosoft sample size calculator, assuming a 50% response distribution, a 95% confidence level, and a 3% margin of error. The minimum required sample size was 318 participants. To account for potential nonresponse or incomplete questionnaires, the sample size was increased by 10%, resulting in a final target sample of 366 participants.

Inclusion criteria included registered healthcare providers (physicians and nurses) who were able to read and understand either English or Arabic and had at least one year of work experience.

Exclusion criteria included healthcare providers with less than one year of work experience, as they may not yet be sufficiently familiar with the hospital system, medical equipment, and patient care processes.

2.4. Tools of Data Collection

Data were collected using electronic self-administered questionnaires. Two main tools were utilized.

The first questionnaire consisted of two parts. The first part addressed socio-demographic characteristics and was developed by the researcher to collect information regarding age, gender, nationality, marital status, job type, current position, educational qualification, years of experience, and department.

The second part, titled "Perception about Artificial Intelligence Questionnaire," was developed by [11]. It consisted of 37 items designed to assess healthcare providers' perceptions of artificial intelligence applications. Responses were measured using a three-point Likert scale (0 = disagree, 1 = neutral, 2 = agree). Item scores were summed and converted into a percentage score. Scores ≤ 40% indicated low perception, scores from 41% to 80% indicated moderate perception, and scores ≥ 81% indicated high perception.

The second questionnaire also consisted of two parts. The first part assessed attitudes toward the medical application of artificial intelligence using a tool developed by [12]. The researcher modified the instrument by converting some multiple-choice questions into a Likert-scale format and omitting items not relevant to the present study. This section included 11 items measuring healthcare providers' attitudes toward AI, perceived risks, and future directions of AI development in healthcare. Responses ranged from strongly disagree (1) to strongly agree (5).

The second part focused on "Areas of Artificial Intelligence Application in Healthcare Settings" and was developed by the researcher to identify participants' perspectives on the most beneficial AI applications in healthcare. This section included 20 items rated on a five-point Likert scale ranging from not beneficial at all (1) to extremely beneficial (5).

2.5. Pilot Study

A pilot study was conducted with 30 nurses, representing approximately 10% of the total sample, selected from East Jeddah Hospital. The purpose was to evaluate the simplicity, clarity, and completion time of the questionnaire. Based on pilot feedback, no modifications were necessary. Participants reported that the questionnaire was easy to read and understand, requiring approximately 12-15 min to complete. Participants involved in the pilot study were excluded from the final research sample.

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2.6. Reliability and Validity of the Tools

The questionnaire was reviewed by a panel of three experts in nursing administration with doctoral qualifications and expertise in research methods. The experts evaluated the instrument for content adequacy, clarity, accuracy, and simplicity. Their feedback was incorporated, and necessary revisions were made to the Arabic translation to ensure linguistic equivalence. The questionnaire's reliability was assessed based on internal consistency by measuring Cronbach's coefficients for each questionnaire. Cronbach alpha coefficients for the""Perception about artificial intelligence questionnaire" and " Questionnaire for attitudes toward medical application of artificial intelligence" were 0.940 and 0.758, respectively. This indicated that the questionnaires of the current were trustworthy.

2.7. Data Analysis

The Windows Statistical Package for Social Science (SPSS) SPSS ® -PC version 28 was used to analyze data. For all statistical analyses, the significance level was set at $P \leq 0.05$. analysis of data composed of descriptive as well as inferential analysis. Descriptive statistics were determined for the demographic data of the participants.

3. Results

This study involved 366 participants more than two third of them were female (66.9%), majority of them were Saudi (72.4%) and more than half were unmarried (52.2%). Majority of participants were nurses (71.0%) while (29.0%) were physician. More than two third of the participants (67.5%) holding the position of staff nurse. The most represented age group was >35-40 years (44.5%) and most of them (85.5%) holding a bachelor's degree. Participants work in different departments, but half of them works in the Surgical ward (27.3%) and medical ward (20.8%).

Table 1. Frequency and percentage of the Sociodemographic characteristics of healthcare providers (n=366).

Sociodemographic		**Frequency**	**Percentage**
Gender	Male	121	33.1
	Female	245	66.9
Nationality	Saudi	265	72.4
	Non-Saudi	101	27.6
Marital status	Married	175	47.8
	Not married	191	52.2
Job type	Physician	106	29.0
	Nurses	260	71.0
Position	Staff nurse	247	67.5
	Head nurse	7	1.9
	Supervisor	3	.8
	Director	4	1.1
	Resident	12	3.3
	Specialist	81	22.1
	Consultant	12	3.3
Age	21-25	64	17.5
	>25-30	40	10.9

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	>30-35	68	18.6
	>35-40	163	44.5
	More than 40 years	31	8.5
Educational qualification	Diploma degree	37	10.1
	Bachelor's degree	313	85.5
	Master's degree and above	16	4.4
Department	Critical care (adult, pediatric, neonate)	21	5.7
	Emergency unit	14	3.8
	Hemodialysis	15	4.1
	Isolation ward	9	2.5
	Maternity ward	30	8.2
	Medical ward	76	20.8
	Nursery	10	2.7
	Nursing education	13	3.6
	Operating room	8	2.2
	Outpatient department	33	9.0
	Pediatrics ward	22	6.0
	Surgical ward	100	27.3
	Other	15	4.1

Table 2 reveals that the perception score was 54.03±10.43. More than half of healthcare providers (52.2%) had moderate perception regarding AI, high (47.0%) and only (0.8%) demonstrated a low perception

Table 2. Perception score of utilization artificial intelligence questionnaire in healthcare setting (n=366).

Perception **Mean ± SD: 54.03±10.43**	**Frequency**	**Percent** **%**
Low	3	0.8
Moderate	191	52.2
High	172	47.0

Table 3 shows that the mean attitude score was 31.54 ± 6.43. Most of the participants (94.0%) had neutral attitude regarding using AI, while 4.9% had positive attitude and 1.1% had negative attitude regarding AI.

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Table 3. Describe frequency and percentage of attitude score toward medical application of artificial intelligence (n=366).

Attitude **Mean ± SD: 31.54±6.43**	**Frequency**	**Percent** **%**
Negative	4	1.1
Neutral	344	94.0
Positive	18	4.9

Table 4 presents a statistical analysis of how different sociodemographic factors relate to the perception levels (Low, Moderate, High) of healthcare providers toward AI applications as follow:

There is a statistically significant relationship between gender and AI perception with ($p = .001$). Males demonstrated a significantly more positive perception, with 60.3% had high perception. In contrast, only 40.4% of females registered a high perception, with a majority (58.8%) holding a moderate view. There is no statistically significant relationship between nationality and AI perception ($p = .542$). A statistically significant relationship exists between marital status and AI perception ($p = .027$). Married individuals held more positive views, with 54.3% having a high perception, compared to unmarried individuals, where 40.3% had a high perception.

The relationship between job type and perception is highly significant ($p < .001$). Physicians were overwhelmingly positive, with 73.6% registering a high perception. Conversely, Nurses were far more moderate in their views; only 36.2% had a high perception, while a majority of 62.7% were in the moderate category. Position within the healthcare hierarchy showed a highly significant correlation with AI perception ($p < .001$). Seniority and specialization were linked to more positive views, with supervisors and directors showing 100% high perception, and specialists at 87.7%. This is in stark contrast to staff nurses, who had the least positive outlook, with only 33.2% holding a high perception and 65.6% holding a moderate view.

Age demonstrated a highly significant with AI perception ($p < .001$). The youngest group of providers (21-25 years) was the most moderate, with 96.9% in this category and only 3.1% holding a high perception. Positive perception peaked among the >35-40 age group, where 75.5% had a high perception, before declining again for those over 40. A highly significant relationship was found between educational level and perception ($p < .001$). Positivity increased with higher education. Those with a Diploma degree were predominantly moderate (86.5%). The percentage with a high perception increased among those with a bachelor's degree (50.5%) and was highest for those with a master's degree or above (56.3%).

The length of professional experience had a highly significant, non-linear relationship with AI perception, mirroring the trend seen with age ($p < .001$). Those with the least experience (1 to 5 years) had the lowest positive perception, with only 23.1% in the high category. Perception peaked among mid-career professionals, such as those with >15-20 years of experience (72.6% high), before dropping sharply for those with more than 20 years of experience (10.5% high). The clinical department where a provider works showed a highly significant correlation with their perception ($p < .001$). the most positive views were found in the medical ward (77.6% high perception) and the emergency unit (71.4% high). in contrast, staff in nursing education and the operating room held unanimously moderate views (100%), while others, such as the paediatric ward (90.9% moderate), were also notably less positive.

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Table 4. Relationship between level of healthcare providers' perception about AI applications and their sociodemographic data (n=366).

Sociodemographic data		Perception score						p. value
		Low		Moderate		High		
		N	%	N	%	N	%	
Gender	Male	1	0.8%	47	38.8%	73	60.3%	**.001***
	Female	2	0.8%	144	58.8%	99	40.4%	
Nationality	Saudi	3	1.1%	139	52.5%	123	46.4%	.542
	Non-Saudi	0	0.0%	52	51.5%	49	48.5%	
Marital status	Married	1	0.6%	79	45.1%	95	54.3%	**.027***
	Not married	2	1.0%	112	58.6%	77	40.3%	
Job type	Physician	0	0.0%	28	26.4%	78	73.6%	**<.001***
	Nurses	3	1.2%	163	62.7%	94	36.2%	
Position	Staff nurse	3	1.2%	162	65.6%	82	33.2%	**<.001***
	Head nurse	0	0.0%	1	14.3%	6	85.7%	
	Supervisor	0	0.0%	0	0.0%	3	100.0%	
	Director	0	0.0%	0	0.0%	4	100.0%	
	Resident	0	0.0%	9	75.0%	3	25.0%	
	Specialist	0	0.0%	10	12.3%	71	87.7%	
	Consultant	0	0.0%	9	75.0%	3	25.0%	
Age	21-25	0	0.0%	62	96.9%	2	3.1%	**<.001***
	>25-30	0	0.0%	32	80.0%	8	20.0%	
	>30-35	0	0.0%	33	48.5%	35	51.5%	
	>35-40	3	1.8%	37	22.7%	123	75.5%	
	More than 40 years	0	0.0%	27	87.1%	4	12.9%	
Educational qualification	Diploma degree	0	0.0%	32	86.5%	5	13.5%	**<.001***
	Bachelor's degree	3	1.0%	152	48.6%	158	50.5%	
	Master's degree and above	0	0.0%	7	43.8%	9	56.3%	
Years of experience	1 to 5 years	0	0.0%	83	76.9%	25	23.1%	**<.001***
	>5 to 10 years	2	2.0%	34	33.7%	65	64.4%	
	>10- 15 years	1	1.9%	34	63.0%	19	35.2%	
	>15 - 20 years	0	0.0%	23	27.4%	61	72.6%	
	More than 20 years	0	0.0%	17	89.5%	2	10.5%	
Department	Critical Care Unit	0	0.0%	15	71.4%	6	28.6%	**<.001***
	Emergency unit	0	0.0%	4	28.6%	10	71.4%	
	Haemodialysis	0	0.0%	12	80.0%	3	20.0%	
	Isolation ward	0	0.0%	8	88.9%	1	11.1%	
	Maternity ward	0	0.0%	11	36.7%	19	63.3%	

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	Medical ward	0	0.0%	17	22.4%	59	77.6%	
	Nursery	0	0.0%	6	60.0%	4	40.0%	
	Nursing education	0	0.0%	13	100.0%	0	0.0%	
	Operating room	0	0.0%	8	100.0%	0	0.0%	
	Outpatient department	3	9.1%	20	60.6%	10	30.3%	
	Paediatrics ward	0	0.0%	20	90.9%	2	9.1%	
	Surgical ward	0	0.0%	45	45.0%	55	55.0%	
	Other	0	0.0%	12	80.0%	3	20.0%	

*: significant P**<.001.**

Table 5 shows the relationship between level of healthcare providers' attitude about AI applications and their sociodemographic data. There is no statistically significant relationship between gender and attitude toward AI (p = .280). Nationality shows no statistically significant relationship with attitude (p = .993). There is no statistically significant difference in attitude based on marital status (p = .256) and there is no statistically significant relationship between job type and attitude (p = .096). Position is a highly significant predictor of attitude (p < .001). A definitively positive attitude is concentrated in managerial roles. directors were unanimously positive (100%), followed by supervisors (66.7% positive) and head nurses (28.6% positive). in contrast, specialists, consultants, and those over 40 were 100% neutral, while staff nurses were also overwhelmingly neutral (94.7%).

A statistically significant relationship exists between age and attitude (p = .015). The most positive attitudes were found in the >30-35 age group (13.2% positive). The most uniformly neutral attitudes were seen in the oldest group (>40 years, 100% neutral) and the youngest group (21-25 years, 98.4% neutral). Educational level is a highly significant factor (p < .001). Interestingly, those with a master's degree or above were unanimously neutral (100%). the small group with positive attitudes was found almost exclusively among those with a bachelor's degree (5.4% positive), while diploma holders were also overwhelmingly neutral (97.3%). Experience level showed a highly significant, non-linear relationship with attitude (p < .001). The most definitively positive attitudes were found in the mid-career group with >10-15 years of experience (20.4% positive). The most and least experienced providers—those with more than 20 years and 1 to 5 years—were the most neutral (100% and 98.1% respectively).

The clinical department is a highly significant predictor of attitude (p < .001). The emergency unit stands out with a majority positive attitude (57.1%). The nursery also showed a strong positive leaning (40.0% positive). In contrast, many departments, including the medical ward, surgical ward, operating room, and nursing education, were 100% neutral. the few negative attitudes recorded were concentrated in the outpatient department (12.1% negative)

Table 5. Relationship between level of healthcare providers' attitude about AI applications and their sociodemographic data (n=366).

Sociodemographic data		Attitude score						p. value
		Negative		Neutral		Positive		
		N	%	N	%	N	%	
Gender	Male	1	0.8%	111	91.7%	9	7.4%	.280
	Female	3	1.2%	233	95.1%	9	3.7%	
Nationality	Saudi	3	1.1%	249	94.0%	13	4.9%	.993
	Non-Saudi	1	1.0%	95	94.1%	5	5.0%	

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Marital status	Married	3	1.7%	166	94.9%	6	3.4%	.256
	Not married	1	0.5%	178	93.2%	12	6.3%	
Job type	Physician	0	0.0%	104	98.1%	2	1.9%	.096
	Nurses	4	1.5%	240	92.3%	16	6.2%	
Position	Staff nurse	4	1.6%	234	94.7%	9	3.6%	**<.001***
	Head nurse	0	0.0%	5	71.4%	2	28.6%	
	Supervisor	0	0.0%	1	33.3%	2	66.7%	
	Director	0	0.0%	0	0.0%	4	100.0%	
	Resident	0	0.0%	11	91.7%	1	8.3%	
	Specialist	0	0.0%	81	100.0%	0	0.0%	
	Consultant	0	0.0%	12	100.0%	0	0.0%	
Age	21-25	0	0.0%	63	98.4%	1	1.6%	**.015***
	>25-30	0	0.0%	37	92.5%	3	7.5%	
	>30-35	2	2.9%	57	83.8%	9	13.2%	
	>35-40	2	1.2%	156	95.7%	5	3.1%	
	More than 40 years	0	0.0%	31	100.0%	0	0.0%	
Educational qualification	Diploma degree	0	0.0%	36	97.3%	1	2.7%	**<.001***
	Bachelor's degree	4	1.3%	292	93.3%	17	5.4%	
	Master's degree and above	0	0.0%	16	100.0%	0	0.0%	
Years of experience	1 to 5 years	0	0.0%	106	98.1%	2	1.9%	**<.001***
	>5 to 10 years	3	3.0%	95	94.1%	3	3.0%	
	>10- 15 years	1	1.9%	42	77.8%	11	20.4%	
	>15 - 20 years	0	0.0%	82	97.6%	2	2.4%	
	More than 20 years	0	0.0%	19	100.0%	0	0.0%	
Department	Critical care Units	0	0.0%	20	95.2%	1	4.8%	**<.001***
	Emergency unit	0	0.0%	6	42.9%	8	57.1%	
	Haemodialysis	0	0.0%	14	93.3%	1	6.7%	
	Isolation ward	0	0.0%	8	88.9%	1	11.1%	
	Maternity ward	0	0.0%	28	93.3%	2	6.7%	
	Medical ward	0	0.0%	76	100.0%	0	0.0%	
	Nursery	0	0.0%	6	60.0%	4	40.0%	
	Nursing education	0	0.0%	13	100.0%	0	0.0%	

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	Operating room	0	0.0%	8	100.0%	0	0.0%	
	Outpatient department	4	12.1%	28	84.8%	1	3.0%	
	Paediatrics ward	0	0.0%	22	100.0%	0	0.0%	
	Surgical ward	0	0.0%	100	100.0%	0	0.0%	
	Other	0	0.0%	15	100.0%	0	0.0%	

***: significant.**

4. Discussion

In recent years, the integration of artificial intelligence (AI) into the healthcare system in Saudi Arabia has accelerated, largely in line with the goals of Saudi Vision 2030, which emphasizes technological advancement and digital transformation. The current results demonstrated that more than half of the participants (52%) had a moderate level of perception, 47% had a high level, and less than 1% had a low level. Most participants perceived AI as a valuable tool for improving healthcare efficiency, decision-making accuracy, and patient safety. High agreement was reported for AI's role in accelerating care processes, enhancing workflow efficiency, and supporting clinical judgment. Similar findings have been reported among nurses in Saudi Arabia, where AI is increasingly recognized as an enabler of quality improvement and operational efficiency rather than a replacement for professional roles [13–15]. This agreement maybe attributed by that artificial intelligence has recently gained significant importance due to the health sector's inclination to utilize it across various departments, and it aims to offer essential information on its application.

Despite positive perceptions, nurses expressed substantial concerns related to patient safety, algorithmic errors, cybersecurity risks, and reduced human interaction. These concerns are well documented in Saudi-based nursing studies, which emphasize fears of overreliance on technology, diminished critical thinking, and unclear legal accountability when AI systems contribute to adverse outcomes [14,16]. Concerns regarding the potential negative impact of AI on the nurse–patient relationship underscores the importance of preserving human-centered care, a fundamental principle of nursing. Consistent with international nursing research, respondents acknowledged that AI lacks emotional intelligence and the capacity to provide empathetic, patient-centered communication [17,18]. These findings reinforce the need for ethical frameworks and nurse-led governance models to ensure AI complements, rather than compromises, nursing values.

Regarding participants' attitudes toward medical applications of artificial intelligence (AI), the current study revealed that only 4.9% of respondents had a positive attitude, while the vast majority (94%) had a neutral attitude and 1.1% had a negative attitude. Inconsistently, a study conducted in Eastern areas of Saudi Arabia, revealed a mildly positive overall attitude towards AI among nurses and students [15]. Additionally, These findings contrast with two previous studies: one in Bangladesh, which reported about 73% of healthcare workers holding positive attitudes [18]. Another in Egypt found approximately 68% of healthcare workers with positive attitudes regarding AI applications [19]. Furthermore, a recent study conducted in Iraq found that about 54% of their healthcare providers had a positive attitude toward AI adoption [20]. In Jordan, nurses demonstrated relatively strong positive attitudes toward AI, albeit influenced by training and anxiety factors [20]. Another study conducted in Pakistan revealed that most of their healthcare professionals were willing to embrace AI incorporation in the healthcare sector [21].

Consistent with prior regional and international research, participants in this study strongly endorsed the usefulness of AI in the medical field. This aligns with findings from a systematic review study, which reported that Saudi nurses widely acknowledge AI as a transformative tool capable of improving clinical workflow, diagnostic accuracy, and patient outcomes [14]. Another study in KSA

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revealed that approximately 70% of their participants agreed that AI has useful applications in the medical field [22]. A study in Pakistan demonstrated that respondents outlined several benefits that the integration of AI can offer to the healthcare system. It has the potential to decrease workload, conserve time and resources, and enhance the efficiency of healthcare professionals [21]. Although perceptions were generally positive, the majority of nurses demonstrated neutral attitudes toward AI applications. This neutrality likely reflects limited hands-on exposure, insufficient training, and uncertainty regarding accountability and role boundaries. Similar patterns have been reported in recent Saudi nursing studies, where neutral attitudes were associated with early-stage implementation and lack of structured AI education [15,23]. This fluctuating attitude is likely a result of the lack of AI tools within our healthcare environments, coupled with the restricted time available for healthcare professionals to investigate new developments associated with it.

Participants identified several AI application areas as particularly beneficial to nursing practice, including nursing care planning, predictive analytics, wearables and remote monitoring, and simulation-based education. These findings are consistent with recent nursing-focused studies highlighting AI's role in early warning systems, workload management, patient monitoring, and competency-based education [23,24]. Moderate-to-high perceived benefit across these domains suggests readiness for targeted AI integration in nursing workflows, provided adequate training and organizational support are in place. In the same line, a recent Saudi systematic review study mentioned that there is a show a strong need for educational and training activities to improve nurses' knowledge and skills in using AI tools efficiently [23].

Significant associations were observed between perception and variables such as professional role, position, age, education level, experience, and department. Nurses in senior positions and those with greater clinical experience demonstrated higher perception levels, likely due to increased exposure to decision-support technologies and leadership responsibilities. Similar trends have been reported in Saudi nursing populations, emphasizing the role of experience and professional maturity in technology acceptance [15,25].

Limitations of the Study

This study has several limitations that should be acknowledged. First, the use of a convenience sampling method may limit the generalizability of the findings, as participants were not randomly selected and were recruited from only two governmental hospitals. Second, the sample included a higher proportion of nurses compared to physicians, which may have influenced the overall results, as perceptions and attitudes toward artificial intelligence may differ between professional groups. Third, data were collected using self-reported questionnaires, which may have introduced response bias, including social desirability bias or subjective interpretation of the items. Despite these limitations, the study provides valuable insights into healthcare providers' perceptions and attitudes toward artificial intelligence within the study context.

5. Conclusions

This study assesses the healthcare providers' (nurses and physician) perceptions and attitudes toward artificial intelligence (AI) applications in healthcare settings and analyze their correlation with sociodemographic characteristics. The findings revealed moderate to high levels of perception regarding AI utilization, accompanied by predominantly neutral attitudes, indicating cautious acceptance rather than resistance. As well as positive correlation between perception and attitude suggests that enhancing nurses' knowledge and practical engagement with AI may gradually shift attitudes from neutrality toward informed acceptance.

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Institutional Review Board Statement: Ethical approval for the study was obtained from the Committee of the Research and Studies Department at the Directorate of Health Affairs in Jeddah, under the oversight of the Institutional Review Board (IRB). The study was registered under number (IRB No: A01941 dated 2 June 2024).

Informed Consent Statement: Informed consent was obtained from participants on the questionnaire's front page, which outlined the study's objectives, methods, and assurances of no personal risk to participants. All collected data were treated with strict anonymity and confidentiality, used solely for research purposes, and securely stored to ensure privacy.

Data Availability Statement: The data utilized in this study are available upon request from the corresponding author. However, they are not publicly accessible to ensure privacy.

Public Involvement Statement: No public involvement in any aspect of this research.

Guidelines and Standards Statement: This manuscript was drafted in accordance with the STROBE Statement for cross-sectional research.

Use of Artificial Intelligence: AI-assisted tools, specifically ChatGPT-4o, were used solely to support language editing, improve clarity, and enhance the academic tone of the manuscript. These tools were not used to generate research data, perform data analysis, interpret results, or draw conclusions. All data interpretation, content accuracy, and critical analysis were conducted independently by the research team, who take full responsibility for the manuscript content.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

AI	Artificial Intelligence
ML	Mashine Learning
MOH	Ministry Of Health
AI	Artificial Intelligence

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